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CANADA—DEPARTMENT OF TRADE AND COMMERCE  
DOMINION BUREAU OF STATISTICS  
MINING, METALLURGICAL AND CHEMICAL BRANCH

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ANNUAL REPORT  
ON THE  
MINERAL PRODUCTION OF  
CANADA

DURING THE CALENDAR YEAR

1934

71

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1934

# 17670

## NOTES ON STATISTICS OF PRODUCTION

In the collection of production data, the Dominion Bureau of Statistics makes a division between primary and secondary production. In the first-named class, there are separate sections for the collection of statistics on (a) **Agricultural Products**, (b) **Furs**, (c) **Fish**, (d) **Forest Products**, (e) **Mineral Products**.

In the second are included (a) **Manufacturing** and (b) **Construction**.

**Manufacturing** is subdivided into nine groups of industries, producing concerns being classified according to the principal component material of their major products. For example, manufactures of leather goods are classified under "Animal Products"; the pulp and paper industry under "Wood and Paper," etc. An outline of the scheme of classification in use for manufacturing industries is given below:

Manufactures of—

- (1) **Vegetable Products**, including—Coffee and Spices; Cocoa and Chocolate; Preserved and Canned Products; Pickles, Vinegar and Cider; Flour and Cereals; Bread and other Bakery Products; Macaroni and Vermicelli; Distilled and Brewed Liquors and Wines; Rubber Products; Starch and Glucose; Sugar, Tobacco Products; Linseed Oil and Oil Cake.
- (2) **Animal Products**, including—Fish and Fish Products; Dairy Factory Products; Meat and Meat Products; Leather and Leather Products; Furs and Fur Products.
- (3) **Textiles and Textile Products**, including—Cotton Textiles (Cloth, Yarn, Thread and Waste); Woollen Textiles (Cloth, Yarn, Blankets, Felt, and Waste); Silk Products; Factory-Made Clothing; Carpets, Rugs and Mats; Cordage, Rope and Twine.
- (4) **Wood and Paper**, including—Pulp and Paper Mill Products; Paper Goods; Printing, Publishing and Lithographing; Saw and Planing Mill Products; Furniture; Carriages; Wagons and Sleighs; Wooden Containers; Woodenware; Turned Wood Products; and the Output of Similar Wood-Using Industries.
- (5) **Iron and Steel and Their Products**, including—Fig Iron and Ferro-Alloys; Steel and Rolled Products; Castings and Forgings; Boilers, Tanks and Engines; Farm Implements; Machinery; Automobiles; Auto Parts; Bicycles; Railway Rolling Stock; Wire and Wire Goods; Sheet Metal Products; Hardware, Tools and Cutlery; Bridge Building and Structural Steel Work; Miscellaneous Iron and Steel Products.
- (6) **Manufactures of Non-Ferrous Metal Products**, including—Aluminium Products; Brass and Copper Products; White Metal Alloys; Jewellery and Silverware; Electrical Apparatus and Supplies; Non-Ferrous Smelting and Refining; Miscellaneous Non-Ferrous Metal Products.
- (7) **Manufactures of the Non-Metallic Minerals**, including—Aerated Waters—Asbestos Products—Cement—Cement Products—Coke and Gas—Glass (blown, cut, ornamental, etc.)—Lime—Petroleum Products—Products from Domestic Clays—Products from Imported Clays—Salt—Sand—Lime Brick—Dressed Stone—Artificial Abrasives and Abrasive Products—Miscellaneous Non-Metallic Mineral Products, including (a) Artificial Graphite and Electrodes, (b) Gypsum Products, (c) Mica Products, (d) Miscellaneous Non-Metallic Mineral Products, n.e.s.
- (8) **Chemicals and Allied Products**, including Coal Tar Distillation; Acids, Alkalies, and Salts—Compressed Gases; Explosives, Ammunition and Fireworks; Fertilizers; Medicinal and Pharmaceutical Preparations; Paints, Pigments and Varnishes; Soaps, Cleaning Preparations and Washing Compounds—Toilet Preparations; Inks; Adhesives; Polishes and Dressings; Wood Distillation; Miscellaneous Chemical Products, including (a) Boiler Compounds, (b) Cellulose Products, (c) Insecticides, (d) Sweeping Compounds, (e) Disinfectants, (f) Matches, (g) Dyes and Colours, (h) Chemical Products, n.e.s.
- (9) **Miscellaneous Products**, including—Brooms and Brushes; Electric Light and Power; Musical Instruments, etc.

The statistics of manufactures are also classified according to the **use or purpose** of the end product as follows:—

- (1) **Food**, including—Breadstuffs; Fish; Nuts; Fruits and Vegetables; Meats, Milk Products; Oils and Fats; Sugar; Infusions; Miscellaneous.
- (2) **Drink and Tobacco**, including—Beverages, alcoholic; Beverages, non-alcoholic; Tobacco.
- (3) **Clothing**, including—Boots and Shoes; Fur Goods; Garments and Personal Furnishings; Gloves and Mitts; Hats and Caps; Knitted Goods; Waterproofs; Miscellaneous.
- (4) **Personal Utilities**, including—Jewellery and Time-Pieces; Recreational Supplies; Personal Utilities, n.e.s.
- (5) **House Furnishings**.
- (6) **Books and Stationery**.
- (7) **Vehicles and Vessels**.
- (8) **Producers' Materials**, including—Farm Materials; Manufacturers' Materials; Building Materials; General Materials.
- (9) **Industrial Equipment**, including—Farm Equipment; Manufacturing Equipment; Trading Equipment; Service Equipment; Light, Heat and Power Equipment; General Equipment.
- (10) **Miscellaneous**.



## PREFACE

This report on the Mineral Production of Canada is issued in continuance of the series of annual reports published first by the Geological Survey of Canada in 1886, later by the Mines Branch of the Department of Mines, and since 1921 by the Dominion Bureau of Statistics. It contains final data on the production of Canada's mines, together with details of capital employed in the mining industry, salaries and wages paid, the number of employees, the amount expended on fuel and power and the power producing equipment installed.

Tables of world production of the more important minerals and metals are included for the purpose of assisting those who may be making international studies and who may not have a reference library readily at hand.

Prior to 1931 it had always been the practice of the Bureau to evaluate gold at the standard price of \$20.671834 per fine ounce regardless of what might be defined as the normal fluctuations of foreign exchange. However, during the past four years, international events of great importance have resulted in a very pronounced increase in the price of gold. This price appears, at the present time, to have attained a temporary stability. For this reason the value of gold in this report, shown either separately or incorporated in the total value of Canadian mineral production, has been computed in Canadian funds. This new statistical procedure in the recording of gold values should be noted in making comparisons with corresponding data published in earlier reports.

In addition to this report the Bureau issues a preliminary report of mineral production about March 15th following the year to which it refers. Since the fuel problem is of major importance to Canada, a separate annual report and quarterly reports on coal statistics are published. Statistical bulletins on the production of Canada's principal minerals are issued monthly, and bulletins on various branches of the mining industry are published as the information becomes available.

As in former years, the Bureau has continued to co-operate with the provinces of Nova Scotia, New Brunswick, Saskatchewan, Alberta and British Columbia in the collection of coal statistics.

By arrangement, the Bureau and the Mines Departments of the provinces of Quebec, Ontario, Manitoba and British Columbia use joint forms in the collection of mineral statistics. This system is of considerable advantage to the operator, as he now has to file only one form in duplicate, and it also tends to greater comparability in Dominion and Provincial figures.

The cordial thanks of the Bureau are tendered to mine and smelter operators, to the Department of the Interior, to the Federal Department of Mines, to the Royal Canadian Mint and to the Imperial Institute, London, 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.

This report has been prepared under the direction of Mr. W. H. Losee, B.Sc., Chief of the Mining, Metallurgical and Chemical Branch, by Mr. R. J. McDowall, B.Sc., and Mr. B. R. Hayden, of the mineral division staff.

R. H. COATS,

Dominion Statistician.

DOMINION BUREAU OF STATISTICS,

OTTAWA, January 28, 1935.

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# DOMINION BUREAU OF STATISTICS

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## ANNUAL REPORT ON THE MINERAL PRODUCTION OF CANADA

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DURING THE CALENDAR YEAR 1934

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### CHAPTER ONE

**General Review.**—The year 1934 witnessed a distinct improvement in the Canadian mining industry; the value of the Dominion's mineral output for the twelve months totalled \$278,162,000 as compared with \$221,496,000 in 1933, or an increase of 25·6 per cent. Increases in value over the preceding year were recorded for each of the principal groups in the industry and included metals, fuels, clay products, structural materials and various other non-metallic minerals. The annual survey of mining operations in 1934 was particularly interesting in that several all-time high records were established in metal production and returns from the industry indicated a strong upward trend in employment, the monthly index increasing from 106·8 in January to 122·9 in December, the average for the year being 110·8 as compared with 97·5 for 1933.

Comprehensive data relating to mining in Canada were first collected in 1886 and progress in the industry since that time not only forms an important and interesting chapter in the history of the Canadian industry, but has established the Dominion in a position of world prominence as a producer of mineral wealth. In 1886 Canadian mineral production was evaluated at \$10,221,255 or \$2·23 per capita; a decade ago, in 1924, the total value had reached \$209,583,406 and by 1929 the all-time high records of \$310,850,246 and \$31·00 per capita were attained. Production in this latter year was followed by the world economic depression, with successive declines in the value of mineral output to \$191,228,225 in 1932. The 1934 production, representing a per capita value of \$25·67, is the second successive increase since 1932 and not only indicates the stability of this basic industry but emphasizes the ever-increasing status of Canadian mineral resources in the economic life of the nation.

The more important mineral products in 1934, in the order of their production value were: gold, coal, nickel, copper, zinc, natural gas, silver, platinum metals, cement, asbestos, stone, sand and gravel, petroleum, lime, clay products and salt. This list of sixteen products includes all that are \$1,000,000 or over in value and in the aggregate they comprise 95·2 per cent of the total recorded value of Canadian mineral production. In addition to these more important products, some 32 other minerals and metals were produced, including arsenic, bismuth, cadmium, radium and uranium, selenium, gypsum, graphite, mica, feldspar and several other metallic and non-metallic mine products.

Of the major mineral groups, metals continued to retain a predominant position in Canadian mineral production; the value of these in 1934 totalled \$194,110,968 or 69·8 per cent of the total mineral output. The value of gold production totalled \$102,536,553 in Canadian funds and constituted an all-time high record for the gold producing mines of Canada. The increase of approximately 67 per cent in the price of this precious metal since 1930 has been largely responsible for the almost continuous expansion in gold mining during recent years. Prospecting of areas considered as favourable for gold deposition and development and exploration of auriferous deposits were intensified in 1934 and several new gold properties brought into production. Of the total value of metal production during the year that of lead comprised approximately 4·35 per cent; zinc, 4·70 per cent; and silver, 4 per cent. The year under review saw a distinct



improvement in lead-zinc-silver production with the output of the first two metals being the highest ever recorded in the history of the Canadian mining industry. Silver production for the year realized an 8.1 per cent gain over 1933 and its value at \$7,790,840 reflects the 25.5 per cent increase in the price per ounce of fine silver over that for the preceding year. Copper output in 1934 at 364,761,062 pounds was the highest ever attained in the Dominion; the total value of production, however, as with lead and zinc, reflected the relatively low prices prevailing for base metals throughout the year. The 1934 production of nickel included the metal contained in matte exported, electrolytic nickel made at Port Colborne, Ontario, and nickel in oxides and salts produced in Canadian plants; the 1934 output of nickel was the highest on record, surpassing 1929, the previous high year, by 17 per cent. Of the total value of all metals produced in the Dominion throughout 1934, the value of nickel comprised 16.58 per cent, being surpassed only by that of gold. Canadian mineral deposits yielded, in 1934, 200,162 fine ounces of platinum, palladium and other platinum group metals evaluated at \$6,190,045; these figures represent an increase over the preceding year of 258.7 per cent in quantity and 312 per cent in value and constitute an all-time high record for the production of these metals in Canada.

The almost general recovery experienced throughout the industry in 1934 was reflected in an increase in the total value of production of the non-metallic minerals and structural materials. The value of fuels increased from \$47,778,436 in 1933 to \$54,262,099 in 1934, with increases in value recorded for coal, natural gas, peat and petroleum. Coal production in Canada during 1934 advanced to 13,810,193 tons worth \$42,045,942 from the 1933 total of 11,903,344 tons valued at \$35,923,962. The 1934 output included 10,058,782 tons of bituminous coal, 537,508 tons of sub-bituminous, and 3,213,903 tons of lignite. Imports of coal into Canada in 1934 reached a total of 13,813,657 tons as compared with 11,465,976 tons imported in the preceding year. Anthracite coal imported in 1934 totalled 3,537,309 tons, of which Great Britain supplied 1,643,516 tons; the United States, 1,804,127 tons; Germany, 72,103 tons; Belgium, 17,557 tons, and Newfoundland, 6 tons. The continued assistance given by the Dominion Government was, to a large extent, responsible for the increased sales of Canadian coal in these highly competitive Canadian markets. During the year under review 2,368,803 short tons of Canadian coal were moved under Dominion Government assistance as compared with 1,932,711 tons in 1933. The Canadian consumption of fuel oil in 1934 totalled 400.7 million gallons and of gas oils, 102.3 million imperial gallons; in 1933 fuel oil consumption amounted to 389.8 million gallons and gas oils, 91.9 million imperial gallons. Production of crude petroleum in 1934 totalled 1,410,895 barrels valued at \$3,449,162 as against 1,145,333 barrels worth \$3,138,791 in 1933.

The improvement in those industries producing talc, diatomite and various other non-metallic minerals, other than fuels, and structural materials, while not so pronounced as for some of the other major groups, was distinct; relatively slight declines in value recorded for asbestos and various other minerals in this classification were more than offset by increases realized for such important products as salt, gypsum, graphite and feldspar. The value of clay products, comprising the various types of brick, sewer pipe, clays, etc., totalled \$2,680,410 as compared with \$2,262,835 in 1933; this increase, although modest, is encouraging in that it signifies a definite advance in the ceramic industries. Production by that group of industries producing cement, lime, sand and gravel and stone was valued at \$16,606,351 in 1934 as compared with \$14,433,852 for the preceding year; the combined value of output by these producers had suffered successive decreases from a total of \$44,630,191 in 1929 and the improvement in 1934 would suggest a widespread revival in construction and building activities.

Ontario continued as the premier mineral producing province of the Dominion. In 1934 the value of minerals produced in this province totalled \$145,565,871 or 52.3 per cent of the total Canadian output; British Columbia occupied second position with a production valued at \$41,206,965, and the other provinces and territories, in the order of their production, ranked as follows: Quebec, Nova Scotia, Alberta, Manitoba, Saskatchewan, New Brunswick, Yukon and Northwest Territories. It is particularly interesting to note a considerable increase in prospecting and exploration of mineral-bearing areas in Saskatchewan and the Northwest Territories; these activities resulted in 1934 in the partial development of certain gold-bearing deposits that are now considered of possible economic importance.

The complete statistical survey of the entire Canadian mining industry established the fact that operating mines, smelters, refineries, oil and gas fields, clay products plants, cement mills, sand and gravel properties, and stone quarries represented a total capital investment of \$831,023,187



in 1934. The survey conducted by the Bureau covered the operations of 11,652 mines, quarries, smelters, etc. Returns made by the industry show that 73,505 persons were employed in the various spheres of mining, an increase of 16.1 per cent over 1933; employees in 1934 received a total of \$88,126,186 in salaries and wages compared with \$70,031,805 in 1933 and \$71,772,049 in 1932. Net sales of mineral products amounted to \$266,652,847. This value is 20.4 per cent in excess of 1933 and represents the proceeds from sales and includes the value added by smelting operations. It is emphasized that this figure should not be confused by comparison with the value of Canadian mineral production for 1934 as shown in table 2, which figure, amounting to \$278,161,590, includes the value of the metals computed at average prices in a recognized world market, together with the reported value of sales of non-metals and structural materials.

Producers of primary base metals in 1934 continued to experience exceptionally low prices for their products. Transposed into Canadian funds the average price of copper based on the London market was 7.4548 cents per pound in 1933 and 7.4193 cents in 1934; the average price of lead based on the same market was 2.3916 cents per pound in 1933 and 2.4364 cents in 1934; the average price of zinc in Canadian funds based on the London market was 3.2105 cents per pound in 1933 and in 1934, 3.0436 cents per pound. The low level of base metal prices was partially compensated for by increases in those of various precious metals. The average world market price of an ounce of fine gold, expressed in Canadian funds, was computed at \$34.50 in 1934 as compared with \$28.60 in the preceding year and \$20.67 the standard price in 1930. The average price of silver in Canadian funds based on the New York market was 37.8328 cents per fine ounce in 1933 and in 1934 it had increased to 47.4609 cents, the highest value for the metal since 1929.

The almost general improvement in the mining industry was strongly reflected in the foreign trade returns relating to the export of Canadian mine products; the value of exports of the non-ferrous metals and their products were evaluated at \$93,677,123 in 1934 as compared with \$69,340,625 in the preceding year, or an advance of 35.1 per cent. Some of the more outstanding increases in exports under this classification included a 27.1 per cent gain for aluminium and its products; 37.8 per cent for copper and its products; 10.7 per cent for lead and its products; 26.8 per cent for nickel and its products; 343.8 per cent for primary platinum; 31.2 per cent for silver bullion; 48.7 per cent for zinc and its products, and 62.5 per cent for gold bullion. The penetration of Canadian mine products into the various markets of the world is better appreciated in a study of the destinations of exports as recorded by the Department of National Revenue. In 1934 destination of Canadian copper and its products included the United Kingdom, France, Germany, Belgium, Denmark, British India, Italy, Japan, Brazil, Argentina, Australia and New Zealand, and it is noteworthy that of the total value of the 1934 copper exports, \$14,969,009 or 64.2 per cent went to the United Kingdom and \$3,045,919 or 13.1 per cent to the United States, whereas in 1931 the corresponding exports to the United Kingdom were valued at only \$1,961,794 or 11.4 per cent of the total exports while those to the United States amounted to \$13,652,932 or 79.6 per cent. The United States continues to remain the greatest market for Canadian nickel, this country receiving in 1934 Canadian nickel or its products valued at \$12,080,198 or 41.8 per cent of the total Canadian nickel exports; the United Kingdom nickel imports from Canada amounted to \$10,087,351 in 1934, while the balance of Canadian nickel went to Germany, France, Italy, Japan, and various other countries. Of Canadian gold bullion exported in 1934, \$69,469,563 was shipped to the United States and \$21,545,438 to the United Kingdom, compared with \$40,804,715 to the United Kingdom and \$15,197,546 to the United States in 1933.

Exports of the non-metallic minerals and their products increased 18.4 per cent from a value of \$13,308,957 in 1933 to \$15,758,171 in 1934. In this group the value of asbestos and asbestos products exports increased from \$5,062,838 in 1933 to \$5,270,322 in 1934; shipments of this well-known Canadian mineral in 1934 went largely to the United States, Japan, Germany, United Kingdom, and France, with lesser quantities to various other countries; the value of exports of coal and its products totalled \$2,585,456 as compared with \$1,998,546 in the preceding year; graphite shipments to foreign countries showed an advance from \$40,115 in 1933 to \$90,129 in 1934, an increase of 124.7 per cent; improvement in industrial conditions, especially in the United States and the United Kingdom, was largely responsible for an increase in the value of Canadian mica exports from \$46,213 in 1933 to \$117,802 in 1934, or an increase of 154.9 per cent and the value of gypsum exports rose from \$344,085 in 1933 to \$413,961 for the year under review.

Legislation of great importance to the gold mining industry was enacted by the Canadian Federal Government in 1934 when the special war Revenue Act was amended in April to provide for a tax on newly mined Canadian gold. It was felt that the unusually prosperous condition of the gold mining industry, due to the rise in the price of gold from \$20.67 per ounce to about \$35.00 per ounce, provided a basis for this gold tax. In the budget speech of March, 22, 1935, the Minister of Finance stated that the gold bullion tax would not be continued after May 31, 1935, and that in future the allowance for depletion to mining companies, the principal product of which is gold or silver, is to be 33½ per cent instead of 50 per cent. Furthermore, dividends received by shareholders are now to be taxed on the basis of a 20 per cent depletion allowance instead of 50 per cent as formerly. With the opening of the Bank of Canada on March 11, 1935, important changes took place in connection with the monetary gold reserves of the Dominion. The Dominion transferred the gold held against Dominion notes to the Bank of Canada to an amount of \$69,455,439. The Dominion's liability for Dominion notes outstanding was assumed by the Bank of Canada. Silver also held by the government was transferred to the Bank of Canada.

A statistical survey to determine the value of consumable stores and equipment purchased and expenditures for freight and insurance, by the Canadian mining and non-ferrous metallurgical industries was recently conducted by the Bureau of Statistics. This survey revealed that the total value of purchases by the industry in 1934, as computed from returns made available, amounted to \$76,083,000. The survey covered the major groups of the mining industry, including metal mining, smelting and refining of non-ferrous ores; non-metallic mineral mining, including coal, petroleum and natural gas production, and, to a lesser extent, the stone, lime and other structural materials industries.

Table 1.—Mineral Production of Canada, by Provinces, 1934 (¹)

	Nova Scotia	New Brunswick	Quebec	Ontario	Mani- toba	Saskat- chewan	Alberta	British Columbia	Yukon*	Canada
<b>METALLICS</b>										
Arsenic (As₂O₃)										
lb.				1,647,513						1,647,513
\$				56,412						56,412
Bismuth				7,552				246,092		253,644
lb.				3,444				297,771		301,215
\$								95,665		95,665
Cadmium										
lb.										
\$										
Chromite			71	40						111
ton			1,098	594,671						1,578
\$				592,497						594,671
Cobalt										
lb.										
\$										
Copper			73,968,545	205,059,530	30,867,141	6,618,913		48,246,924		364,761,062
lb.			5,487,948	14,822,704	2,200,126	491,077		3,579,583		26,671,438
\$			3,525	2,105,339	132,321	5,405	393	296,196	38,798	2,972,074
Gold, fine oz.	72,868		8,064,020	43,521,218	2,735,318	111,731	8,124	6,122,915	802,026	61,438,220
Estimated ex- change equa- lization on gold pro- duced	48,745		5,394,327	29,112,977	1,829,757	74,741	5,434	4,095,847	536,505	41,698,333
\$				21,558				344,467,138	1,780,880	346,275,576
Lead				525				8,392,597	43,536	8,436,658
lb.				128,687,340						128,687,340
\$				32,139,425						32,139,425
Nickel										
lb.										
\$										
Palladium, Rhodium, Iridium, etc.										
fine oz.				83,932						83,932
\$				1,699,282						1,699,282
Platinum, fine oz.				116,177					53	116,230
\$				4,488,712				2,051		4,490,763
Radium and uranium (products)										
lb.										
\$										
Selenium										
lb.				48,764	51,574	4,127	450			104,924
\$				73,146	91,280	6,190	689			171,311
Silver, fine oz.	321		470,254	5,321,160	1,252,920	87,551	35	8,729,721	553,320	16,415,282
\$	152		223,187	2,525,470	594,647	41,552	17	4,143,204	262,611	7,790,840

\* Includes silver, lead and petroleum produced in the Northwest Territories.

¹ Unless otherwise noted all total values of mineral production from 1931 to 1934, inclusive, include estimated exchange equalization on gold produced.

Table 1.—Mineral Production of Canada, by Provinces, 1934—Continued

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Canada
<b>METALLIC—Conc.</b>										
Tellurium... lb.				5,130						5,130
\$				25,599						25,599
Titanium ore ton			2,023							2,023
\$			14,161							14,161
Zinc... lb.					47,264,342	2,162,638		249,182,403		298,579,683
\$					1,438,538	65,831		7,583,202		9,087,571
<b>Total</b> \$	<b>121,765</b>		<b>19,257,887</b>	<b>129,668,031</b>	<b>8,894,576</b>	<b>785,621</b>	<b>13,575</b>	<b>24,312,835</b>	<b>1,644,678</b>	<b>194,110,968</b>
<b>NON-METALLIC FUELS</b>										
Coal... ton	6,341,625	314,750			4,113	909,288	4,753,810	1,485,969	638	13,810,193
\$	21,860,093	1,026,343			8,952	1,241,130	12,556,099	5,351,108	2,217	42,645,942
Natural M cu.ft.		625,601		7,682,851	600	13,781	14,841,491			23,161,324
gas, \$		306,005		4,741,368	180	4,823	3,707,276			8,759,652
Peat... ton				1,878						1,878
\$				7,343						7,343
Petroleum bbl.		11,106		141,385			1,253,966		4,438	1,410,895
crude, \$		22,277		299,874			3,104,823		22,188	3,449,162
<b>Total</b> \$	<b>21,860,093</b>	<b>1,354,625</b>		<b>5,048,585</b>	<b>9,132</b>	<b>1,245,953</b>	<b>19,368,198</b>	<b>5,351,108</b>	<b>24,465</b>	<b>54,267,099</b>
<b>OTHER NON-METALLICS</b>										
Actinolite... ton				30						30
\$				365						365
Asbestos... ton			155,980							155,980
\$			4,936,326							4,936,326
Barytes... ton										
\$										
Bituminous ton							862			862
sands, \$							3,449			3,449
Diatomite... ton	1,320			46				8		1,372
\$	52,800			1,920				190		54,910
Feldspar... ton			9,207	7,302	1,793					18,302
\$			78,553	61,065	6,763					147,281
Fluorspar... ton				150						150
\$				2,100						2,100
Graphite... ton			129	1,389						1,518
\$			6,426	64,998						71,424
Grindstones (includes pulpetones, etc.)... ton										
\$										
Gypsum... ton	50	535						402		987
\$	1,762	27,091						17,625		46,478
Iron oxides ton	378,287	30,398		33,234	9,657			9,661		461,237
(ochre), \$	488,044	104,709		141,389	81,553			48,081		863,776
Magnesitic dolomite \$										
Magnesium ton										
sulphate, \$										
Mica... lb.			643,967	1,230,302				115,000		1,995,269
\$			85,967	9,059				2,045		97,071
Mineral imp. gal.			75,665	21,775						97,440
waters, \$			16,116	1,622						17,738
Phosphate... ton			81							81
\$			683							683
Quartz... ton	7,292		57,208	89,838	931	92,447		24,847		272,563
\$	12,107		229,817	134,572	3,031	88,748		13,990		482,265
Salt... ton	42,886			276,751	1,664	452				321,753
\$	191,017			1,734,196	20,137	8,703				1,954,953
Silica brick, M	2,159			369						2,528
\$	71,215			14,730						85,945
Soapstone... \$			44,297							44,297
Sodium ton										
carbonate, \$								244		244
Sodium ton								1,920		1,920
sulphate, \$						66,821				66,821
Sulphur (f), ton			4,908	14,598		587,986				597,966
\$			50,398	145,080				32,031		51,537
Talc... ton				13,934				319,124		515,502
\$				135,978				25		13,959
Volcanic ton								502		136,480
dust, \$							1	30		31
\$							20	600		620
<b>Total</b> \$	<b>817,845</b>	<b>131,800</b>	<b>5,806,376</b>	<b>2,448,574</b>	<b>111,484</b>	<b>685,457</b>	<b>3,449</b>	<b>406,777</b>		<b>10,501,762</b>

(†) Sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid made from waste smelter gases.



Table 1.—Mineral Production of Canada, by Provinces, 1934—Concluded

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon*	Canada
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS</b>										
<b>Clay Products</b>										
<b>Brick—</b>										
Soft mud process—										
Face.... M	40		1,000	3,514	350					4,904
\$	800		7,000	64,642	4,005					76,247
Common. M	500	1,500	1,580	7,193	1,634	20	763	1,066		14,256
\$	5,000	19,399	13,349	96,770	25,334	325	9,178	14,224		183,585
Stiff mud process (wire cut)—										
Face.... M	545	267	7,637	15,060	160	12	87	32		23,860
\$	11,863	6,846	157,078	311,490	4,224	382	1,601	857		491,311
Common. M	2,695	141	18,404	6,876		173	829	1,199		30,317
\$	32,924	2,239	267,622	97,323		1,936	6,189	15,898		421,131
Dry press—										
Face.... M			610	4,836		47	374	138		6,065
\$			15,951	103,718		1,290	3,857	5,576		130,392
Common. M				2,046		13	3,828	553		6,440
\$				33,177		243	26,937	6,259		66,616
Fancy or ornamental brick... M				14			29			43
\$				835			1,790			2,625
Sewer brick... M				307						367
\$				5,992						5,992
Paving brick... M								10		10
\$								382		382
Firebrick... M						558	13	1,536		2,109
\$						28,337	882	71,896		101,219
Fireclay.... ton	24	15				441	50	513		1,043
\$	230	601				3,322	708	7,737		12,598
Knolin.... ton			48							48
\$			504							504
Fireclay blocks and shapes... \$	367					52,276		9,745		62,388
Structural tile—										
Hollow blocks... ton	1,068	151	13,668	13,576	158	4	1,436	1,075		31,136
\$	10,955	1,276	107,675	102,243	1,941	45	10,438	9,549		244,122
Roofing tile... No.				44,115						44,115
\$				1,852						1,852
Floor tile (quarries) sq. ft.				77,604			2,752			80,356
\$				16,886			605			17,491
Drain tile. M	96	3	540	6,017	41		48	580		7,325
\$	3,179	442	14,191	137,699	2,412		2,144	20,786		180,553
Sewer pipe, copings, flue linings, etc... \$	91,724		48,952	226,005			47,763	21,989		436,433
Pottery, glazed or unglazed... \$		29,394		52,578			134,585	7,176		223,733
Bentonite... ton							63			63
\$							1,578			1,578
Other clay products... \$	310			9,790		2,641		881		13,628
<b>Total.... \$</b>	<b>157,158</b>	<b>59,897</b>	<b>632,322</b>	<b>1,261,006</b>	<b>37,916</b>	<b>90,997</b>	<b>246,677</b>	<b>191,437</b>		<b>2,698,410</b>
<b>OTHER STRUCTURAL MATERIALS†</b>										
Cement.... bbl			1,613,641	1,702,128	181,166		163,046	122,345		3,783,226
\$			2,294,847	2,403,590	411,247		326,253	232,009		5,667,916
Lime.... ton	8,920	15,752	108,690	191,041	16,568		7,455	19,687		368,113
\$	67,954	126,409	631,984	1,536,289	163,608		65,097	153,856		2,745,797
Sand and gravel.... ton	256,572	568,064	3,672,582	7,880,959	334,026	533,575	650,232	958,149		14,851,159
\$	114,597	322,238	980,454	1,821,689	95,426	169,033	196,808	335,142		4,035,477
Slate.... ton			306	120				312		738
\$			458	600				3,748		4,802
Stone.... ton	123,068	37,918	1,199,152	2,460,300	43,127		2,737	210,714		4,077,016
\$	171,317	161,182	1,575,617	1,965,507	53,545		8,104	217,057		4,152,329
<b>Total.... \$</b>	<b>353,868</b>	<b>609,829</b>	<b>5,483,360</b>	<b>7,727,675</b>	<b>723,826</b>	<b>169,633</b>	<b>596,952</b>	<b>941,808</b>		<b>16,606,351</b>
<b>Grand Total (In Canadian Funds).... \$</b>	<b>21,310,729</b>	<b>2,156,151</b>	<b>31,269,945</b>	<b>145,565,871</b>	<b>9,776,931</b>	<b>2,977,061</b>	<b>20,228,851</b>	<b>41,206,965</b>	<b>1,669,083</b>	<b>278,161,590</b>

\* See footnote page 8.

† For non structural uses of lime and stone see chapter 9.



Table 2.—Quantities and Values of Mineral Products from Canadian Sources, 1933 and 1934 <sup>(1)</sup>

		1933		1934		Per cent Increase (+) or Decrease (-)	
		Quantity	Value	Quantity	Value	Quantity	Value
METALLICS			\$		\$		\$
Arsenic (As <sub>2</sub> O <sub>3</sub> )	lb.	1,468,022	56,534	1,647,513	56,412	+ 12.2	- 0.2
Bismuth	lb.	78,303	81,526	253,644	301,215	+ 223.9	+ 269.5
Cadmium			78,733		95,665		+ 21.5
Chromite	tons	30	343	111	1,578	+ 270.0	+ 360.0
Cobalt	lb.	466,702	597,752	594,671	592,497	+ 27.4	- 0.9
Copper	lb.	299,982,448	21,634,853	364,761,062	26,671,438	+ 21.6	+ 23.3
Gold	fine oz.	2,949,309	60,967,626	2,972,074	61,438,220	+ 0.8	+ 0.8
Estimated exchange equalization paid for gold produced			23,382,611		41,098,333		+ 75.8
Lead	lb.	266,475,191	6,372,998	346,275,576	8,436,658	+ 29.9	+ 32.4
Manganese ore	tons						
Molybdenite	lb.						
Nickel	lb.	83,264,658	20,130,480	128,687,340	32,139,425	+ 54.6	+ 59.7
Palladium, Rhodium, Iridium, etc.	fine oz.	31,009	645,043	83,932	1,699,282	+ 170.7	+ 163.4
Platinum	fine oz.	24,786	857,590	116,230	4,490,763	+ 368.9	+ 423.6
Radium and Uranium			Data not available for publication.				
Selenium	lb.	48,221	70,345	104,924	171,311	+ 117.6	+ 143.5
Silver	fine oz.	15,187,950	5,746,027	16,415,282	7,790,840	+ 8.1	+ 35.6
Tellurium	lb.		5,130		25,599		
Titanium ore	tons		2,023		14,161		
Zinc	lb.	199,131,984	6,493,132	208,579,683	9,087,571	+ 49.9	+ 42.2
Total	\$		147,015,593		194,110,968		+ 32.0
NON-METALLICS—FUELS							
Coal	tons	11,003,344	35,923,962	13,810,193	42,045,942	+ 18.0	+ 17.0
Natural gas	M cu. ft.	23,138,103	8,712,234	23,164,324	8,759,652	+ 0.1	+ 0.5
Peat	tons	1,131	3,449	1,878	7,343	+ 66.0	+ 112.9
Petroleum, crude	brls.	1,145,333	3,138,791	1,410,895	3,449,162	+ 23.2	+ 99.9
Total	\$		47,778,436		54,262,699		+ 13.6
OTHER NON-METALLICS							
Actinolite	tons			30	365		
Asbestos	tons	158,367	5,211,177	155,980	4,936,326	- 1.5	- 5.3
Barytes	tons	20	60				
Bituminous sands	tons	466	1,662	862	3,449	+ 85.0	+ 107.5
Diatomite	tons	1,789	36,648	1,372	54,910	+ 23.3	+ 49.8
Feldspar	tons	10,658	105,117	18,302	147,281	+ 71.7	+ 40.1
Fluor-spar	tons	73	1,064	150	2,100	+ 105.5	+ 97.4
Graphite	tons	405	18,367	1,518	71,424	+ 274.8	+ 288.9
Graustones†	tons	498	21,919	987	46,478	+ 98.2	+ 112.0
Gypsum	tons	382,736	675,822	461,237	863,776	+ 20.5	+ 27.8
Iron oxides (ochres)	tons	4,357	53,450	4,959	66,166	+ 13.8	+ 23.8
Magnesian dolomite			360,128		382,927		+ 6.3
Magnesium sulphate	tons	120	3,360	42	1,100	- 65.0	- 67.3
Mica	tons	944	49,284	998	97,071	+ 5.7	+ 97.0
Mineral waters	imp. gal.	38,818	5,441	97,440	17,738	+ 151.0	+ 226.0
Phosphate	tons	2,214	5,475	81	683	- 96.3	- 87.6
Quartz	tons	185,783	297,820	272,563	482,265	+ 46.7	+ 61.9
Salt	tons	280,115	1,939,874	321,753	1,954,953	+ 14.9	+ 0.8
Slip brick	M	636	23,185	2,528	85,945	+ 297.5	+ 270.7
Soapstone			47,680		44,297		- 7.1
Sodium carbonate	tons	559	5,773	244	1,920	- 56.4	- 66.7
Sodium sulphate	tons	50,080	485,416	66,821	587,986	+ 33.4	+ 21.1
Sulphur*	tons	57,373	510,299	51,537	515,502	- 10.2	+ 1.0
Talc	tons	15,181	143,156	13,959	136,480	- 8.0	- 4.7
Volcanic dust	tons	118	2,360	31	620	- 73.7	- 73.7
Total	\$		10,004,537		10,591,762		+ 5.9
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Brick—Soft mud process	Face	2,482	41,737	4,904	76,247	+ 97.6	+ 82.7
	Common	12,389	156,769	14,256	183,585	+ 15.1	+ 17.1
Stiff mud process	Face	19,602	412,367	23,800	494,341	+ 21.4	+ 20.0
	Common	23,894	356,498	30,317	424,131	+ 26.9	+ 19.0
Dry press	Face	4,544	101,252	6,005	130,392	+ 32.2	+ 28.8
	Common	3,916	44,377	6,440	66,616	+ 64.5	+ 50.1
Fancy or ornamental brick	M	630	7,824	43	2,625	- 93.2	- 66.4
Sewer brick	M	243	3,693	307	5,992	+ 26.3	+ 62.3
Paving brick	M	1	42	10	382	+ 900.0	+ 809.5
Firebrick	M	1,547	73,226	2,109	101,219	+ 36.3	+ 38.2

(1) Unless otherwise noted, all total values of mineral production from 1931 to 1934, inclusive, include estimated exchange equalization on gold produced.

† Includes grindstones, soapstones and saw stones.

\* Sulphur content of pyrites shipped and estimated sulphur contained in the sulphuric acid made from smelter gas.

Table 2.—Quantities and Values of Mineral Products from Canadian Sources, 1933 and 1934—Concluded

		1933		1934		Per cent Increase (+) or Decrease (-)	
		Quantity	Value	Quantity	Value	Quantity	Value
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—Concluded			\$		\$		\$
Fireclay and other clay.....	tons	1,421	11,273	1,043	12,598	- 20.6	+ 11.8
Refin.....	tons			48	504		
Fireclay blocks and shapes.....			80,625		62,388		- 22.6
Hollow blocks.....	tons	26,747	160,059	31,136	244,122	+ 16.4	+ 52.5
Roofing tile.....	No.	20,469	1,136	44,115	1,852	+ 115.5	+ 63.0
Floor tile (quarries).....	sq. ft.	91,495	14,297	80,356	17,491	- 12.2	+ 22.3
Down tile.....	M	10,057	222,829	7,325	180,553	- 27.2	- 19.0
Sewer pipe, copings, flue linings, etc.....			354,458		436,433		+ 23.1
Pottery, glazed or unglazed.....			202,500		223,733		+ 10.5
Bentonite.....	tons	55	1,363	63	1,578	+ 14.5	+ 15.8
Other clay products.....			16,510		13,628		- 17.5
Total.....	\$		2,262,935		2,680,410		+ 18.5
Cement.....	brls	3,007,432	4,536,935	3,783,226	5,667,946	+ 25.8	+ 24.9
Lime.....	tons	323,540	2,432,306	368,113	2,745,797	+ 13.8	+ 12.9
Sand and gravel.....	tons	11,738,823	4,464,285	14,854,159	4,035,477	+ 26.5	- 9.6
Slate.....	tons	250	3,750	738	4,802	+ 195.2	+ 28.1
Stone—							
Granite.....	tons	256,723	679,585	200,285	781,739	- 22.0	+ 15.0
Limestone.....	tons	2,572,911	2,142,516	3,747,779	3,157,832	+ 45.7	+ 47.4
Marble.....	tons	10,897	65,913	13,783	69,475	+ 26.5	+ 5.4
Sandstone.....	tons	99,043	108,562	115,169	143,283	+ 16.3	+ 32.0
Total.....	\$		14,433,852		16,696,351		+ 15.1
Grand Total (Canadian Funds)....	\$		221,495,253		278,161,590		+ 25.6

Prices: Higher prices for metals of the non-metallic and the iron and steel products groups were responsible for the index of articles of mineral origin—raw and partly manufactured—rising from 75.6 in 1933 to 77.5 in 1934. Although gains were recorded for antimony, silver, and tin in the non-ferrous series, these were offset by losses for copper, lead and zinc, and the index for this sub-group remained unchanged at 64.3. Articles, raw and partly manufactured of mineral origin, followed practically the same course as the index for Iron and Its Products. It rose from 77.9 in January to a high for the year of 78.0 in February and continued generally downward to 77.8 in December. Non-metallics reached a high of 86.2 in February and by December had receded to 86.1 as compared with 86.0 in January. Non-ferrous metals dropped steadily from 67.0 in January to 62.1 in September and then moved gradually up to 63.7 in December.

Electrolytic domestic copper averaged \$8.22 in 1934, as against \$8.68 per 100 pounds, carlots, f.o.b. Montreal in 1933. Quoted on the same basis, lead declined from \$3.71 in 1933 to \$3.41 in 1934 and zinc from \$4.49 to \$4.06. Fine silver, at New York, rose from 37.6c. to 47.4c. per ounce (Canadian funds). Tin ingots, Straits, f.o.b. Toronto advanced from 45.7c. to 56.9c. per pound.

There were marked gains in quotations for scrap iron and steel. No. 1 scrap steel, charging box size, changed from \$6.88 to \$9.21 per gross ton delivered at Canadian consuming mill. No. 1 machinery cast iron was \$2.25 higher at \$9.83 per gross ton, delivered at Canadian foundry.

The major price changes in the non-metallic group were recorded for coal, and petroleum products. Imported United States bituminous run of mine rose from \$5.35 to \$5.73 and slack from \$4.85 to \$5.13 per ton ex yard, Montreal. Gasolene prices per gallon, tank wagon basis, at specified cities for 1933 and 1934 were as follows:—Montreal, 16.8c. and 18.0c.; Toronto, 17.3c. and 16.3c.; Winnipeg, 19.8c. and 21.7c.; and Calgary, 20.9c. and 22.5c. respectively.

(Internal Trade Branch—Dominion Bureau of Statistics)

Table 3.—Exchange Quotations at Montreal, 1934

	New York funds	London Sterling 4-8666	France Franc -0392	Germany Reischmark -2382	Italy Lira -0526	Japan Yen -4985
January .....	1-0047	5 0702	-0625	-3781	-0839	-3046
February .....	1-0084	5 0777	-0652	-3931	-0869	-3022
March .....	1-0022	5-1065	-0660	-3978	-0861	-3019
April .....	.9979	5-1476	-0661	-3954	-0856	-3039
May .....	.9982	5-1002	-0661	-3942	-0852	-3030
June .....	.9922	5 0122	-0656	-3813	-0855	-2980
July .....	.9883	4 9851	-0652	-3818	-0849	-2959
August .....	.9769	4 9509	-0651	-3862	-0848	-2943
September .....	.9714	4 8551	-0649	-3917	-0845	-2904
October .....	.9791	4 8431	-0649	-3964	-0844	-2822
November .....	.9761	4-8724	-0644	-3925	-0835	-2846
December .....	.9878	4-8865	-0652	-3970	-0844	-2855

NOTE.—The nominal closing quotations in Canadian funds upon which these averages are based have been supplied by the Bank of Montreal.

Table 4.—Metal Prices, 1930-1934

Metal	Market	Unit	1930	1931	1932	1933	1934
			\$	\$	\$	\$	\$
Antimony (ordinaries) .....	New York	Pound	0-07667	0-06720	0-05592	0-06528	0-08901
Arsenic, white .....	New York	Pound	0-04	0-045	0-04	0-04	0-04
Cobalt .....	New York	Pound	2-50	2-50	2-50	2-80	2-50
Cobalt oxide .....	New York	Pound	2-00	1-75	1-35	1-35	1-35
	New York	Pound	0-12982	0-08116	0-05555	0-07025	0-08428
Copper .....	Montreal	Pound	0-1498	0-10006	0-07516	0-08884	0-0822
	London	Long ton	61-528	42-093	35-962	36-359	33-319
Gold (in Canadian funds) .....		Fine oz	20-67	21-55	23-48	28-60	34-50
	New York	Pound	0-05517	0-04243	0-03180	0-03869	0-03860
Lead .....	Montreal	Pound	0-05496	0-04168	0-03511	0-03705	0-04488
	London	Long ton	18-007	12-958	11-913	11-670	10-935
Nickel .....	New York	Pound	0-36	0-36	0-35	0-35	0-35
Platinum .....	London	Fine oz	45-358	35-665	*10-104	7-630	7-75
Silver .....	New York	Fine oz	0-38154	0-287	0-27892	0-34727	0-47973
Tin .....	New York	Pound	0-31694	0-24467	0-22017	0-39110	0-52191
	St. Louis	Pound	0-04556	0-0364	0-02870	0-04029	0-04158
Zinc .....	Montreal	Pound	0-05084	0-03961	0-03724	0-04488	0-04059
	London	Long ton	16-570	12-215	13-545	15-666	13-657

\* All prices in dollars per unit excepting London copper, lead and zinc prices, which are quoted in £ sterling per long ton, and from 1932 the price of platinum is quoted in £ sterling per fine ounce.

Table 5.—Annual Values of the Mineral Production of Canada, 1925-1934

Year	Value of production	Value per capita	Year	Value of production	Value per capita
	\$	\$		\$	\$
1925 .....	226,583,333	24-38	1930 .....	279,873,578	27-42
1926 .....	240,437,123	25-44	1931 .....	230,434,726	22-21
1927 .....	247,356,695	25-67	1932 .....	191,228,225	18-20
1928 .....	274,989,487	27-96	1933 .....	221,495,253	20-74
1929 .....	310,850,246	31-00	1934 .....	278,161,590	25-67

NOTE.—For years 1886 to 1924 see previous reports.

Table 6.—Annual Values of the Mineral Production of Canada, by Classes, 1925-1934

Year	Metallics	Non- metallics, including fuels	Clay products and other structural materials	Total
	\$	\$	\$	\$
1925 .....	117,082,298	71,851,801	37,649,234	226,583,333
1926 .....	115,237,581	85,240,144	39,959,398	240,437,123
1927 .....	113,561,030	88,986,246	44,809,419	247,356,695
1928 .....	132,012,454	93,239,852	49,737,181	274,989,487
1929 .....	154,454,056	97,861,356	58,534,834	310,850,246
1930 .....	142,743,764	83,402,349	53,727,465	279,873,578
1931 .....	120,930,147	65,346,284	44,158,295	230,434,726
1932 .....	112,041,763	56,788,179	22,398,283	191,228,225
1933 .....	147,015,593	57,782,973	16,696,687	221,495,253
1934 .....	194,110,968	64,763,861	19,286,761	278,161,590

NOTE.—For years 1907-1924 see previous reports.

Table 7.—Values of the Mineral Production of Canada, by Provinces, 1925-1934

Year	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskat- chewan	Alberta	British Columbia	Yukon*
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1925	17,625,612	1,743,858	24,284,527	87,980,430	2,276,759	1,076,392	25,318,866	64,485,242	1,791,641
1926	28,873,792	1,811,104	25,956,193	84,702,296	3,073,528	1,193,394	26,977,027	65,622,976	2,226,813
1927	30,111,221	2,148,535	28,870,403	89,982,962	2,888,912	1,455,225	29,309,223	60,801,170	1,789,044
1928	30,524,392	2,198,919	37,037,420	99,584,718	4,186,853	1,719,461	32,531,416	64,496,351	2,709,957
1929	30,904,453	2,439,072	46,358,285	117,662,505	5,423,825	2,253,506	34,739,986	68,162,878	2,905,736
1930	27,019,367	2,383,571	41,215,220	113,530,976	5,453,182	2,368,612	30,427,742	54,953,320	2,521,588
1931	21,081,157	2,176,910	35,964,537	97,975,915	10,057,808	1,931,880	23,580,901	35,480,701	2,184,917
1932	16,201,279	2,223,505	25,638,466	85,910,030	9,058,365	1,681,728	21,174,061	27,326,173	2,014,618
1933	16,966,183	2,107,682	28,141,482	110,205,021	9,026,951	2,477,425	19,702,953	30,794,504	2,073,052
1934	23,310,729	2,156,151	31,269,945	145,565,871	9,776,934	2,977,061	20,228,851	41,206,965	1,669,083

NOTE.—For years 1899-1924 see previous reports.

\* Includes small production from the Northwest Territories since 1932.

Table 8.—Percentage of the Total Value of the Mineral Production of Canada, by Provinces, 1930-1934

Province	1930	1931	1932	1933	1934
Nova Scotia	9.65	9.24	8.9	7.7	8.4
New Brunswick	0.84	0.96	1.2	0.9	0.8
Quebec	14.73	15.65	13.4	12.7	11.2
Ontario	40.57	42.15	43.5	49.8	52.3
Manitoba	1.95	4.37	4.8	4.1	3.5
Saskatchewan	0.85	0.85	0.9	1.1	1.1
Alberta	10.87	10.34	11.6	8.9	7.3
British Columbia	19.64	15.50	14.7	13.9	14.8
*Yukon	0.90	0.94	1.0	0.9	0.6
<b>Canada</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

\* Includes small production from the Northwest Territories since 1932.

NOTE.—In the following provincial tables the value of gold includes the exchange equalization. For further information on the price of gold see Chapter II.

Table 9.—Mineral Production of Nova Scotia,\* 1932-1934

Product	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
<b>METALLICS—</b>						
Gold..... fine oz.	904	22,634	1,382	39,525	3,525	121,613
Silver..... fine oz.	47	15	104	39	321	152
Manganese ore..... tons						
<b>NON-METALLICS—</b>						
Barytes..... tons						
Coal..... tons	4,084,581	15,187,793	4,557,590	15,969,793	6,341,925	21,860,093
Diatomite..... tons	1,428	28,760	1,747	34,040	1,320	52,800
Grindstones..... tons	12	433	21	868	50	1,702
Gypsum..... tons	341,508	398,861	315,948	363,528	378,287	488,044
Quartz..... tons			1,017	1,447	7,292	12,107
Salt..... tons	31,897	150,708	34,278	161,889	42,886	191,917
Silica brick..... M			453	15,834	2,159	71,215
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>						
Clay products.....		172,557		125,500		157,158
Lime—						
Quicklime..... tons	6,075	30,954	3,325	24,270	8,298	63,630
Hydrated..... tons	458	4,580	589	5,890	622	4,324
Sand and gravel..... tons	423,487	136,677	282,228	126,031	256,572	114,597
Stone..... tons	34,661	87,307	41,449	96,629	123,068	171,317
<b>Total</b>		<b>16,201,279</b>		<b>16,966,183</b>		<b>23,310,729</b>

\* In 1934, 133,360 long tons of pig iron were produced in Nova Scotia from Newfoundland ores; production in 1933 totalled 118,514 long tons.



Table 10.—Mineral Production of New Brunswick, 1932-1934

		1932		1933		1934	
		Quantity	Value	Quantity	Value	Quantity	Value
			\$		\$		\$
<b>METALLICS—</b>							
Manganese ore.....	tons						
<b>Non-METALLICS—</b>							
Coal.....	tons	212,695	794,168	312,303	1,041,744	314,750	1,026,343
Grindstones.....	tons	266	11,802	277	12,051	535	27,991
Gypsum.....	tons	38,019	297,520	30,391	88,500	30,398	104,709
Manganese bog.....	tons						
Natural gas.....	M cu. ft.	662,452	326,191	618,033	302,706	625,601	306,065
Petroleum.....	brls.	6,408	14,332	8,835	18,111	11,106	22,277
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>							
Clay products.....			68,151		46,917		59,897
Lime—							
Quicklime.....	tons	5,547	59,064	8,059	68,446	8,949	76,132
Hydrated.....	tons	6,025	50,120	8,790	66,340	6,803	50,277
Sand and gravel.....	tons	569,150	447,239	496,961	331,497	568,064	322,238
Stone.....	tons	16,805	154,918	16,714	131,370	37,918	161,182
<b>Total.....</b>	<b>\$</b>		<b>2,223,595</b>		<b>2,107,682</b>		<b>2,156,151</b>

Table 11.—Mineral Production of Quebec,\* 1932-1934

Product		1932		1933		1934	
		Quantity	Value	Quantity	Value	Quantity	Value
			\$		\$		\$
<b>METALLICS—</b>							
Chromite.....	tons	78	1,113	30	343	71	1,098
Copper.....	lb.	67,336,692	4,296,216	60,943,882	5,214,177	73,968,545	5,487,948
Gold.....	fine oz.	401,105	9,417,572	382,880	10,950,539	390,097	13,458,347
Selenium.....	lb.			22,131	16,000	48,764	73,146
Silver.....	fine oz.	628,902	199,184	471,419	178,351	470,254	223,187
Titanium ore, sold for export.....	tons					2,023	14,161
<b>Non-METALLICS—</b>							
Asbestos.....	tons	122,977	3,039,721	158,367	5,211,177	155,980	4,936,326
Feldspar.....	tons	3,390	39,062	6,183	59,283	9,207	78,853
Graphite.....	tons			43	2,222	129	6,426
Iron oxides (ochre).....	tons	5,017	44,161	4,192	51,965	4,798	64,566
Magnesian dolomite.....			262,860		360,128		382,927
Mica.....	tons	41	4,076	256	39,000	322	85,967
Natural mineral waters.....	imp. gal.	15,506	4,697	9,024	3,094	75,665	16,116
Peat.....	tons	762	2,286	681	2,549		
Phosphate.....	tons	1,316	12,333	105	805	81	683
Quartz.....	tons	20,123	71,645	28,294	109,533	57,208	229,817
Sulphur.....	tons	17,954	133,838	19,167	146,261	4,908	50,398
Soapstone.....			46,751		47,680		44,297
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>							
Cement.....	brls.	2,210,584	3,155,702	1,517,555	2,128,900	1,613,641	2,294,847
Clay products.....			1,064,551		580,088		632,322
Lime—							
Quicklime.....	tons	76,933	493,787	89,740	539,603	85,106	510,614
Hydrated lime.....	tons	16,830	94,114	20,594	107,955	23,584	121,370
Sand and gravel.....	tons	3,458,128	893,890	3,356,232	942,429	3,672,582	980,454
Stone.....	tons	2,246,825	2,360,901	1,342,493	1,448,740	1,199,152	1,575,617
Slate.....	tons					306	458
<b>Total.....</b>	<b>\$</b>		<b>25,638,466</b>		<b>28,141,482</b>		<b>31,289,945</b>

\* There is also in this province an important production of aluminium from imported ores.

Table 12.—Mineral Production of Ontario,\* 1932-1934

Product	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
<b>METALLICS—</b>						
Arsenic (As <sub>2</sub> O <sub>3</sub> )..... lb.	2,424,342	98,714	1,468,022	56,534	1,647,513	56,412
Bismuth..... lb.	16,798	7,289	7,580	3,731	7,552	3,444
Chromite..... tons					40	480
Cobalt..... lb.	490,631	587,957	466,702	597,752	594,671	592,497
Copper..... lb.	77,055,413	4,407,928	145,504,720	10,118,847	205,059,539	14,822,704
Gold..... fine oz.	2,280,105	53,534,743	2,155,519	61,647,843	2,105,339	72,634,195
Lead..... lb.	86,477	1,828	29,910	692	21,558	525
Nickel..... lb.	30,327,968	7,179,862	83,264,658	20,130,480	128,687,340	32,139,425
Palladium, Rhodium, etc..... fine oz.	37,613	901,890	31,009	645,043	83,932	1,699,282
Platinum..... fine oz.	27,284	1,097,021	24,746	856,190	116,177	4,488,712
Selenium..... lb.			26,090	53,745	51,574	91,286
Silver..... fine oz.	6,335,783	2,006,648	4,535,680	1,715,975	5,321,160	2,525,470
Tellurium..... lb.					5,130	25,599
<b>NON-METALLICS—</b>						
Actinolite..... tons					30	365
Barytes..... tons			20	60		
Diatomite..... tons	11	309	28	1,298	46	1,920
Feldspar..... tons	3,657	42,920	4,387	45,350	7,302	61,665
Fluorspar..... tons	32	464	73	1,064	150	2,100
Graphite..... tons	346	18,483	362	16,145	1,389	64,998
Gypsum..... tons	35,655	186,175	24,460	112,319	33,234	141,389
Mica..... tons	269	2,752	666	9,371	618	9,059
Natural mineral waters..... imp. gal.	61,208	2,473	29,794	2,347	21,775	1,622
Natural gas..... M cu. ft.	7,386,154	4,719,297	7,166,659	4,523,085	7,682,851	4,741,368
Peat..... tons	2,486	5,307	450	900	1,878	7,343
Petroleum..... brls.	130,343	247,468	136,058	253,486	141,385	299,874
Quartz..... tons	66,135	93,574	66,562	86,146	89,838	134,572
Salt..... tons	231,138	1,789,751	244,107	1,765,087	276,751	1,734,196
Silica brick..... M	93	4,304	183	7,351	369	14,730
Sulphur..... tons	3,332	33,320	8,196	81,960	14,598	145,980
Talc..... tons	12,064	111,585	15,114	142,134	13,934	135,978
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>						
Cement..... brls.	1,599,342	2,288,975	1,095,845	1,587,812	1,702,128	2,403,590
Clay products.....		1,639,508		1,024,579		1,261,006
<b>Lime—</b>						
Quicklime..... tons	143,185	1,018,007	126,460	1,006,906	168,760	1,287,251
Hydrated..... tons	23,518	255,223	19,733	220,191	22,281	249,038
Sand and gravel..... tons	6,994,447	1,971,239	5,967,994	2,517,230	7,880,959	1,821,689
Stone..... tons	1,905,138	1,655,016	1,253,906	983,268	2,460,300	1,965,507
Slate..... tons					120	600
<b>Total.....</b>	<b>\$</b>	<b>85,910,030</b>		<b>110,265,021</b>		<b>145,563,871</b>

\*The total production of blast-furnace pig-iron in Ontario in 1932 was 113,433 long tons, in 1933, 108,803 long tons and in 1934, 271,635 long tons.

†Sulphur content of pyrites shipped or estimated sulphur contained in the sulphuric acid made from smelter gases.

Table 13.—Mineral Production of Manitoba, 1932-1934

Product	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
<b>METALLICS—</b>						
Copper..... lb.	52,706,861	3,302,803	38,163,181	2,844,989	30,867,141	2,290,126
Gold..... fine oz.	122,507	2,876,350	125,310	3,583,800	132,321	4,505,075
Selenium..... lb.					4,127	8,190
Silver..... fine oz.	1,036,497	328,275	1,101,578	416,758	1,252,920	594,647
Zinc..... lb.	41,736,600	1,004,016	43,516,037	1,397,082	47,264,342	1,438,538
<b>NON-METALLICS—</b>						
Coal..... tons	1,552	3,684	3,880	9,214	4,113	8,952
Feldspar..... tons			88	484	1,793	6,763
Gypsum..... tons	12,719	113,739	6,830	65,471	9,657	81,653
Natural gas..... M cu. ft.	600	180	600	180	600	180
Quartz..... tons	87,453	102,493	7,736	23,507	931	3,031
Salt..... tons	508	7,092	1,499	18,388	1,664	20,137
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>						
Cement..... brls.	242,112	549,594	129,540	295,351	181,166	411,247
Clay products.....		49,773		20,966		37,916
<b>Lime—</b>						
Quicklime..... tons	15,047	116,369	14,793	110,957	12,988	100,958
Hydrated..... tons	3,188	55,741	3,239	56,683	3,580	62,650
Sand and gravel..... tons	440,309	188,974	288,214	108,828	334,026	95,426
Stone..... tons	78,423	209,282	33,190	74,227	43,127	53,545
<b>Total.....</b>	<b>\$</b>	<b>9,058,365</b>		<b>9,026,351</b>		<b>9,776,334</b>

Table 14.—Mineral Production of Saskatchewan, 1932-1934

Product	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
<b>METALLICS—</b>						
Copper..... lb.			3,223,941	240,338	6,618,913	491,077
Gold..... fine oz.	11	258	5,400	154,440	5,405	186,472
Selenium..... lb.						689
Silver..... fine oz.	14	4	114,604	43,358	87,551	41,552
Zinc..... lb.			2,789,683	89,563	2,162,938	65,831
Coal..... tons	887,139	1,229,449	927,649	1,285,996	909,288	1,241,130
Quartz..... tons			59,506	59,506	92,447	88,748
Salt..... tons			231	4,510	452	8,703
Sodium sulphate..... tons		271,736	50,080	485,416	66,821	587,986
Volcanic dust..... tons	180	3,600	118	2,360	1	20
Natural gas..... M cu. ft.					13,781	4,823
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>						
Clay products..... tons	362,841	109,739		92,207		90,997
Sand and gravel..... tons		66,942	104,400	19,731	533,575	169,033
<b>Total</b>		<b>1,681,728</b>		<b>2,477,425</b>		<b>2,977,061</b>

Table 15.—Mineral Production of Alberta, 1932-1934

Product	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
<b>METALLICS—</b>						
Gold..... fine oz.	83	1,949	324	9,267	363	13,558
Silver..... fine oz.	9	3	32	12	35	17
<b>NON-METALLICS—</b>						
Bituminous sands..... tons	343	1,372	466	1,662	862	3,449
Coal..... tons	4,870,648	13,526,309	4,718,788	12,307,258	4,753,810	12,556,099
Natural gas..... M cu. ft.	15,370,968	3,883,794	15,352,811	3,886,263	14,841,491	3,707,276
Petroleum..... brls.	906,751	2,751,541	995,832	2,844,157	1,253,966	3,104,823
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>						
Cement..... brls.	193,571	399,922	149,206	299,530	163,946	326,253
Clay products.....		329,584		198,373		246,677
Lime—						
Quicklime..... tons	6,529	55,336	7,403	61,061	7,300	64,143
Hydrated..... tons	113	1,241	98	976	155	1,554
Sand and gravel..... tons	734,067	250,025	281,122	85,577	650,232	196,898
Stone..... tons	1,428	2,985	1,550	8,817	2,737	8,104
<b>Total</b>		<b>21,174,061</b>		<b>19,762,853</b>		<b>26,228,851</b>

Table 16.—Mineral Production of British Columbia, 1932-1934

Product	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
<b>METALLICS—</b>						
Bismuth..... lb.	57	51	70,723	77,795	248,092	297,771
Cadmium..... lb.		26,824		78,733		95,865
Copper..... lb.	50,580,104	3,227,111	43,146,724	3,216,502	48,240,924	3,579,583
Gold..... fine oz.	199,004	4,672,429	238,995	6,835,257	296,196	10,218,762
Lead..... fine oz.	252,007,574	5,320,432	263,345,776	6,296,178	344,467,138	8,392,597
Platinum..... fine oz.	59	2,372	40	1,400	53	2,051
Silver..... fine oz.	7,293,462	2,309,958	6,737,037	2,548,817	8,729,721	4,143,204
Zinc..... lb.	130,546,958	3,140,438	152,826,264	4,906,487	249,152,403	7,583,202
<b>NON-METALLICS—</b>						
Coal..... tons	1,681,490	6,392,801	1,382,272	5,306,287	1,485,969	5,351,108
Diatomite..... tons	47	440	14	410	6	190
Grindstones, pulpstones..... tons	60	3,500	200	9,000	402	17,625
Gypsum..... tons	10,728	84,084	5,107	46,004	9,661	48,081
Iron oxides (ochre)..... tons	223	2,000	165	1,485	161	1,000
Magnesium Sulphate..... tons			120	3,360	42	1,100
Mica..... tons			23	853	57	2,045
Phosphate..... tons			2,109	4,670		
Quartz..... tons	15,621	8,435	22,668	17,681	24,847	13,990
Sodium carbonate..... tons	495	5,450	559	5,773	244	1,920
Sulphur*..... tons	31,886	302,856	30,010	282,078	32,031	319,124
Talo..... tons	39	702	67	1,022	25	502
Volcanic dust..... tons					30	600

\* Includes sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid made from waste smelter gases.

Table 16.—Mineral Production of British Columbia, 1932-1934—Concluded

Product	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	253,112	536,528	115,286	225,342	122,345	232,009
Clay products.....		216,355		174,205		194,437
Lime—						
Quicklime..... tons	14,902	141,968	18,147	144,479	16,721	135,528
Hydrated..... tons	2,250	18,003	2,570	18,449	2,966	18,328
Sand and gravel..... tons	1,487,513	525,604	961,672	332,962	958,149	335,142
Slate..... tons	250	3,750	250	3,750	312	3,744
Stone..... tons	407,642	378,052	250,272	253,525	210,714	217,057
<b>Total.....</b>		<b>27,326,173</b>		<b>30,794,584</b>		<b>41,206,965</b>

Table 17.—Mineral Production of the Yukon, 1932-1934

Product	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold..... fine oz.	40,608	953,438	39,493	1,129,500	38,798	1,338,531
Lead..... lb.	3,853,327	81,444	3,090,505	74,128	1,783,349	43,450
Silver..... fine oz.	3,014,755	954,822	2,204,237	833,925	515,542	244,681
NON-METALLICS—						
Coal..... tons	808	3,491	862	3,670	638	2,217
<b>Total.....</b>		<b>1,993,195</b>		<b>2,041,223</b>		<b>1,628,879</b>

Table 18.—Mineral Production of the Northwest Territories, 1932-1934

Product	1932		1933		1934*	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Radium and Uranium products.....	Data not available for publication.					
Lead..... lb.					3,531	86
Silver..... fine oz.	38,433	12,172	23,239	8,792	37,778	17,030
Petroleum, crude..... brl.	910	9,251	4,608	23,037	4,438	22,188
<b>Total.....</b>		<b>21,423</b>		<b>31,829</b>		<b>40,204</b>

\* During 1934 the Port Hope (Ontario) refinery of Eldorado Gold Mines Ltd. received from the Eldorado mine at Great Bear Lake, N.W.T., 77 tons of pitchblende and silver ore and seven tons of concentrates.

Table 19.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1930-1934

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel, pits, etc.	Capital employed	Number of employees	Salaries and wages	Cost of fuel and electricity for heat and power	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries
			\$		\$	\$	\$
<b>Metal Mining Industry</b>							
<b>ALLUVIAL GOLD MINES</b>							
1930.....	79	79	5,881,620	394	612,369	8,272	877,778
1931.....	109	109	5,908,001	337	682,935	41,745	1,226,541
1932.....	120	120	7,306,130	373	665,711	38,840	1,211,018
1933.....	73	74	10,402,705	454	704,151	35,165	1,218,250
1934.....	93	93	14,315,701	615	1,027,569	76,615	1,260,483



Table 19.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1930-1934—Continued

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel, pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity for heat and power \$	Net value of bullion, ore, concentrates residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
AURIFEROUS QUARTZ MINES							
1930.....	54	56	119,758,057	8,401	14,034,620	2,364,102	39,771,739
1931.....	68	69	109,933,164	9,636	16,467,165	2,700,326	49,144,578
1932.....	100	100	58,167,335	10,442	17,686,584	3,031,494	58,645,772
1933.....	214	216	158,599,931	12,823	20,536,012	3,330,137	69,151,535
1934.....	408	416	214,068,359	17,762	27,156,887	4,249,296	83,761,440
COPPER-GOLD-SILVER MINES (a)							
1930.....	61	68	45,844,395	5,694	9,156,759	1,272,262	15,629,564
1931.....	53	56	37,127,920	3,351	4,958,317	726,502	15,951,103
1932.....	28	30	14,793,372	3,076	3,770,627	463,463	11,143,759
1933.....	28	29	40,228,626	2,841	3,938,778	404,625	7,707,270
1934.....	21	23	39,892,387	3,169	4,869,801	542,670	8,265,071
SILVER-COBALT MINES							
1930.....	23	28	12,268,322	1,043	1,488,591	352,844	3,637,181
1931.....	22	26	9,352,520	786	1,149,689	227,467	1,925,593
1932.....	17	20	3,005,872	369	551,255	124,478	1,735,708
1933.....	12	14	3,365,755	242	322,281	83,565	1,071,602
1934.....	15	16	5,102,491	286	361,726	85,685	1,380,318
SILVER-LEAD-ZINC MINES*							
1930.....	86	93	42,053,674	2,866	4,263,961	654,685	13,000,815
1931.....	39	40	31,152,078	1,299	2,149,921	485,106	6,351,975
1932.....	36	36	11,921,067	1,084	1,719,186	358,649	5,156,365
1933.....	42	43	17,705,026	1,100	1,501,012	284,277	7,569,867
1934.....	58	60	12,923,827	1,292	1,935,284	389,276	8,885,081
NICKEL-COPPER MINES							
1930.....	2	5	26,194,605	3,483	5,388,783	200,151	8,460,556
1931.....	3	6	21,320,977	2,133	3,150,240	105,403	7,539,836
1932.....	3	6	23,137,628	1,210	1,776,190	96,670	3,174,208
1933.....	4	7	30,048,125	1,599	2,518,181	152,984	6,108,325
1934.....	4	7	31,685,426	2,677	4,375,702	233,963	11,606,713
MISCELLANEOUS METAL MINES							
1930.....	10	10	427,906	116	110,096	5,100	2,595
1931.....	7	7	444,179	32	25,694	576	13,434
1932.....	5	5	1,140,200	34	35,181	2,475	1,113
1933.....	5	5	563,500	24	14,275	1,178	343
1934.....	7	7	1,548,205	44	32,273	2,383	15,739
NON-FERROUS METAL SMELTING AND REFINING							
1930.....	10	13	175,010,686	8,626	13,796,124	6,465,897	155,635,664
1931.....	11	14	175,669,195	7,860	13,245,327	6,053,398	150,229,454
1932.....	10	13	149,708,860	5,343	8,778,970	4,435,394	138,722,129
1933.....	11	14	146,085,284	6,360	8,403,181	(b) 2,792,322	157,318,734
1934.....	11	14	146,047,422	8,298	11,059,206	(b) 3,564,712	171,610,687
Total Metal Mining Industries							
1930.....	325	352	427,439,265	39,623	48,851,393	11,323,313	137,015,892
1931.....	312	327	396,904,031	25,434	41,829,248	10,340,523	131,382,511
1932.....	319	330	269,146,161	21,931	31,943,704	8,551,463	119,790,072
1933.....	389	402	406,994,952	25,443	37,937,871	7,084,253	159,145,926
1934.....	617	636	465,583,818	34,143	50,818,418	9,144,690	186,785,532

\* Contains data relating to silver ores in the Northwest Territories since 1931. † Value added by smelting.

(a) The considerable decrease in the value of 1933 and 1934 shipments as compared with those for previous years results largely from low copper prices and through companies reporting ore costs rather than estimates of market prices for metal contents. This practice of reporting costs is confined to some of the larger base metal mining companies which operate both mines and metallurgical plants. Decreases of this nature in the value of mine products are compensated for by increases in the non-ferrous smelting and refining industry and thereby do not affect the grand total representing the net value of Canadian mineral sales.

(b) See footnote, tables 25 and 26.

Table 19.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1930-1934—Continued

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel, pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity for heat and power \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
<b>Non-Metal Mining Industries, Including Fuels</b>							
<b>* FUELS</b>							
<b>COAL</b>							
1930.....	390	430	140,316,395	29,172	36,442,361	3,595,416	49,905,327
1931.....	412	452	135,712,866	27,860	28,802,428	3,060,487	37,762,927
1932.....	455	493	131,879,071	20,960	25,042,769	3,066,001	34,084,922
1933.....	496	547	125,740,790	25,375	22,378,736	3,214,632	33,805,148
1934.....	503	534	118,274,406	25,961	25,662,591	3,448,787	39,394,294
<b>NATURAL GAS</b>							
1930.....	124	2,280	70,548,353	1,941	2,349,703	33,811	8,447,385
1931.....	145	2,444	71,085,678	1,692	2,072,022	26,921	8,232,822
1932.....	160	2,418	75,187,066	1,351	1,738,949	32,912	8,188,966
1933.....	174	2,515	80,937,170	1,367	1,650,815	53,994	7,725,951
1934.....	171	2,682	70,767,123	1,553	1,789,811	67,341	7,569,935
<b>PETROLEUM</b>							
1930.....	234	2,324	63,300,244	1,869	3,337,754	363,098	6,481,847
1931.....	160	2,346	57,620,950	1,209	1,634,517	303,511	4,733,287
1932.....	175	2,210	48,568,562	655	776,163	120,842	3,467,538
1933.....	175	2,128	36,972,528	718	773,734	136,278	3,562,170
1934.....	189	2,219	35,408,801	944	1,072,617	168,338	3,622,722
<b>TOTAL FUELS</b>							
1930.....	748	5,034	274,164,993	32,982	42,129,818	3,993,225	64,834,559
1931.....	717	5,242	262,419,494	30,761	32,508,967	3,390,019	60,729,039
1932.....	790	5,121	253,683,299	28,966	27,557,881	3,220,353	46,641,426
1933.....	845	5,190	243,650,488	27,490	24,805,285	3,404,904	45,093,269
1934.....	863	5,435	224,450,530	28,458	28,625,019	3,684,466	60,686,951
<b>OTHER NON-METAL MINING INDUSTRIES</b>							
<b>ABRASIVES—NATURAL</b>							
1930.....	10	10	345,102	45	42,867	4,305	80,108
1931.....	8	8	569,772	31	25,837	3,906	73,352
1932.....	10	10	679,865	36	26,471	2,422	48,844
1933.....	9	10	58,556	19	7,796	1,034	60,927
1934.....	11	12	234,776	34	20,580	2,616	102,008
<b>ASBESTOS</b>							
1930.....	7	8	35,097,872	2,770	3,474,215	1,133,737	8,390,163
1931.....	7	8	40,164,005	1,675	1,836,115	849,047	4,812,886
1932.....	7	8	30,081,362	1,409	1,156,315	827,303	3,039,721
1933.....	7	8	21,109,967	1,629	1,279,093	771,327	5,211,177
1934.....	7	8	21,816,350	1,855	1,608,812	855,556	4,936,326

\* Production of peat since 1929 included in the miscellaneous non-metallies.

Table 19.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1930-1934—Continued

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel, pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity for heat and power \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
OTHER NON-METAL MINING INDUSTRIES—Concluded							
FELDSPAR AND QUARTZ							
1930.....	51	52	870,488	429	257,388	35,645	686,596
1931.....	33	36	1,342,668	166	135,809	20,996	490,119
1932.....	33	33	936,171	120	91,603	13,391	358,129
1933.....	28	28	1,143,792	146	117,037	26,327	402,937
1934.....	50	51	1,310,182	312	205,508	45,854	629,546
GYPSUM							
1930.....	16	18	8,796,865	822	781,639	201,409	2,818,788
1931.....	15	19	7,941,082	676	656,590	188,524	2,111,517
1932.....	11	17	8,054,148	478	368,484	122,926	1,080,379
1933.....	10	16	8,769,564	415	263,279	91,518	675,822
1934.....	8	14	7,352,562	428	324,731	118,560	863,776
IRON OXIDES (ORE)							
1930.....	4	4	150,704	43	41,238	13,929	83,873
1931.....	4	4	181,535	30	29,194	8,560	49,205
1932.....	4	4	206,863	26	22,909	5,993	46,161
1933.....	4	4	156,551	22	15,631	5,755	53,450
1934.....	4	4	172,730	32	24,980	9,670	66,166
MICA							
1930.....	13	13	441,744	244	63,316	1,102	96,004
1931.....	11	11	276,356	28	22,556	444	54,066
1932.....	5	5	119,670	9	7,864	50	6,828
1933.....	15	15	312,396	41	25,007	80	49,284
1934.....	16	16	139,716	102	50,391	50	97,071
SALT							
1930.....	8	8	4,685,549	381	455,539	197,313	1,604,631
1931.....	7	7	4,196,927	363	446,984	184,001	1,904,149
1932.....	7	8	3,805,008	345	455,049	176,836	1,947,551
1933.....	9	9	3,798,358	400	473,420	191,373	1,939,874
1934.....	9	9	3,711,598	469	551,998	236,257	1,954,953
TALC AND SOAPSTONE							
1930.....	6	6	614,384	141	79,472	16,369	186,216
1931.....	5	5	618,590	70	71,787	19,128	157,083
1932.....	5	5	703,532	83	76,577	17,930	159,038
1933.....	7	7	684,375	103	83,060	26,424	190,836
1934.....	8	8	640,194	112	79,711	26,312	180,777
MISCELLANEOUS							
1930.....	38	38	3,608,896	498	527,183	188,449	1,192,417
1931.....	34	34	5,457,030	275	297,394	205,140	1,247,697
1932.....	35	35	2,072,413	182	155,186	110,396	1,061,779
1933.....	40	40	4,202,736	297	241,999	176,512	1,234,629
1934.....	48	48	3,291,842	393	371,762	240,224	1,162,980

Table 19.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1930-1934—Continued

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel, pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity for heat and power \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
<b>TOTAL OTHER NON-METAL MINING INDUSTRIES</b>							
1930.....	153	157	54,611,604	5,373	5,722,857	1,792,268	15,228,706
1931.....	124	132	60,748,865	3,314	3,522,266	1,479,755	10,990,174
1932.....	117	135	46,659,538	2,688	2,360,438	1,277,247	7,748,430
1933.....	129	137	40,146,295	3,072	2,506,322	1,290,350	9,818,936
1934.....	161	170	38,669,950	3,737	3,238,473	1,535,099	9,993,603

## Total Non-Metal Mining Industries, Including Fuels

1930.....	901	5,191	328,776,596	33,355	47,852,675	5,785,483	80,063,355
1931.....	841	5,374	325,168,359	31,675	36,031,233	4,870,674	61,623,210
1932.....	907	5,216	302,294,837	31,654	29,914,319	4,497,602	51,349,856
1933.....	871	5,327	283,796,783	30,332	27,309,607	4,695,254	51,912,265
1934.....	1,021	5,695	263,120,280	32,195	31,763,492	5,219,565	60,580,554

## Clay Products and Other Structural Materials

## CLAY PRODUCTS

## Brick, Tile and Sewer Pipe

1930.....	186	198	32,757,926	4,870	4,907,380	1,910,899	10,296,960
1931.....	171	185	33,159,664	3,131	3,428,142	1,476,870	7,585,310
1932.....	143	159	24,910,020	1,622	1,469,270	569,515	3,405,295
1933.....	141	152	23,760,177	1,195	1,011,747	360,686	2,062,388
1934.....	134	144	22,633,285	1,444	1,165,740	547,347	2,458,826

## STONEWARE AND POTTERY

1930.....	5	5	672,851	156	153,750	11,707	296,618
1931.....	4	4	659,500	128	113,108	9,568	255,978
1932.....	5	5	437,562	118	107,316	10,288	244,923
1933.....	5	5	451,703	117	90,146	10,636	200,447
1934.....	5	5	413,522	123	97,237	11,385	221,584

## TOTAL CLAY PRODUCTS\*

1930.....	191	203	33,430,777	5,026	4,961,130	1,922,606	10,593,578
1931.....	175	189	33,819,164	3,259	3,541,250	1,486,438	7,841,288
1932.....	148	164	25,347,582	1,740	1,576,686	679,803	3,650,218
1933.....	146	157	24,211,880	1,312	1,101,893	377,381	2,262,835
1934.....	139	149	23,046,807	1,572	1,262,977	558,732	2,680,410

## OTHER STRUCTURAL MATERIALS†

## CEMENT

1930.....	8	11	59,210,737	2,317	3,172,198	4,120,367	17,713,067
1931.....	9	12	57,378,436	1,820	2,432,950	3,280,870	15,826,243
1932.....	6	12	55,294,814	1,216	1,344,772	1,701,125	6,930,721
1933.....	6	12	54,403,379	740	781,746	982,087	4,536,935
1934.....	5	11	53,413,000	860	1,009,686	1,206,550	5,667,946

\*Includes kaolin and other clays.

†A considerable proportion of the values shown for lime and stone sales represents shipments for chemical purposes—see Chapter 9.



Table 19.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1930-1934—Concluded

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel, pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity for heat and power \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
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## OTHER STRUCTURAL MATERIALS—Concluded

## LIME

1930	44	50	8,816,879	1,086	1,087,778	886,354	4,038,698
1931	54	60	7,289,990	799	785,868	612,278	2,764,415
1932	53	60	6,823,949	677	575,072	535,433	2,394,537
1933	54	60	8,920,042	696	480,833	473,125	2,432,306
1934	53	58	8,497,895	737	535,492	606,335	2,745,797

## SANDS AND GRAVEL

1930	724	2,993	7,550,217	5,601	2,508,037	331,010	8,344,913
1931	704	3,287	8,635,241	3,224	2,878,011	292,892	6,651,165
1932	688	4,249	9,542,446	1,743	1,322,201	190,477	4,480,596
1933	696	4,598	6,203,113	2,726	1,169,079	129,410	4,464,285
1934	794	4,768	4,377,551	1,911	1,236,819	155,194	4,035,477

## STONE

1930	285	305	22,196,388	6,192	5,542,211	697,060	13,037,209
1931	300	329	18,860,796	4,198	4,470,699	625,673	11,075,184
1932	296	310	16,727,481	2,609	2,051,395	420,581	4,942,211
1933	288	317	15,758,193	1,885	1,250,776	283,454	3,000,326
1934	354	425	12,983,836	2,087	1,499,272	311,516	4,157,131

## TOTAL OTHER STRUCTURAL MATERIALS

1930	1,061	3,359	97,774,221	15,196	12,310,224	6,034,791	43,133,887
1931	1,067	3,688	92,164,403	10,041	10,567,688	4,811,713	36,317,007
1932	1,043	4,640	88,388,690	6,145	5,293,440	2,847,616	18,748,065
1933	1,044	4,987	85,284,732	6,047	3,682,434	1,868,076	14,433,852
1934	1,806	5,262	79,272,888	5,695	4,281,869	2,279,595	16,606,351

## Total Clay Products and Other Structural Materials

1930	1,252	3,562	131,294,998	20,222	17,271,354	7,957,397	53,727,465
1931	1,242	3,877	125,983,627	13,300	14,168,778	6,298,151	44,158,295
1932	1,191	4,864	113,736,272	7,885	6,870,926	3,427,419	22,388,283
1933	1,190	5,144	109,496,612	7,359	4,784,327	2,245,397	16,696,697
1934	1,345	5,411	102,319,699	7,167	5,544,246	2,838,327	19,286,761

## GRAND TOTAL OF ALL INDUSTRIES

1930	2,478	9,105	887,420,859	89,200	113,975,332	25,066,193	270,806,712
1931	2,395	9,578	812,069,029	72,809	91,969,299	21,509,348	238,170,019
1932	2,417	10,380	685,211,373	61,470	71,772,019	16,476,484	195,578,211
1933	2,553	10,823	800,292,347	63,334	70,031,805	14,024,904	221,754,818
1934	2,886	11,652	831,023,187	73,505	88,126,186	*17,202,492	266,652,847

\*See footnote, table 26.

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Provinces, 1930-1934

Year	Number of operating mines, oil and gas wells, quarries, gravel, pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity for heat and power \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
NOVA SCOTIA						
1930	125	65,363,756	15,484	19,284,197	2,410,115	25,043,071
1931	244	63,853,580	14,871	15,302,444	2,020,666	19,258,296
1932	495	63,415,735	13,706	11,302,801	2,047,874	15,049,226
1933	595	59,727,371	13,915	9,852,765	2,219,236	15,744,102
1934	171	55,799,825	13,500	13,594,114	2,532,500	21,773,899
NEW BRUNSWICK						
1930	113	5,349,073	1,391	1,132,306	162,501	2,350,372
1931	116	5,543,570	1,197	1,048,860	163,893	2,137,832
1932	563	4,998,656	1,480	1,123,080	96,922	2,185,174
1933	399	5,185,718	1,629	1,402,114	83,493	2,088,331
1934	418	5,090,927	1,722	1,276,770	98,213	2,137,835
QUEBEC						
1930	2,416	140,286,034	15,397	15,190,714	5,885,600	51,673,630
1931	2,723	146,067,130	11,141	12,666,586	5,607,812	44,064,907
1932	2,487	121,290,885	7,694	8,198,379	4,243,362	32,834,588
1933	3,064	127,600,083	8,629	8,621,984	2,953,543	33,888,539
1934	3,584	132,819,808	10,362	10,492,169	3,429,003	35,322,932
ONTARIO						
1930	5,267	326,396,783	24,706	34,433,915	9,022,652	105,434,625
1931	5,409	305,883,585	20,277	30,470,475	7,508,844	98,509,571
1932	5,196	244,250,088	16,376	24,412,126	5,447,055	85,868,259
1933	5,210	310,789,173	17,306	25,600,168	4,891,054	109,060,404
1934	5,527	323,309,378	22,033	32,619,846	6,039,605	140,857,001
MANITOBA						
1930	135	35,812,839	3,021	4,372,044	1,205,288	5,665,008
1931	107	39,113,921	2,059	3,096,332	796,076	15,122,432
1932	133	21,340,000	1,730	2,106,017	479,993	11,396,818
1933	120	30,130,497	1,379	1,847,251	234,202	8,433,130
1934	128	36,329,062	1,948	2,796,454	456,172	8,696,985
SASKATCHEWAN						
1930	144	6,424,080	1,371	1,040,790	229,760	2,333,280
1931	111	7,130,859	1,092	896,131	222,526	1,876,284
1932	115	6,013,271	924	748,782	152,433	1,626,307
1933	134	12,368,385	1,265	1,111,001	238,898	2,614,337
1934	179	11,197,998	1,461	1,257,282	285,161	3,055,611
ALBERTA						
1930	562	149,974,382	12,675	16,272,916	1,407,136	29,933,896
1931	553	141,639,189	10,579	11,357,722	1,198,890	23,021,495
1932	567	124,484,909	9,692	10,476,449	804,137	20,701,075
1933	575	112,666,472	9,057	9,403,382	805,577	18,945,255
1934	588	108,786,069	9,843	9,762,297	888,005	19,056,775

Table. 20.—Principal Statistics of the Mineral Industry in Canada, by Provinces, 1930-1934—Concluded

Year	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity, for heat and power \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
BRITISH COLUMBIA						
1930.....	319	150,279,895	14,836	21,412,925	4,652,217	45,768,150
1931.....	309	127,009,722	11,297	16,345,887	3,874,529	31,925,780
1932.....	819	91,469,101	9,582	12,642,830	3,094,145	25,071,738
1933.....	765	129,665,431	9,845	11,455,946	2,557,066	29,464,365
1934.....	1,043	144,025,741	12,270	15,482,102	3,389,259	34,661,029
YUKON (a)						
1930.....	24	7,534,017	319	835,525	90,834	2,583,481
1931.....	6	5,822,464	295	784,862	116,112	2,253,422
1932.....	5	8,029,918	286	761,585	110,563	1,845,026
1933.....	11	12,159,207	309	677,194	41,835	1,516,355
1934.....	14	13,754,379	366	815,152	84,574	1,090,780
Canada						
1930.....	9,105	887,429,859	89,200	113,975,332	25,066,193	270,785,513
1931.....	9,578	842,909,020	75,809	91,969,299	21,509,348	238,170,019
1932.....	10,380	685,211,573	61,470	71,772,049	16,476,484	196,578,211
1933.....	10,873	800,292,347	63,334	70,031,805	14,024,904	221,754,818
1934.....	11,652	831,023,187	73,305	88,126,186	*17,202,492	266,652,847

(a) Contains data for the Northwest Territories since 1931.

NOTE.—The increases in column 1 in 1932 for Nova Scotia, New Brunswick and British Columbia were mainly accounted for by more detailed information received from the Provincial Highways Departments on the number of gravel pits in use during the year.

\*See footnote, table 25.

Table 21.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Provinces, 1933 and 1934

Industry and year	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total†	Salaries	Wages	Total
	Male	Female					
					\$	\$	\$
<b>1933</b>							
Nova Scotia.....	390	56	13,469	13,915	799,660	9,053,105	9,852,765
New Brunswick.....	63	17	1,549	1,629	134,678	1,267,436	1,402,114
Quebec.....	681	79	7,869	8,629	1,275,169	7,346,815	8,621,984
Ontario.....	1,396	211	15,699	17,306	3,629,139	21,971,029	25,600,168
Manitoba.....	114	6	1,259	1,379	219,392	1,627,859	1,847,251
Saskatchewan.....	72	9	1,184	1,265	149,460	961,541	1,111,001
Alberta.....	725	84	8,248	9,057	1,551,332	7,912,050	9,463,382
British Columbia.....	931	105	8,809	9,845	1,880,933	9,574,093	11,455,946
Yukon.....	31	2	276	309	98,042	579,152	677,194
<b>Canada.....</b>	<b>4,463</b>	<b>569</b>	<b>58,362</b>	<b>63,334</b>	<b>9,737,825</b>	<b>66,293,980</b>	<b>76,031,805</b>
<b>1934</b>							
Nova Scotia.....	454	60	12,986	13,500	878,799	12,715,315	13,594,114
New Brunswick.....	67	16	1,639	1,722	140,281	1,136,489	1,276,770
Quebec.....	959	80	9,323	10,362	1,609,529	8,882,640	10,492,169
Ontario.....	1,719	261	20,053	22,033	4,213,756	28,406,090	32,619,846
Manitoba.....	190	16	1,742	1,948	374,283	2,422,171	2,796,454
Saskatchewan.....	77	9	1,375	1,461	162,265	1,095,017	1,257,282
Alberta.....	748	88	9,007	9,843	1,612,994	8,179,303	9,792,297
British Columbia.....	1,123	126	11,021	12,270	2,370,216	13,111,886	15,482,102
Yukon and N.W.T.....	32	5	329	366	91,781	723,371	815,152
<b>Canada.....</b>	<b>5,369</b>	<b>661</b>	<b>67,475</b>	<b>73,505</b>	<b>11,453,904</b>	<b>76,672,282</b>	<b>88,126,186</b>

\*The average number of wage-earners was obtained by adding the monthly figures for individual companies and dividing by 12 irrespective of the number of months worked, the average number of wage-earners in the industry, as in the previous year, is the sum of these individual averages.

†The data are not inclusive of individual or syndicates engaged exclusively in prospecting or general exploration.

Table 22.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1933-1934

Industry and year	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
					\$	\$	\$
<b>1933</b>							
<b>METAL MINING</b>							
Alluvial Gold Mines.....	19	3	432	454	49,430	654,721	704,151
Auriferous Quartz Mines.....	873	70	11,890	12,823	2,232,508	18,303,504	20,536,012
Copper-Gold-Silver Mines.....	154	5	2,682	2,841	306,363	3,632,415	3,938,778
Silver-Cobalt Mines.....	24	1	217	242	59,929	262,352	322,281
Silver-Lead-Zinc Mines.....	129	9	962	1,100	278,933	1,222,079	1,501,012
Nickel-Copper Mines.....	56	3	1,540	1,599	166,531	2,351,650	2,518,181
Miscellaneous Metal Mines.....	5	-	19	24	3,312	10,963	14,275
Non-ferrous Smelting and Refining.....	596	83	5,681	6,340	1,461,380	6,941,801	8,403,181
<b>NON-METAL MINING, INCLUDING FUELS</b>							
<b>Fuels</b>							
Coal.....	1,161	122	24,092	25,375	2,477,415	19,901,321	22,378,736
Natural Gas.....	464	124	779	1,367	817,952	832,863	1,650,815
Petroleum.....	91	20	607	718	194,762	578,972	773,734
<b>Other Non-metal Mining</b>							
Abrasives—natural.....	1	-	18	19	1,500	6,296	7,796
Asbestos.....	118	-	1,489	1,629	261,684	1,017,409	1,279,093
Feldspar and Quartz.....	20	3	123	146	34,979	82,058	117,037
Gypsum.....	21	4	390	415	48,942	214,337	263,279
Iron Oxides.....	1	1	20	22	3,212	12,419	15,631
Mica.....	2	1	38	41	2,242	22,765	25,007
Salt.....	46	17	337	400	144,454	328,966	473,420
Talc and Soapstone.....	8	2	93	103	24,096	58,964	83,060
Miscellaneous.....	34	10	253	297	62,364	179,635	241,999



Table 22.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1933-1934—Concluded

Industry and year	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
					\$	\$	\$
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	80	5	655	740	160,680	621,066	781,746
Clay Products.....	207	32	1,073	1,312	440,966	660,927	1,101,893
Lime.....	57	8	631	696	85,861	394,972	480,833
Sand and Gravel.....	58	3	2,665	2,726	106,761	1,062,318	1,169,079
Stone.....	178	21	1,686	1,885	311,569	939,207	1,250,776
Total.....	4,463	569	58,362	63,334	9,737,825	60,293,960	70,031,885
1934							
METAL MINING							
Alluvial Gold Mines.....	48	5	562	615	120,928	906,641	1,027,569
Auriferous Quartz Mines.....	1,518	105	16,139	17,762	3,139,220	24,017,867	27,156,887
Copper-Gold-Silver Mines.....	193	11	2,965	3,169	446,799	4,423,002	4,869,801
Silver-Cobalt Mines.....	29	1	256	286	78,013	283,713	361,726
Silver-Lead-Zinc Mines.....	126	10	1,156	1,292	297,582	1,637,702	1,935,284
Nickel-Copper Mines.....	52	1	2,624	2,677	167,030	4,208,672	4,375,702
Miscellaneous Metal Mines.....	4	1	39	44	6,345	25,928	32,273
Non-ferrous Smelting and Refining.....	737	112	7,449	8,296	1,842,449	9,216,757	11,059,206
NON-METAL MINING, INCLUDING FUELS							
Fuels							
Coal.....	1,174	116	24,671	25,961	2,579,605	23,082,986	25,667,591
Natural Gas.....	485	135	933	1,553	842,059	947,752	1,789,811
Petroleum.....	129	31	784	944	233,657	838,960	1,072,617
Other Non-metal Mining							
Abrasives—natural.....	6	—	28	34	5,208	15,372	20,580
Asbestos.....	125	22	1,708	1,855	281,493	1,327,319	1,608,812
Feldspar and Quartz.....	37	7	268	312	50,888	154,620	205,506
Gypsum.....	35	4	389	428	59,534	265,197	324,731
Iron oxides.....	1	1	30	32	3,432	21,548	24,980
Mica.....	2	2	98	102	2,476	47,016	50,391
Salt.....	53	18	398	469	164,085	387,313	551,994
Talc and Soapstone.....	9	2	101	112	26,516	53,195	79,711
Miscellaneous.....	36	9	348	393	79,333	292,429	371,762
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	79	5	776	860	161,118	848,568	1,009,686
Clay Products.....	186	29	1,357	1,572	389,722	873,255	1,262,977
Lime.....	53	9	675	737	82,983	452,509	535,492
Sand and Gravel.....	53	7	1,851	1,911	75,745	1,161,974	1,236,819
Stone.....	199	18	1,870	2,067	317,085	1,182,187	1,499,272
Total.....	5,369	661	67,475	73,565	11,453,904	76,672,282	88,126,186

\* See footnote to table 21.

Table 23.—Number of Wage-Earners in Canadian Mining Industry, in Month of Highest Employment During 1933 whose Regular (Normal) Hours, per Week, were:

(Does not include overtime)

	40 hours or less	41-43 hours	44 hours	45-47 hours	48 hours	49-50 hours	51-53 hours	54 hours	55 hours	56-59 hours	60 hours	Over 60 hours
<b>By Provinces—</b>												
Nova Scotia.....	109	24	8	9	9,774	1,210	253	366	118	90	3,194	25
New Brunswick.....	86	1	4	41	1,063	18	.....	300	13	1	653	66
Quebec.....	545	625	346	144	3,574	176	110	1,515	105	649	4,223	389
Ontario.....	880	49	257	403	9,596	234	985	1,745	2,666	1,385	995	664
Manitoba.....	82	3	45	20	711	29	101	135	.....	468	39	126
Saskatchewan.....	521	5	10	40	734	25	21	184	7	148	287	69
Alberta.....	876	12	266	174	9,260	10	91	91	25	519	285	24
British Columbia.....	3,514	154	370	528	3,632	104	142	281	49	2,169	21	318
†Yukon.....	11	.....	.....	.....	39	.....	.....	16	.....	74	259	32
<b>Canada.....</b>	<b>6,624</b>	<b>873</b>	<b>1,306</b>	<b>1,359</b>	<b>38,383</b>	<b>1,806</b>	<b>1,703</b>	<b>4,633</b>	<b>2,983</b>	<b>5,503</b>	<b>9,956</b>	<b>1,713</b>
<b>By Industries—</b>												
<b>METAL MINING—</b>												
Alluvial Gold Mines.....	18	.....	.....	17	237	.....	12	25	.....	146	259	30
Auriferous Quartz Mines.....	33	4	25	333	7,531	123	420	1,737	1,032	2,227	284	545
Copper-Gold-Silver Mines.....	3	141	226	.....	1,491	205	49	215	.....	835	2	16
Silver-Cobalt Mines.....	1	.....	.....	.....	180	.....	.....	69	.....	6	.....	13
Silver-Lead-Zinc Mines.....	683	.....	.....	.....	195	.....	15	17	.....	288	9	33
Nickel-Copper Mines.....	14	.....	.....	3	1,784	.....	185	106	.....	37	131	297
Miscellaneous Metal Mines.....	3	.....	.....	.....	23	5	.....	1	.....	8	7	1
Non-ferrous Smelting and Refining.....	2,215	111	231	.....	1,058	.....	411	189	1,542	819	117	40
<b>NON-METAL MINING, INCLUDING FUELS—</b>												
<b>Fuels—</b>												
Coal.....	2,009	22	244	575	22,395	1,219	333	492	16	80	489	20
Natural Gas.....	207	3	1	192	157	12	53	159	2	16	167	65
Petroleum.....	152	7	6	.....	116	1	2	17	16	425	49	6
<b>Other Non-metal Mining—</b>												
Abrasives—natural.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	40	.....
Asbestos.....	.....	432	.....	.....	346	.....	5	167	.....	.....	1,096	3
Feldspar and Quartz.....	6	6	2	2	8	1	5	42	2	3	163	21
Gypsum.....	91	12	9	28	226	7	10	216	109	28	49	27
Iron Oxides.....	9	.....	1	.....	11	1	3	.....	.....	2	12	.....
Mica.....	.....	.....	.....	.....	46	26	.....	7	6	.....	9	.....
Salt.....	10	25	11	12	158	2	7	41	1	3	114	23
Talc and Soapstone.....	18	1	5	.....	1	.....	1	.....	21	1	54	35
Miscellaneous.....	13	2	2	2	91	3	21	37	.....	56	197	54
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>												
Cement.....	105	21	50	78	412	36	8	.....	1	121	72	63
Clay Products.....	400	34	169	44	334	94	55	280	89	184	257	174
Lime.....	77	17	36	4	211	2	2	153	7	16	223	68
Sand and Gravel.....	186	12	19	3	507	20	17	9	.....	46	5,356	23
Stone.....	371	23	269	66	865	49	89	652	139	156	800	156
<b>Total.....</b>	<b>6,624</b>	<b>873</b>	<b>1,306</b>	<b>1,359</b>	<b>38,383</b>	<b>1,806</b>	<b>1,703</b>	<b>4,633</b>	<b>2,983</b>	<b>5,503</b>	<b>9,956</b>	<b>1,713</b>

†Contains data on mining of silver-pitchblende ores in the Northwest Territories.

Table 24.—Number of Wage-Earners in Canadian Mining Industry, in Month of Highest Employment During 1934, whose Regular (Normal) Hours, per Week, were:

(Does not include overtime)

	40 hours or less	41-43 hours	44 hours	45-47 hours	48 hours	49-50 hours	51-53 hours	54 hours	55 hours	56-59 hours	60 hours	Over 60 hours
<b>By Provinces—</b>												
Nova Scotia.....	55	38	1	3	11,911	1,058	238	311	89	148	634	132
New Brunswick.....	34	6	33	7	1,493	28	34	150	13	40	688	23
Quebec.....	1,177	137	402	88	4,210	356	227	1,473	173	622	4,559	912
Ontario.....	740	59	580	118	10,721	400	2,155	1,942	307	4,961	1,370	1,504
Manitoba.....	31	22	55	10	803	24	9	296	4	829	64	363
Saskatchewan.....	568	1	.....	7	432	251	11	246	11	183	398	127
Alberta.....	1,580	71	227	232	9,177	26	4	171	4	582	125	53
British Columbia.....	3,403	98	251	101	6,065	122	351	363	37	2,813	21	40
†Yukon.....	.....	.....	.....	.....	38	.....	30	.....	.....	69	7	462
<b>Canada.....</b>	<b>7,588</b>	<b>432</b>	<b>1,549</b>	<b>566</b>	<b>41,836</b>	<b>2,265</b>	<b>3,059</b>	<b>4,952</b>	<b>638</b>	<b>10,247</b>	<b>7,866</b>	<b>3,616</b>
<b>By Industries—</b>												
<b>METAL MINING—</b>												
Alluvial Gold Mines.....	1	.....	132	.....	204	.....	.....	13	25	242	21	478
Auriferous Quartz Mines.....	200	55	389	26	9,656	191	1,569	2,122	50	4,584	214	1,872
Copper-Gold-Silver Mines.....	126	24	27	31	1,787	48	155	355	4	845	3	38
Silver-Cobalt Mines.....	9	.....	.....	.....	188	.....	.....	63	.....	46	.....	22
†Silver-Lead-zinc Mines.....	.....	.....	.....	.....	1,053	55	30	3	.....	218	130	13
Nickel Copper Mines.....	5	1	.....	.....	2,128	.....	211	75	4	322	217	25
Miscellaneous Metal Mines.....	1	.....	.....	1	49	12	3	22	.....	3	1	3
Non-Ferrous Smelting and Refining.....	2,685	21	226	.....	1,685	36	536	257	.....	2,643	126	46
<b>NON-METAL MINING, INCLUDING FUELS—</b>												
<b>Fuels—</b>												
Coal.....	2,318	104	135	68	24,778	1,066	268	314	11	109	418	50
Natural gas.....	280	13	28	182	175	21	89	267	3	58	188	97
Petroleum.....	393	6	1	2	136	3	.....	35	2	466	59	23
<b>Other Non-metal Mining—</b>												
Abrasives—natural.....	7	1	.....	.....	.....	1	.....	.....	1	47	9	.....
Asbestos.....	634	56	.....	.....	1	.....	.....	.....	.....	.....	1,287	3
Feldspar and Quartz.....	54	.....	.....	.....	39	12	.....	109	2	9	265	10
Gypsum.....	50	3	18	5	271	8	18	32	100	21	117	35
Iron Oxides.....	7	1	1	.....	2	1	16	.....	1	2	19	.....
Mica.....	4	.....	3	.....	16	50	.....	55	12	13	14	.....
Salt.....	.....	2	1	.....	158	4	11	56	4	32	142	55
Talc and Soapstone.....	5	.....	4	1	.....	.....	.....	.....	.....	22	77	20
Miscellaneous.....	32	.....	2	4	46	1	6	67	35	8	119	218
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>												
Cement.....	43	15	84	22	460	24	15	64	3	128	118	53
Clay Products.....	301	10	258	137	306	179	91	414	175	164	348	173
Lime.....	35	28	51	9	251	27	.....	80	84	17	247	64
Sand and Gravel.....	44	23	22	2	131	289	.....	68	10	63	2,782	104
Stone.....	354	69	167	76	1,330	236	44	481	112	185	935	214
<b>Total.....</b>	<b>7,588</b>	<b>432</b>	<b>1,549</b>	<b>566</b>	<b>41,836</b>	<b>2,265</b>	<b>3,059</b>	<b>4,952</b>	<b>638</b>	<b>10,247</b>	<b>7,866</b>	<b>3,616</b>

†Contains data on mining of silver-pitchblende ores in the Northwest Territories.

Table 25.—Fuel and Electricity Used in the Mineral

Industry	Bituminous coal		Anthracite coal	Lignite coal		Coke
	Canadian	Imported		Canadian	Imported	
	Tons	Tons	Tons	Tons	Tons	Tons
<b>METAL MINING</b>						
Alluvial Gold Mines.....	Quantity 1	7				
	\$ 10	540				
Auriferous Quartz Mines.....	Quantity 9,929	11,370	608			233
	\$ 84,986	100,578	10,667			3,362
Copper-Gold-Silver Mines.....	Quantity 1,824					50
	\$ 14,157					424
Silver-Cobalt Mines.....	Quantity	883	317			
	\$	12,445	4,610			
Silver-Lead-Zinc Mines.....	Quantity 16,921	8				
	\$ 71,229	1,892				
Nickel-Copper Mines.....	Quantity 16	1,436	353			
	\$ 165	8,004	5,339			
Miscellaneous Metal Mines.....	Quantity					
	\$					
Non-Ferrous Smelting and Refining.....	Quantity 4,315	16,120	84			1,783
(See footnote)	\$ 23,550	88,448	957			16,528
<b>Total.....</b>	<b>Quantity</b>	<b>29,524</b>	<b>1,362</b>			<b>2,066</b>
	<b>\$</b>	<b>211,907</b>	<b>21,573</b>			<b>20,314</b>
<b>NON-METAL MINING, INCLUDING FUELS</b>						
<i>Fuels</i>						
Coal.....	Quantity 582,624			107,369		
	\$ 1,842,087			102,047		
Natural Gas.....	Quantity 277	2,082	400	108		2
	\$ 805	3,921	4,763	450		36
Petroleum.....	Quantity	50		57		
	\$	422		285		
<b>Total.....</b>	<b>Quantity</b>	<b>2,132</b>	<b>400</b>	<b>107,534</b>		<b>2</b>
	<b>\$</b>	<b>4,343</b>	<b>4,763</b>	<b>102,782</b>		<b>36</b>
<i>Other Non-Metal Mining</i>						
Abrasives—natural.....	Quantity 144					
	\$ 1,010					
Asbestos.....	Quantity 14,825	110	6,159			126
	\$ 99,348	945	41,448			1,502
Feldspar and Quartz.....	Quantity 170					1
	\$ 982	6,099				16
Gypsum.....	Quantity 4,062					148
	\$ 20,727					1,212
Iron Oxides.....	Quantity 36		16			
	\$ 250		246			
Mica.....	Quantity					
	\$					
Salt.....	Quantity 2,420	38,096				
	\$ 10,827	156,940				
Talc and Soapstone.....	Quantity 25	49	39			
	\$ 300	317	432			
Miscellaneous.....	Quantity 6,780	259		10,732		
	\$ 44,077	1,152		32,340		
<b>Total.....</b>	<b>Quantity</b>	<b>39,415</b>	<b>6,214</b>	<b>10,732</b>		<b>275</b>
	<b>\$</b>	<b>166,453</b>	<b>42,188</b>	<b>32,340</b>		<b>2,790</b>
<b>STRUCTURAL MATERIALS AND CLAY PRODUCTS</b>						
Cement.....	Quantity 48,905	46,955				
	\$ 236,947	229,399				
Clay Products.....	Quantity 6,887	33,943		271		115
	\$ 39,891	200,269		1,068		1,099
Lime.....	Quantity 21,593	27,795	110	34		10,096
	\$ 120,885	120,097	558	113		64,280
Sand and Gravel.....	Quantity 10,454	694	2			9
	\$ 51,484	4,508	35			88
Stone.....	Quantity 1,690	3,884	512	21		25
	\$ 11,649	24,551	3,468	105		308
<b>Total.....</b>	<b>Quantity</b>	<b>113,271</b>	<b>624</b>	<b>326</b>		<b>10,245</b>
	<b>\$</b>	<b>581,824</b>	<b>4,061</b>	<b>1,296</b>		<b>65,781</b>
<b>Canada.....</b>	<b>Quantity</b>	<b>184,649</b>	<b>8,600</b>	<b>118,392</b>		<b>12,588</b>
	<b>\$</b>	<b>966,527</b>	<b>72,523</b>	<b>136,408</b>		<b>88,841</b>

NOTE.—Fuel and electricity used for metallurgical purposes and not included above consisted of bituminous coal from Canadian mines 244,701 tons, value \$1,657,991; imported bituminous, 109,006 tons at \$578,272; coke, 129,605 tons at \$1,165,432; fuel oil, 7,218,294 gallons at \$327,775; wood, 5,489 cords at \$28,963; manufactured gas, 45,886 M cu. ft., at \$4,998; electricity purchased 380,331,833 K. W. H. at \$1,232,104, and other fuel valued at \$22,079. Total value \$5,017,614.



## Industry in Canada, by Kinds and Industries, 1933

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.
7,324	830	101,200	2,915						11,301,002
3,134	317	10,600	20,564					35,165	
244,767	9,536	1,828,112	54,405	21			317,550,168		15,758,080
67,325	2,489	189,453	209,011	348		66	2,661,852	3,330,137	
3,170	857	394,568	1,192				68,641,303		25,757,872
990	204	19,211	2,747			15,485	351,407	404,625	
1,358		7,326	410				5,487,755		
459		1,200	2,472			11,360	51,019	83,545	
22,861	369	169,838	60				39,040,970		3,396,440
23,295	135	23,602	263				163,861	264,277	
2,290	1,355	51,449	62				43,546,440		
630	276	4,725	372				133,473	152,984	
295			500				3,000		
78			1,000				100	1,178	
29,541	4,395	3,078,478	160	127,372	79		833,473,571		15,442,203
5,653	948	114,325	657	14,011	69	5,098	2,522,078	2,792,322	
211,006	17,342	5,630,971	59,704	127,393	79		1,307,743,207		71,655,606
101,564	4,349	363,116	237,096	14,359	69	32,009	5,884,790	7,084,253	
45,216	4,112	5,731					80,231,995		45,068,623
11,869	852	844					1,256,923	3,214,632	
22,192	3,000	1,130			79,332		10,996		
5,573	317	80			37,827		222	53,994	
2,562	300	35,630	82		1,645,033		1,448,496		1,859,830
618	36	1,374	246		113,084		20,213	136,278	
69,970	7,412	42,491	88		1,724,365		90,691,487		46,928,453
18,060	1,205	2,298	246		150,911		1,277,358	3,404,904	
100									
24								1,634	
18,289	3,195	6,402					53,024,096		
3,201	490	732					623,661	771,327	
13,152	271	65,026		342			286,762		438,300
3,138	59	5,946	1,300			96	8,691	26,327	
44,697	224	79,716	918		10,763		2,725,415		781,190
11,243	49	3,983	2,891		4,305		47,108	91,518	
	65		783				71,774		
	12		3,094				2,153	5,755	
			80						
			80					80	
200	127	89,369	1,258				685,840		5,968,524
62	37	8,043	7,548				7,916	191,373	
2,675			113				1,441,864		
535			452				24,388	26,424	
43,996	270	1,500,104	459				62,875		1,375,426
7,076	59	89,689	1,406				713	176,512	
123,109	4,152	1,740,617	3,611	542	10,765		58,298,628		8,663,440
25,879	706	108,593	15,471	1,300	4,305	96	714,630	1,290,350	
39,178	581	37					48,160,143		
6,793	102	5					508,841	982,067	
19,424	130	12,622	14,408		173,485		3,749,105		59,578
4,451	27	1,320	52,529		11,232		65,435	377,321	
4,120	35	324,095	35,677	1,300			5,343,821		857,799
889	7	9,865	110,601	780			38,956	473,125	
81,157	151	205,770				88	1,990,397		150,000
17,923	28	10,024				98	44,374	129,410	
133,669	620	61,912	2,294			907	12,470,882		209,380
30,272	97	5,121	6,030				201,416	283,454	
277,518	1,517	664,436	52,379	1,300	173,583		71,714,349		1,276,757
60,328	261	26,335	163,160	790	11,271	1,432	859,922	2,245,397	
782,233	30,423	8,078,515	115,776	129,035	1,904,790		1,528,417,668		128,424,256
205,231	6,541	590,112	421,963	16,439	166,556	33,537	8,734,800	14,024,904	

Table 26.—Fuel and Electricity Used in the Mineral

Industry	Bituminous coal		Anthracite coal	Lignite coal		Coke
	Canadian	Imported		Canadian	Imported	
	Tons	Tons	Tons	Tons	Tons	
<b>METAL MINING</b>						
Alluvial Gold Mines.....	Quantity	31				5
	\$	2,022				504
Auriferous Quartz Mines.....	Quantity	14,988	11,550	870	309	269
	\$	133,711	111,511	12,654	3,440	4,037
Copper-Gold-Silver Mines.....	Quantity	6,843		75		84
	\$	51,804		1,384		1,157
Silver-Cobalt Mines.....	Quantity	6	883	133		
	\$	79	12,261	2,224		
Silver-Lead-Zinc Mines.....	Quantity	27,629	31	3	160	8
	\$	115,669	986	77	873	66
Nickel-Copper Mines.....	Quantity	20	818	7		60
	\$	280	4,791	51		819
Miscellaneous Metal Mines.....	Quantity					
	\$					
Non-Ferrous Smelting and Refining.....	Quantity	3,315	20,131	58		2,371
(See footnote)	\$	15,374	113,051	889		25,506
<b>Total.....</b>	<b>Quantity</b>	<b>52,801</b>	<b>33,444</b>	<b>1,142</b>	<b>529</b>	<b>2,797</b>
	<b>\$</b>	<b>316,917</b>	<b>244,622</b>	<b>17,279</b>	<b>4,313</b>	<b>32,689</b>
<b>NON-METAL MINING, INCLUDING FUELS</b>						
<i>Fuels</i>						
Coal.....	Quantity	625,672		97,110		
	\$	1,963,140		91,487		
Natural Gas.....	Quantity	979	238	100		5
	\$	7,184	1,903	425		36
Petroleum.....	Quantity	1,217				
	\$	5,124				
<b>Total.....</b>	<b>Quantity</b>	<b>627,868</b>	<b>238</b>	<b>97,210</b>		<b>5</b>
	<b>\$</b>	<b>1,975,448</b>	<b>1,903</b>	<b>91,912</b>		<b>36</b>
<i>Other Non-Metal Mining</i>						
Abrasive—natural.....	Quantity	248				
	\$	1,653				
Asbestos.....	Quantity	17,900	14	8,269		110
	\$	120,695	193	52,756		1,309
Feldspar and Quartz.....	Quantity	1,001	1,325			
	\$	7,208	9,057			
Gypsum.....	Quantity	4,223	878		687	180
	\$	23,801	5,486		2,404	1,863
Iron Oxides.....	Quantity		211	19		
	\$		1,477	295		
Mica.....	Quantity					
	\$					
Salt.....	Quantity	4,221	39,767	80		
	\$	17,795	192,352	247		
Talc and Soapstone.....	Quantity	1				
	\$	9				
Miscellaneous.....	Quantity	8,904	631	21	22,331	1
	\$	48,957	2,845	232	59,660	7
<b>Total.....</b>	<b>Quantity</b>	<b>36,498</b>	<b>42,826</b>	<b>8,309</b>	<b>23,098</b>	<b>291</b>
	<b>\$</b>	<b>220,028</b>	<b>211,410</b>	<b>53,283</b>	<b>62,311</b>	<b>3,179</b>
<b>STRUCTURAL MATERIALS AND CLAY PRODUCTS</b>						
Cement.....	Quantity	69,853	60,877			
	\$	367,880	330,432			
Clay Products.....	Quantity	10,706	49,791	66	547	357
	\$	60,073	317,697	626	2,302	3,010
Lime.....	Quantity	29,144	40,156	85	57	10,035
	\$	173,350	194,568	324	189	66,580
Sand and Gravel.....	Quantity	3,007	11,481			4
	\$	15,702	63,728			35
Stone.....	Quantity	1,364	5,143	518		
	\$	10,476	36,052	3,712		
<b>Total.....</b>	<b>Quantity</b>	<b>114,074</b>	<b>167,448</b>	<b>649</b>	<b>694</b>	<b>10,396</b>
	<b>\$</b>	<b>627,571</b>	<b>912,477</b>	<b>4,662</b>	<b>2,491</b>	<b>69,625</b>
<b>Canada.....</b>	<b>Quantity</b>	<b>831,241</b>	<b>243,956</b>	<b>10,100</b>	<b>121,441</b>	<b>13,489</b>
	<b>\$</b>	<b>3,139,961</b>	<b>1,400,412</b>	<b>75,224</b>	<b>161,027</b>	<b>164,929</b>

NOTE.—In addition to the items listed, this industry consumed for metallurgical purposes 373,362 tons of Canadian bituminous coal valued at \$2,320,909; 50,493 tons of imported bituminous at \$299,398; 261,897 tons of coke at \$2,476,281; 713 gallons of gasoline at \$210; 399 gallons of kerosene at \$89; 9,894,420 gallons of fuel oil at \$554,779; 4,662 cords of wood at \$26,721; 50,418 M cu. ft. of manufactured gas at \$5,848; 411,073,814 K.W.H. of purchased electricity at \$1,197,717, and other fuel valued at \$30,898.

## Industry in Canada, by Kinds and Industries, 1934

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K W.H.	\$	K W.H.
30,950	4,747	107,438	4,075						12,351,000
12,450	2,252	17,404	41,970			4		76,615	
348,584	41,310	3,076,092	108,984	30			415,570,129		29,745,373
116,269	8,215	371,662	395,908	466		270	3,091,147	4,219,296	
46,478	5,214	455,032	1,335				91,206,159		32,425,684
13,937	1,230	29,140	3,451			650	440,917	512,670	
1,208	40	4,118	1,457				5,276,797		
331	9	671	2,717			16,954	59,439	85,645	
21,544	238	382,123	762				37,690,307		16,286,150
20,299	125	58,167	7,408				185,606	389,276	
3,858	1,718	92,814	2,449				61,074,381		1,336,119
1,027	374	8,968	6,573				211,080	233,963	
795	10	180	410				29,734		
227	2	32	1,230				892	2,383	
47,363	7,089	2,741,880	69	92,035	152		1,077,765,407		20,251,796
10,133	1,539	121,952	344	11,320	122	8,852	3,255,630	3,564,712	
500,810	60,366	6,439,672	119,541	92,065	152		1,688,512,917		112,396,121
174,673	13,746	696,996	459,610	11,786	122	26,736	7,233,711	9,141,600	
40,660	4,299	4,570					105,530,072		41,315,731
12,525	1,028	617					1,379,990	3,448,787	
44,908	49	8,801	72		114,401		23,899		
10,000	6	518	288		46,565		416	67,341	
13,890	416	16,251	750		1,867,580		1,749,478		
3,064	49	4,268	2,250		129,446		24,147	168,338	
108,458	4,755	29,682	822		1,981,981		107,303,449		41,315,731
25,579	1,083	5,403	2,538		176,011		1,404,55	3,684,406	
3,500			40					2,616	
850			113						
29,226	3,664	6,580					67,564,901		
5,356	593	750					678,994	835,556	
30,715	350	104,183	504				452,272		900,000
7,627	78	9,355	1,090				11,430	45,854	
59,979	400	70,252	537		17,197		2,912,953		907,492
19,822	95	5,471	2,148	1,098	6,883	59	49,430	118,560	
			664				86,154		
			5,314				2,584	9,679	
162		58							126,329
42		8						50	
3,695	258	113,098	2,774				595,420		6,269,620
899	73	10,881	7,920				6,090	236,257	
7,042	193	730	31				1,428,653		
1,602	20	82	107				24,492	26,312	
25,487		1,611,093	1,154	37,245			1,927,711		1,323,750
5,741		96,578	4,243	3,501		20	18,140	210,224	
159,806	4,778	1,911,894	5,704	37,437	17,197		74,968,154		9,527,191
41,939	859	123,125	20,935	4,599	6,883	79	786,499	1,535,099	
69,890	907	145					48,457,250		
11,008	170	22					496,138	1,206,550	
25,735	650	10,116	19,212	212	412,024		4,679,491		75,540
5,723	106	1,990	71,075	997	8,792	57	86,284	558,732	
7,738	35	327,454	39,467		1,450		6,241,569		342,167
1,492	7	15,230	113,220		840		40,535	606,335	
64,933	107		7		50		2,447,727		150,000
12,832	21		39		30	909	61,808	155,194	
183,761	2,241	100,500	2,955				15,840,918		231,245
39,920	282	9,287	9,186			1,326	201,266	311,516	
332,060	3,940	44,221	61,611	212	412,524		77,666,916		798,952
71,884	586	26,529	193,520	997	9,662	2,292	886,031	2,838,327	
1,121,131	73,839	9,245,474	187,708	129,714	2,412,854		1,918,451,666		164,037,995
314,075	16,274	762,033	676,603	17,382	192,678	29,107	10,312,761	17,292,192	

Table 27.—Fuel and Electricity Used in the Mineral

Province	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons		Tons	Tons	
Nova Scotia.....	Quantity 361,890	5				820
	\$ 1,284,407	80				4,804
New Brunswick.....	Quantity 5,838	7				
	\$ 24,029	122				
Quebec.....	Quantity 82,234	29,732	7,045			4,735
	\$ 450,803	164,544	49,929			35,557
Ontario.....	Quantity 19,645	154,422	1,476			6,799
	\$ 131,159	792,653	21,804			46,449
Manitoba.....	Quantity 2,710	388		34		20
	\$ 20,219	4,310		113		256
Saskatchewan.....	Quantity 2,162			42,098		
	\$ 15,622			66,090		
Alberta.....	Quantity 115,580			75,539		
	\$ 301,800			70,100		
British Columbia.....	Quantity 143,817	80	79	21		205
	\$ 447,259	2,584	790	105		1,795
Yukon.....	Quantity 22	6				
	\$ 78	2,234				
Canada.....	Quantity 733,898	184,640	8,600	118,592		12,388
	\$ 2,675,376	966,327	72,523	136,408		89,861

\*See footnote, table 25.

Table 28.—Fuel and Electricity Used in the Mineral

Province	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons		Tons	Tons	
Nova Scotia.....	Quantity 410,120	154	6			2,640
	\$ 1,429,427	1,746	91			15,115
New Brunswick.....	Quantity 6,011	8				
	\$ 27,040	130				
Quebec.....	Quantity 101,672	28,184	8,903			2,540
	\$ 581,346	176,722	58,049			19,918
Ontario.....	Quantity 19,670	213,783	1,123	68		7,546
	\$ 147,678	1,200,408	15,285	405		59,231
Manitoba.....	Quantity 11,997	1,738		799		57
	\$ 96,597	17,437		2,678		964
Saskatchewan.....	Quantity 3,491			54,126		12
	\$ 23,966			93,575		190
Alberta.....	Quantity 126,363			65,686		
	\$ 352,173			58,930		
British Columbia.....	Quantity 151,804	57	68	762		689
	\$ 481,668	1,411	1,799	5,379		9,007
Yukon and N.W.T.....	Quantity 23	32				5
	\$ 69	2,558				504
Canada.....	Quantity 831,241	243,956	10,100	121,441		13,489
	\$ 3,139,964	1,400,412	75,221	161,027		104,929

\*See footnote, table 26.



## Industry in Canada, by Provinces, 1933\*

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.
53,021	322	47,725	816				65,018,005		14,081,073
13,079	77	5,375	3,060				908,348	2,219,236	
5,713		805	8,404		15,318		943,001		
1,519		40	30,640		7,500		19,643	83,493	
248,358	10,210	1,894,733	47,333	342			247,773,170		7,463,332
57,427	1,676	112,407	166,170	1,300		578	1,913,152	2,953,543	
323,099	10,927	967,988	32,419	1,321	81,410		526,275,310		13,452,791
71,669	2,380	85,799	118,600	1,128	40,213	11,421	3,567,779	4,891,654	
15,655	314	39,545	12,436				151,244,115		118,935
7,320	110	10,374	51,726				139,774	234,202	
43,476	575	1,505,996	3				49,677,889		1,682,604
9,101	148	90,187	14				57,736	238,599	
18,470	3,907	41,398	581		1,812,062		18,378,699		16,807,813
5,168	798	2,223	2,481		118,843	43	304,121	805,677	
61,166	4,037	3,578,034	12,094	127,372			469,137,479		63,611,708
10,686	1,254	191,972	31,868	14,011		21,495	1,824,247	2,557,066	
13,285	71	2,291	1,690						11,206,000
20,262	98	1,765	17,398					41,835	
782,233	30,423	8,078,515	115,776	129,035	1,908,790		1,528,147,668		128,424,256
205,231	6,541	500,112	421,963	16,439	166,556	33,637	8,731,900	14,024,904	

## Industry in Canada, by Provinces, 1934\*

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.
75,779	817	121,659	2,249	37,245			78,175,417		15,397,214
23,356	202	13,038	7,190	3,501		59	1,038,175	2,532,500	
9,198		9,501	9,027		20,304		853,149		
1,995		546	32,360		8,526		27,616	98,213	
312,615	15,080	2,106,565	59,935				339,764,104		10,473,633
78,332	2,886	163,319	192,209			1,340	2,154,876	3,429,003	
441,057	18,628	1,007,167	70,795	242	119,631		655,437,825		18,398,231
100,948	4,796	140,179	237,820	1,463	49,342	17,506	4,004,484	6,039,605	
49,001	2,399	53,177	23,618	192			171,555,944		68,480
24,604	750	14,114	113,597	1,098		520	183,813	456,172	
46,440	634	1,622,604	26				41,551,413		1,861,090
11,017	161	98,106	131			130	57,885	255,161	
29,484	4,327	30,703	1,550		2,272,919		21,437,899		9,296,146
8,300	1,034	5,721	5,662		134,810		321,375	898,005	
137,548	29,881	4,167,349	16,026	92,035			639,075,715		96,616,001
44,195	4,987	310,762	44,645	11,320		9,546	2,464,540	3,359,259	
20,012	2,073	36,749	3,582						11,926,000
21,328	1,458	15,668	42,989					84,574	
1,121,134	73,839	9,245,474	187,798	129,714	2,412,854		1,948,451,446		164,037,995
314,075	16,274	762,653	676,603	17,352	182,678	29,107	10,312,764	17,292,492	

Table 29.—Power Employed in the Mineral Industry in Canada, by Provinces, 1934, with Comparative Totals for 1933

Province	Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
Nova Scotia..... No.	100	13	60	.....	173	690	863	107	149
..... H.P.	58,619	1,344	2,744	.....	62,707	50,837	113,541	6,371	36,929
New Brunswick..... No.	26	1	38	.....	65	112	177	.....	33
..... H.P.	1,660	35	1,021	.....	2,716	1,728	4,444	.....	1,715
Quebec..... No.	65	37	129	5	236	3,039	3,275	163	138
..... H.P.	2,611	5,306	4,005	1,155	13,077	147,424	160,501	2,763	11,489
Ontario..... No.	203	156	284	16	659	6,630	7,286	830	285
..... H.P.	18,446	6,853	11,619	6,221	43,139	286,952	330,091	18,184	32,658
Manitoba..... No.	42	6	51	.....	99	1,249	1,348	11	51
..... H.P.	4,857	546	2,486	.....	7,889	52,696	60,585	135	4,717
Saskatchewan..... No.	58	6	38	.....	102	339	441	112	27
..... H.P.	4,499	933	1,191	.....	6,623	12,601	19,221	1,296	3,777
Alberta..... No.	230	1	122	.....	353	962	1,315	378	256
..... H.P.	33,889	75	2,448	.....	36,412	32,672	69,084	11,294	29,679
British Columbia..... No.	141	108	108	77	434	3,354	3,788	1,218	173
..... H.P.	36,337	11,445	2,411	45,469	96,662	162,960	258,622	46,710	33,557
Yukon and N.W.T. No.	12	1	13	2	28	.....	28	107	16
..... H.P.	284	70	318	2,090	2,672	.....	2,672	6,144	515
Canada, 1934..... No.	874	329	843	100	2,146	16,975	19,121	2,926	1,128
..... H.P.	161,202	26,607	28,243	54,845	270,897	747,870	1,018,767	92,897	155,036
Canada, 1933..... No.	817	170	756	107	1,830	14,917	16,747	2,575	1,022
..... H.P.	160,764	17,660	23,494	115,428	317,346	699,178	1,016,524	73,157	150,863

NOTE.—Includes stand-by equipment.

Table 30.—Power Employed in the Mineral Industry in Canada, by Industries, 1934, with Comparative Totals for 1933

Industry	Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
METAL MINING—									
Alluvial Gold Mines..... No.	12	7	34	10	63	.....	63	118	10
..... H.P.	284	630	632	2,188	3,734	.....	3,734	6,784	289
Auriferous Quartz Mines..... No.	112	137	175	31	455	3,508	3,963	467	236
..... H.P.	6,932	17,021	7,257	8,896	40,106	125,739	165,845	11,366	17,173
Copper-Gold-Silver Mines..... No.	6	4	26	7	43	1,510	1,553	138	14
..... H.P.	3,225	303	1,790	9,300	14,618	65,524	80,142	7,770	3,083
Silver-Cobalt Mines..... No.	3	.....	.....	.....	3	40	43	.....	8
..... H.P.	235	.....	.....	.....	235	1,473	1,708	.....	575
Silver-Lead-Zinc Mines..... No.	3	18	15	5	41	502	543	236	23
..... H.P.	6,000	1,683	422	590	8,695	16,914	25,609	6,453	3,361
Nickel-Copper Mines..... No.	1	.....	1	2	4	417	421	14	2
..... H.P.	80	.....	2	750	832	29,634	30,466	746	233
Miscellaneous Metal Mines..... No.	1	2	4	.....	7	2	9	.....	4
..... H.P.	25	80	53	.....	158	12	170	.....	140
Non-ferrous Smelting and Refining..... No.	34	.....	15	10	59	5,003	5,062	840	50
..... H.P.	10,556	.....	543	14,035	31,134	247,889	279,023	16,750	25,701
Total..... No.	172	168	270	65	675	10,982	11,657	1,819	347
..... H.P.	33,337	19,717	10,699	35,759	99,512	487,185	586,697	49,869	50,555
NON-METAL MINING, INCLUDING FUELS—									
Fuels									
Coal..... No.	399	2	103	2	506	1,672	2,178	597	415
..... H.P.	108,360	83	1,343	12,000	121,786	79,780	201,566	29,477	75,573
Natural Gas..... No.	16	121	74	.....	211	28	239	13	12
..... H.P.	565	2,289	2,997	.....	6,861	679	6,530	202	470
Petroleum..... No.	45	.....	72	.....	117	89	206	39	90
..... H.P.	2,661	.....	1,751	.....	4,412	657	5,069	1,487	6,805
Total..... No.	460	123	249	2	834	1,789	2,623	649	517
..... H.P.	111,586	2,372	6,091	12,000	132,049	81,116	213,165	31,166	82,948

Table 30.—Power Employed in the Mineral Industry in Canada, by Industries, 1934, with Comparative Totals for 1933—Concluded

Industry	Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
<b>Non-Metal Mining, including Fuels—Conc.</b>									
<i>Other Non-Metal Mining</i>									
Abrasive—natural No. H.P.	8		4		12	30	42		4
Asbestos No. H.P.	325		112		437	550	987		225
Feldspar and Quartz No. H.P.	4		1		5	690	695		7
Gypsum No. H.P.	110		2		112	36,391	36,503		1,100
Iron Oxides No. H.P.									
Mica No. H.P.	10	3	16		29	28	57	35	15
Salt No. H.P.	587	600	717		1,904	635	2,539	208	851
Talc and Soapstone No. H.P.	16	4	42		62	254	316	22	11
†Miscellaneous No. H.P.	1,421	536	2,084		4,041	7,642	11,683	538	1,160
Total No. H.P.									
	9	4	9	1	3	81	81	3	15
	1,680	580	36	145	154	1	155	115	50
					17	36	53	138	10
					2,296	526	2,822	1,367	3,120
		1	8		9	20	29		1
		25	98		123	708	831		80
	5	3	10	2	20	75	95	58	9
	670	700	660	200	2,236	2,514	4,750	710	875
	52	15	87	3	157	1,140	1,297	256	59
	4,793	2,441	3,724	345	11,303	49,018	60,351	2,938	7,476
<b>CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—</b>									
Cement No. H.P.	4	2	42	9	57	1,288	1,345	119	15
Clay Products No. H.P.	613	610	1,592	5,336	8,151	75,630	83,781	6,882	587
Lime No. H.P.	72	3	40		121	523	644	22	81
Sand and Gravel No. H.P.	5,847	232	1,081		7,160	18,010	25,170	768	7,466
Stone No. H.P.	11	3	16	2	32	269	301	37	25
Total No. H.P.	410	329	321	60	1,120	5,789	6,900	483	1,795
	12		32	7	51	199	250	2	8
	644		1,368	240	2,252	6,812	9,164	45	565
	91	15	101	12	219	785	1,004	22	76
	3,972	906	3,367	1,105	9,350	24,189	33,539	746	3,744
	190	23	237	30	480	3,064	3,544	202	205
	11,466	2,977	7,729	6,741	29,033	130,321	158,554	8,924	14,157
Grand total 1934 No. H.P.	874	329	843	100	2,146	16,975	19,121	2,926	1,128
Grand total 1933 No. H.P.	161,202	26,607	28,243	51,845	270,897	747,870	1,018,767	92,897	155,636
Grand total 1933 No. H.P.	817	159	756	107	1,830	14,917	16,747	2,575	1,022
Grand total 1933 No. H.P.	160,764	17,660	23,491	115,428	317,346	699,178	1,016,521	73,157	150,863

†Includes data for pent.

Table 31.—Accidents in the Mining Industry in Canada, by Provinces\*, during 1933 and 1934

Cause of accident	Nova Scotia		New Brunswick		Quebec		Ontario		Saskatchewan		Alberta		British Columbia		Canada	
	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal
<b>UNDERGROUND—</b>																
Falls of roof or face	15	442	1	98		57	7	107	1	62	6	46	11	328	41	1,140
Mine cars and locomotives	10	288		46		36	1	121		33	3	31	4	122	18	672
Gas and dust explosions	2	1		1							3			3	5	7
Explosives		1		4	4	9	4	27				2	2	8	10	51
Electricity												9		4		13
Miscellaneous	4	609		97	3	70	10	1,030		128		33	10	645	27	2,603
Total	31	1,332	1	246	7	172	22	1,255	1	223	12	123	27	1,110	101	4,491
<b>SURFACE—</b>																
Haulage and cars		38	1	5		61	1	11		34		3		24	2	176
Machinery	1	16		11	2	41	4	50		6		5	1	15	8	144
Miscellaneous		168		19	4	149	5	567		48	3	7		207	12	1,255
Total	1	222	1	35	6	251	10	628		88	3	15	1	336	22	1,575
Grand total for 1934	32	1,554	2	281	13	423	32	1,913	1	311	15	138	28	1,446	123	6,066
Grand total for 1933	12	783		208	8	349	25	1,513	4	267	6	169	14	1,061	69	4,350

\*Data for Manitoba not available.

## SPECIAL REPORT ON THE CONSUMPTION OF SUP

TABLE 32.—\*PURCHASES OF MINING AND MILLING EQUIPMENT, GE  
BY THE ENTIRE CANADIAN

	Nova Scotia
	\$
Belting of all kinds, including elevator, conveyor, transmission, etc., and fasteners for same.....	34,093
Bolts, nuts, rivets, studs, washers, coach, set and machine screws, etc.....	64,916
Castings:—unfinished iron and steel.....	43,665
Unfinished brass castings; brass and copper rods and sheets, babbitt and non-ferrous metals of all kinds.....	20,876
Cars and locomotives and mechanical parts for same.....	293,295
Track materials:—rails and fittings, switches, spikes, bolts, etc.....	139,414
Explosives:—powder, fuse and detonators.....	252,538
Rock drills and parts.....	25,721
Drill and tool steels.....	9,396
Pipe and fittings, plumbing supplies and valves.....	228,283
Well casings.....	
Iron and steel bars, sheets, plates, and all structural steel.....	145,165
Wire rope and fittings.....	180,468
Diamonds and bort for drilling.....	
Safety equipment and apparel:—Safety hats, boots, gloves, goggles, respirators, etc; miners' lamps and accessories and lamp rentals.....	71,200
Fuel:—coal, coke, charcoal and wood.....	55,435
Fuel oil, kerosene, and gasoline.....	53,638
Lubricants:—oil, grease, and waste.....	92,381
Lumber and timber of all kinds.....	655,152
Building materials:—cement, brick, tile, roofing and building paper, insulating material, building hardware, glass, putty, paints, varnishes and brushes, wood screws, nails, screw hooks and eyes, sand, lime, and miscellaneous.....	101,551
Electrical equipment and supplies:—motors, batteries, wire and cable, etc.....	199,611
Crushing, grinding and screening machinery and parts; ball and tube mill liners, roll shells, etc.....	23,070
Filter cloth, rotor covers and ore dressing blankets.....	20
Balls and rods for grinding.....	1,598
Machinery, mill, n.o.p. and parts.....	14,881
Machinery, mine, n.o.p., and parts:—steel shop equipment, hoists, mine pumps, etc.....	97,077
Machinery, smelter, n.o.p., and parts.....	
Machinery, miscellaneous, and parts: machine, blacksmith, carpenter shop and general surface equipment.....	59,804
Motor cars, trucks and accessories.....	19,267
Tools:—brooms, picks, shovels, hammers, handles, saws, wrenches, machinists' tools, etc.....	23,582
Welding and cutting equipment and accessories:—oxygen, acetylene welding, rods, tips, etc.....	23,877
Rubber goods, suits, boots, hose and accessories, pump valves, launder linings, etc. (not including belts).....	18,410
Flotation reagents.....	
Cyanide and cyanide plant chemicals.....	3
Acids and chemicals, n.o.p.....	1,442
Refractories:—brick, cement, fireclay, etc.....	19,306
Smelter fluxes:—fluorspar, limestone, quartz, sand, etc.....	150
Hospital equipment and medical supplies.....	3,831
Stationery, office equipment and supplies, survey and drafting equipment and supplies.....	34,775
Miscellaneous materials, n.o.p. Includes all materials NOT OTHERWISE PROVIDED FOR in any other item.....	225,344
Power—electric.....	1,007,449
Freight (a) incoming—only amounts paid direct to Railway Company.....	185,129
(b) outgoing.....	125,876
Express (a) incoming—only amounts paid direct to Express Company.....	4,164
(b) outgoing.....	377
Insurance (a) Fire.....	38,149
(b) Sickness and accident.....	29
(c) Group.....	1,451
(d) Workmen's compensation.....	458,379
(e) Bullion.....	40
(f) Other.....	35,373
Added Items for Coal Mining Industry—	
(a) Underground mine cars.....	111,992
(b) Coal cutting machinery and parts.....	159,084
(c) Horses and horse-keep (includes the purchase of horses, oats, hay, mixed feeds, harness, etc.).....	88,150
(d) Ground limestone for dusting.....	39,203
<b>Total.....</b>	<b>\$ 5,488,030</b>

\* Compiled from data received from 629 companies. The survey is not entirely comprehensive, since it was found impracticable to collect or obtain returns from individuals or companies whose records were either incomplete or entirely lacking. Then again, returns were not generally obtainable from prospectors or syndicates whose operations were of an exploratory nature and conducted in isolated or remote regions and whose expenditures would amount to a considerable sum in the aggregate.



## PLIES BY THE CANADIAN MINING INDUSTRY, 1934

NERAL SUPPLIES, AND FREIGHT AND INSURANCE EXPENDITURES,  
MINING INDUSTRY, IN 1934

New Brunswick	Quebec	Ontario	(a) Manitoba and Saskatchewan	Alberta	British Columbia and Yukon	Canada
\$	\$	\$	\$	\$	\$	\$
715	58,817	106,027	15,800	9,528	79,656	301,639
1,245	106,589	111,922	20,087	11,604	118,251	491,615
288	28,273	131,081	16,134	11,139	103,662	331,210
189	55,700	57,393	26,711	2,716	317,587	481,133
39,565	290,375	29,395	21,093	109,665	780,393	603,717
52,323	262,256	51,003	22,346	74,482	5,310,932	1,059,007
723,179	2,708,440	316,479	112,038	1,183,263	658,443	1,665,381
143,004	569,407	67,700	13,559	230,420	309,606	1,761,866
76,234	399,993	27,214	61,158	84,375	705,618	157,150
183,878	789,893	87,006	118,589	252,730	413,811	7,151,816
47,876	846,572	113,057	48,585	338,512	1,518,316	651,218
510	269,475	193,671	40,570	63,776	4,153,613	1,437,743
2,514	39,215	124,133	5,903	234	2,342,920	1,275,150
21,677	140,607	15,254	21,488	169,138	203,263	1,060,635
2,339	23,785	3,933,760	229,102	16,551	317,094	1,765,365
6,787	1,249,518	684,202	49,729	41,859	24,395	1,259,977
2,901	293,561	216,489	57,063	65,338	140,225	497,090
2,682	74,577	2,352,472	106,413	325,848	270,371	887,605
40,132	245,910	58,468	51,156	336,636	65,665	432,829
4,167	248,599	919,161	172,434	51,397	76,433	3,818,043
5,285	422,069	644,198	80,027	5,547	2,377,384	9,139,510
1,295	255,679	135,471	11,669	2,203	2,307,888	8,456,238
12,280	103,581	728,480	89,337	41,620	187,844	837,718
932	336,496	754,430	111,074	3,230	2,001	50,453
10,660	314,557	581,021	171,544	224,494	76,350	2,161,149
85,740	601,205	19,930	19,930	24,395	6,747	58,208
10,701	199,775	535,054	52,127	149,810	94,120	183,500
525	42,509	137,070	22,126	45,368	189	161,932
1,973	51,780	181,370	43,620	19,895	12,243	268,098
841	37,989	117,922	25,603	11,436	11,473	192,184
723	44,591	150,280	20,742	5,943	1,703	43,657
182,965	253,817	180,452	180,452	7,608		
38,490	710,923	144,998	144,998	6,251		
165	38,321	19,136	19,136	7,608		
120	164,550	547,097	45,823	6,251		
10,702	1,283,633	91,873	91,873	122,847		
100	4,042	26,501	1,537	1,684		
3,448	58,465	160,061	22,466	28,666		
1,000	702,347	1,093,737	883,768	185,065		
15,736	1,345,704	4,075,773	131,094	186,310		
12,957	775,332	4,590,675	468,118	116,139		
31,721	102,977	469,155	467,073	275,533		
967	11,931	109,136	2,191	6,771		
368	12,326	63,883	6,938	764		
3,809	155,144	310,141	60,281	102,380		
4,555	36,943	1,193	1,193	5,432		
355	28,674	127,298	1,202	17,951		
30,463	163,845	766,212	124,815	259,475		
4,446	47,021	934	934	6,747		
8,016	22,218	10,863	10,863	12,710		
5,936		3,533	3,533	40,282		
16,754		1,699	1,699	74,318		
2		12,011	12,011	70,548		
		365	365	2,386		
239,997	9,713,823	35,072,148	4,842,640	3,195,334	17,530,593	76,082,763

(a) Since the operations of one large mining and smelting company are conducted on the Interprovincial boundary, it was necessary to combine the statistics for Manitoba and Saskatchewan.

## CHAPTER TWO

## THE GOLD MINING INDUSTRY IN CANADA

(With tables showing the production of gold)

## General Review

## CANADA

**Definition of the Industry.**—Gold mining in Canada is classified into three principal industries—(a) the recovery of gold from the gravels and sands of stream channels or beaches or what is defined as "The Alluvial Gold Mining Industry"; (b) the recovery of lode gold, which is named "The Auriferous Quartz Mining Industry" and in which industry the gold is usually the most important economic constituent of the ores mined and quartz the predominant gangue mineral; (c) gold is often found in various other mineral deposits, more particularly in those of copper, and for this reason the review of Canada's "Copper-Gold-Silver Mining Industry" is included here to complete a more comprehensive survey of the Canadian gold mining industry.

**Historical.**—The early history (1850-1895) of gold production in Canada is largely confined to the placer operations of the pioneer prospector in British Columbia and it was from this source that most of the metal was derived until the discovery, in 1896, of the extremely rich gravels of the Klondike river in the Yukon Territory, between 1898 and 1905 gold to the value of more than \$100,000,000 (4,838,000 fine ounces) is stated to have been obtained from the placers of the Bonanza, Eldorado, Hunker, Dominion and Sulphur Creeks. Almost coincident with this western activity was witnessed the Lake of the Woods discoveries in Ontario and renewed activity on the Nova Scotia quartz veins. The past fifteen to twenty years, although witnessing a decline in the alluvial gold industry, have given to the nation the highly productive auriferous quartz mines of the Porcupine and Kirkland Lake camps in Ontario and of the Portland Canal and Bridge River districts in British Columbia. The base metal mining industries are now contributing important and increasing quantities of gold to Canada's total production. This has been mostly highly reflected in the growing gold production originating in the recent expansion in copper-nickel and copper-gold mining industries; this increase is strikingly exemplified in the recovery of the metal as the result of extensive mining and metallurgical developments at the Noranda copper mine in the province of Quebec, the Frood mine in the Sudbury area of Ontario and the Flin Flon mine in Manitoba.

**Sources.**—The greater part of the gold production of Canada comes from the Canadian shield, an immense area of precambrian rocks extending from the Labrador Coast westward almost to the mouth of the MacKenzie River. The area of the shield is roughly 1,825,000 square miles, almost half of Canada—the precambrian shield is not only our present greatest reservoir of the precious metal, but in all probabilities the most fruitful region for discovery of new deposits.

Production of new gold from all sources in Canada during 1934 amounted to 2,972,074 fine ounces, valued at \$61,438,220 as compared with an output of 2,949,309 fine ounces valued at \$60,967,626 in 1933 and 3,044,387 fine ounces worth \$62,933,063 in 1932, (gold valued at \$20.671834 per fine ounce). The quantity of metal recovered in 1934 represents only an increase of .8 per cent over the preceding year, however, the value of production, in Canadian funds, realized a 21.6 per cent gain over that for 1933.

The 1934 output originated as follows: gold contained in crude bullion made at gold mines, 2,335,132 fine ounces; alluvial gold, 59,284 fine ounces; gold in blister and anode copper and in base bullion made at Canadian smelters, 434,635 fine ounces; and the estimated recovery of gold in ores, matte, slags, residues and concentrates exported to foreign metallurgical plants, 143,023 fine ounces.

Of the total Dominion output, Nova Scotia contributed 3,525 fine ounces; Quebec, 390,097 fine ounces; Ontario, 2,105,339 fine ounces; Manitoba, 132,321 fine ounces; Saskatchewan, 5,405 fine ounces; Alberta, 393 fine ounces; British Columbia, 296,196 fine ounces and the Yukon Territory, 38,798 fine ounces.

**Importance of the Industry and Recent Gold Legislation.**—Practically all of Canada's gold bullion is shipped by the mines to the Royal Canadian Mint at Ottawa. Up until April 19th, 1933, Canada shipped refined gold to New York accepting payment in United States funds at the coinage value, later after April 19th, on which date the United States went off the gold standard, this gold was consigned to London. The present practice, as that prevailing throughout 1934, is to ship gold to the most advantageous market, either London or New York. During the earlier movements of gold to New York the mining companies were paid a premium on the net value of their gold at a rate equivalent to the exchange premium in United States funds on the date of deposit of the gold at the Mint. After April 19th, 1933, the Mint paid the producer the standard rate per fine ounce, less charges for melting, assaying and refining, and when the gold was sold in a foreign market the difference between the standard rate and the net amount realized, was returned to the producer or shipper. The average price in Canadian funds of gold in 1934, based on the average prices paid by New York or London, was \$34.50 as against \$28.60 in 1933 or in other words the value of the 1934 Canadian gold production amounted, in Canadian funds, to \$102,536,553 as against \$84,350,237 in 1933.

The more outstanding events associated with the recent rise in price of gold include the suspension of specie payments by Great Britain on September 21, 1931; the direct control and licensing of Canadian gold exports by the Canadian Government; the purchase by the Canadian Government of all new gold bullion produced in the Dominion with the payment to the miner of equalization exchange; the departure of the United States from the gold standard on April 19th, 1933, and the announcement of January 31st, 1934, by President Roosevelt, that thereafter the United States Treasury would purchase gold from any quarter at not less than \$35.00 per fine ounce and would be empowered by United States Congress to offer, if necessary, up to \$41.34 an ounce. The weight of the new United States gold dollar is 15.5/21 grains, nine-tenths fine, as compared with the former gold dollar of 25.8 grains, nine-tenths fine. The new dollar contains 1/35 of an ounce of gold and an ounce of fine gold is equivalent to \$35.00.

The increase in the price of gold is reflected in an almost general expansion in the Canadian gold mining industry, in the older camps the economic mining of lower grade materials has resulted in a very large increase in ore reserves while deposits in other areas previously considered of little commercial importance have been developed and brought into production. Prospecting and exploration in both old and virgin districts have been both widespread and intensive, resulting in the discovery and development of new mines. These developments, of very great economic importance, have given to gold mining a status comparable with those of the great basic industries of the nation. The economic importance of primary gold production to the Dominion may be better appreciated when it is stated that, in the preliminary estimate by the Bureau of Statistics of the balance of International Payments for Canada in 1934, the net value of gold exports was surpassed only by the favourable balance of exports in the entire commodity trade of the Dominion, the favourable balance of \$145,000,000 in the entire commodity trade being raised to \$239,200,000 when the balance of gold exports is included. Again the net value of gold exports equalled 41 per cent of the net interest and dividend payments to foreign holders of Canadian securities, whether government, municipal or corporation and were \$19,200,000 in excess of the Dominion's requirements to meet its capital payments on maturing bonds. It is also interesting to note that the value of Canadian gold production per capita has increased within the last decade from \$3.86 in 1925 to \$9.45 in 1934.

According to the Department of Mines, Ottawa, a decided impetus will be given to Canadian gold development as a result of the \$1,000,000 Dominion Government program of geological field work undertaken during the 1935 season. The attention of the 180 parties placed in the field focussed mainly on areas where the geological occurrences were believed to be favourable to gold deposition. The program constituted the most ambitious effort ever undertaken by the Dominion Government toward assisting the prospector and engineer in the search for new sources of mineral wealth.

The Special War Revenue Act was amended in April 1934 to provide for a tax on newly mined Canadian gold. It was felt that the unusually prosperous condition of the gold mining industry due to the rise in price of gold from \$20.67 per ounce to about \$35.00 per ounce provided a basis for a gold tax. The increase in the price of gold in terms of the Canadian dollar resulted from national and international monetary policies.



The tax as finally approved by Parliament provided that mines that had paid dividends in the calendar years 1932 and 1933 were to pay a tax of 25 per cent of the premium value of the gold deposited for sale at the Royal Canadian Mint or exported under licence. The tax was not to operate to reduce the amount received by the mine below \$30.00 per ounce.

Against the tax collected, the tax-paying mines were allowed a deduction of an amount equal to the income tax payable by them for the year 1934, or, in those cases where the mine's fiscal year did not coincide with the calendar year, an amount equal to the income tax attributable to the calendar year 1934. The tax came into force on April 19, 1934, and was to continue until May 31, 1935.

In the Budget Speech of March 22, 1935, the Minister of Finance stated that the gold bullion tax would not be continued after May 31, 1935, and that important changes would be made in the depletion allowances allowed for Income Tax purposes to gold and silver mines. In future the allowance for depletion to mining companies, the principal product of which is gold or silver, is to be 33½ per cent instead of 50 per cent. Furthermore, dividends received by shareholders are now to be taxed on the basis of a 20 per cent depletion allowance instead of 50 per cent as formerly.

**Royal Canadian Mint.**—The Ottawa Mint, established as a branch of the Royal Mint under the (Imperial) Coinage Act, 1870, and opened on January 2, 1908, was by 21-22 Geo. V, c. 48, constituted a branch of the Department of Finance and since December 1, 1931, has operated as the Royal Canadian Mint. The great development of the gold mining industry in Canada has resulted in gold refining becoming one of the principal activities of the Mint. Gold coins have never been a popular medium of exchange in Canada and have not been struck since 1919, most of the fine gold produced from the rough shipments from the mines being delivered to the Department of Finance in the form of bars, the rest being sold in convenient form to manufacturers. The fine silver extracted from the rough gold, when not required for coinage, is sold on the New York market or disposed of to local manufacturing firms.

The domestic gold currency of Canada, as at present authorized by the Currency Act, consists of \$20, \$10, \$5 and \$2½ gold pieces, 900 millesimal fineness (only \$10 and \$5 pieces have been issued). Gold was used only to an insignificant extent as a circulating medium in Canada, its monetary use being practically confined to reserves; \$5 and \$10 gold pieces weighing respectively 129 and 258 grains, 9/10ths pure gold by weight, have been coined, the Canadian gold dollar thus containing 23.22 grains of pure gold. The \$5, \$10 and \$20 gold coins of the United States, which contain exactly the same weight of gold as Canadian gold coins of these denominations, are legal tender for their face value only, as are the British sovereigns, which are legal tender for \$4.86⅔, their equivalent in Canadian gold dollars.

The regulations in part for the receipt of gold bullion at the Royal Canadian Mint, Ottawa, are as follows:—Each parcel of bullion for which a separate assay is required shall be regarded as a separate deposit, and no ingot exceeding 1,500 ounces troy, gross weight, will be accepted. All deposits shall be dealt with in the order in which they are received. Deposits containing, by assay, less than 200 parts of gold in 1,000, as appearing, either before or after melting and assaying, to be unsuitable for treatment by the refining process in use, may be rejected. A deposit so rejected shall be returned to the depositor on payment by him of any costs incurred for melting and assaying.

The Mint charges, to be calculated on the gross weight of the deposit after melting, shall be as follows:—

(a) For melting and assaying—one dollar for the first four hundred ounces or part thereof, and twenty-five cents for each additional one hundred ounces or part thereof.

(b) For refining—when the deposit contains not more than 5 per cent base metal, 3 cents the ounce.

Over 5 per cent but not over 10 per cent base metal, 3½ cents the ounce.

Over 10 per cent but not over 15 per cent base metal, 4½ cents the ounce.

Over 15 per cent but not over 20 per cent base metal, 5 cents the ounce.

On deposits which contain over 20 per cent base metal, or which require other treatment a charge not exceeding 10 cents the ounce, to be determined by the cost of treatment.



The minimum charge for refining shall be two dollars for each deposit and the charge for refining shall apply to all deposits containing by assay less than 995 parts fine gold in 1,000.

An additional handling charge at the rate of 35 cents the ounce fine, to cover costs of realization in a market outside Canada, shall be made on all newly mined Canadian gold deposited with the Mint, and this charge shall be increased to \$1.00 the ounce fine on all other gold accepted as a deposit.

The gross value of gold deposited for sale with the Royal Canadian Mint or the Dominion of Canada Assay Office, Vancouver, shall be the market price of gold in the country to which the Government is at the time of the receipt of the deposit exporting gold, converted into Canadian funds at the average of the buying rates of exchange of that country reported to the Department of Finance by the Bank of Canada at 11 a.m. daily during the week in which the gold is deposited with the Mint or Assay office.

In addition to newly-mined Canadian gold there may be accepted at the Mint gold (over 1 ounce troy—fine) in the following forms:—old jewellery and dental scrap, provided it has not been melted or otherwise treated in any way to prevent its origin being readily recognized; scrap from manufacturers and refiners the result of processes carried out by them in the ordinary course of their business; gold coin which when full weight and fineness, is not legal tender in Canada. Satisfactory evidence as to the origin of the gold shall be furnished by the depositor if required.

Delivery of deposits shall be accepted at the Mint counter only free of all charges, and when bullion is forwarded by mail or express the original packages will not ordinarily be opened until an invoice of the description and weight of their several contents has been received. When there is a serious discrepancy between the actual and invoice weights of any deposit, further action in regard to it will be deferred pending communication with depositor.

The gross value of a deposit shall be calculated at a rate of one dollar for each 23.22 grains fine gold contained therein (equivalent to \$20.6718+ the ounce fine) and at a rate for all silver in excess of one per centum of the weight of the deposit after melting to be determined by the Minister of Finance—the rate to be paid for silver in any week shall be one cent below the average for that week of the daily London quotation for standard silver from Monday to Friday, inclusive, converted into the equivalent for fine silver in Canadian funds at the daily rate of exchange between Montreal and London, calculated to the nearest one-eighth of a cent.

### CONCENTRATION OF NATION'S GOLD RESERVES

With the opening of the Bank of Canada on March 11, 1935, important changes took place in connection with the monetary gold reserves of the Dominion. The Dominion transferred the gold held against Dominion Notes to the Bank of Canada to an amount of \$69,455,439.44. The Dominion's liability for Dominion Notes outstanding was assumed by the Bank of Canada.

Under section 28 of the Bank of Canada Act the chartered banks were required to transfer to the Bank of Canada all gold coin or bullion owned and held in Canada. The amount transferred to the Bank of Canada was \$37,480,494.46. The gold so transferred was valued at the standard price of \$20.67 per ounce. There was provision made, however, (section 30, Bank of Canada Act) that any profits resulting from the sale by the Bank of Canada of gold coin and bullion transferred to the Bank by the chartered banks or from an increase in the value of such gold resulting from any change in the monetary standard, shall belong to the chartered banks if the Governor in Council is satisfied that the said gold was at the time of transfer being held against liabilities elsewhere than in Canada. The Governor in Council directed that 40 per cent of the gold so held was against foreign liabilities. In addition, in the case of two banks additional concessions were made on account of special deposits of gold that were ear-marked against definite external liabilities.

Thus for the first time all the gold reserves of the country are held by the one institution which will henceforth be responsible for regulating the volume of credit and currency in Canada, and for protecting the external value of the national monetary standard.

Table 33.—Production of New Gold in Canada, by Provinces and Sources, 1933 and 1934

(Gold at \$20.671834 per fine ounce)

	1933		1934	
	Fine ounces	Value	Fine ounces	Value
		\$		\$
NOVA SCOTIA—				
In gold bullion and in ores exported.....	1,382	28,568	3,525	72,868
Exchange equalization.....		10,957		48,745
QUEBEC—				
In blister copper, in ores shipped and in gold bullion.....	382,886	7,914,956	390,097	8,064,020
Exchange equalization.....		3,035,583		5,394,327
ONTARIO—				
*Porcupine area—In gold bullion.....	1,046,091	21,624,620	949,799	19,634,087
*Kirkland Lake—In gold bullion.....	1,007,036	20,817,281	988,046	20,424,723
*Other gold mines—In gold bullion.....	65,404	1,352,020	107,120	2,214,367
Copper-nickel and other ores.....	36,988	764,610	60,374	1,248,041
Total.....	2,155,519	44,558,531	2,105,339	43,521,218
Exchange equalization.....		17,089,312		29,112,977
MANITOBA—				
In gold bullion, ores shipped and in blister copper.....	125,310	2,590,388	132,321	2,735,318
Exchange equalization.....		993,478		1,829,757
SASKATCHEWAN—				
In ores shipped to Canadian smelters and crude gold to Royal Canadian Mint.....	5,400	111,628	5,405	111,731
Exchange equalization.....		42,812		74,741
ALBERTA—				
In alluvial gold.....	324	6,698	393	8,124
Exchange equalization.....		2,569		5,434
BRITISH COLUMBIA—				
In alluvial gold.....	19,142	395,700	20,145	416,434
In gold bullion.....	122,293	2,528,021	153,173	3,156,367
In blister copper.....	8,667	179,163	6,063	125,333
In base bullion and in matte and ores exported.....	88,893	1,837,581	116,815	2,414,781
Total.....	238,995	4,940,465	296,196	6,122,915
Exchange equalization.....		1,894,792		4,095,847
YUKON—				
In alluvial gold.....	39,174	809,798	38,703	800,062
In ores exported.....	319	6,594	95	1,964
Total.....	39,493	816,392	38,798	802,026
Exchange equalization.....		313,108		536,505
<b>Total for Canada</b> .....	<b>2,919,309</b>	<b>60,967,626</b>	<b>2,972,074</b>	<b>61,438,220</b>
Estimated exchange equalization on gold produced.....		23,382,611		41,098,333
<b>Grand Total Value, including exchange equalization</b> .....		<b>84,350,237</b>		<b>102,536,553</b>

\*Includes small amounts of gold contained in slags, etc.

In 1933 the estimated average price of a troy ounce of fine gold in Canadian funds was \$28.60, in 1934 the corresponding price was \$34.50.

Table 34.—Production of Gold in Canada by Principal Mines, 1934

Property	Ore raised	Ore treated	Gold† recovered	Mill capacity 24 hours	See footnote
	Tons	Tons	Fine ounces	Tons	
NOVA SCOTIA—					
Beacon Gold Mines.....	51	51	25	10	(a)
Corwin Gold Mines.....	150	50	7		(a)
Ross Mine (Cons. M. & S. Co.).....	871	871	377	20	(a)
Banook Mining Co.....	230	230	108	24	(a)
Guysboro Mines Ltd.....			31	50	(a)
Higgins & Lawlor (Moose River).....	963	649	285	15	(a)
Lacey Gold Mining Co. Ltd.....	1,000	240	(d)	35	
Montague Gold Mines Ltd.....	13,088	8,549	1,681	50	(a) (e)
Seal Harbour Gold Mines Ltd.....	3,732	3,732	662	25	(a)
MacDonald Hudson Gold Mines.....	313	313	41	20	(a)
United Goldfields of N.S. (Brookfield).....	2,282	2,282	117*	25	(a) (e)
Other producers.....	†	†	191	†	†
<b>Total Nova Scotia</b> .....			<b>3,525</b>		

Table 34.—Production of Gold in Canada by Principal Mines, 1934—Continued

Property	Ore raised	Ore treated	Gold† recovered	Mill capacity 24 hours	See footnote
	Tons	Tons	Fine ounces	Tons	
<b>QUEBEC—</b>					
Bentley Gold Mines Ltd.	360,900	359,200	52,240	1,200	(b) (c)
Bessieres Mining Co. Ltd.	55,879	38,047	5,039	190	(a) (c)
Granada Gold Mines Ltd.	36,266	35,424	6,804	100	(a) (b) (c)
Green Stuhell Mines Ltd.	23,003	21,583	5,682	100	(a) (b) (c)
La Mine D'Or Venus Cons.	60	60	8	25	(c)
McWatters Gold Mines Ltd.	5,713	5,081	2,961	50	(a)
O'Brien Gold Mines Ltd. (c)	26,743	27,832	7,626	80	(a) (c)
Perron Gold Mines Ltd.	5,047	2,646	392	25	(a)
Siscoe Gold Mines Ltd.	124,846	124,151	63,394	340	(a) (b)
Sullivan Cons. Mines Ltd.	7,278	7,960	4,002	50	(a) (b)
Placer mines	†	†	43	†	†
Copper-gold mines			241,786		(c)
Total Quebec			390,097		
<b>ONTARIO—</b>					
<b>Porcupine Camp—</b>					
Anglo-Huronian Ltd. (Vipond)	101,799	101,806	15,541	300	(b)
Buffalo Ankerite Gold Mines	125,134	125,134	20,603	350	(b)
Blue Quartz Mine (Analg. Gold Fields)	dump	500	19	25	(b)
Comstarum Mines Ltd.	138,114	138,114	28,436	500	(b)
Dome Mines Ltd.	547,600	547,600	206,158	1,500	(a) (b)
Hollinger Cons. Gold Mines Ltd.	1,900,341	1,900,480	434,257	6,000	(b)
Marbuan Gold Mines Ltd.	26,030	26,030	3,304	150	(b)
McIntyre Porcupine Mines Ltd.	851,345	851,345	239,099	2,000	(b) (c)
McLaren-Porcupine Gold Mines Ltd.	60	50	10	3-5	(a)
Munro-Croesus Gold Mines Ltd.	180	205	298	15	(a)
Paymaster Cons. Mines Ltd.	11,572	13,824	2,020	500	(b)
Miscellaneous	†	†	54	†	†
Total Porcupine Camp		3,705,098	949,799		
<b>Kirkland Lake Camp—</b>					
Barry-Hollinger Mines Ltd.	33,445	33,445	4,399	100	(b)
Bidgood Kirkland Gold Mines Ltd.	2,560	2,433	199	15	(b)
Kirkland Lake Gold Mining Co. Ltd.	64,952	64,952	20,316	170	(b) (c)
Lake Shore Mines Ltd.	836,023	836,023	471,762	2,300	(b)
Macassa Mines Ltd.	63,057	66,557	32,056	200	(b)
Moffat Hall Mine	8,476	8,476	2,525		(b) (*)
Sylvanite Gold Mines Ltd.	111,767	111,767	50,337	350	(b)
Teck-Hughes Gold Mines Ltd.	442,745	442,745	167,412	1,300	(b)
Toburn Gold Mines Ltd.	36,230	36,230	20,401	100	(b)
Wright-Hargreaves Mines Ltd.	354,418	354,418	218,203	900	(b)
Miscellaneous	†	†	436	†	†
Total Kirkland Lake		1,957,046	988,046		
<b>Other gold mines—</b>					
Algoma Summit Gold Mines Ltd.	†	421	144	†	(a)
Ardeen Gold Mines Ltd.	†	38,143	5,815	200	(b)
Ashley Gold Mining Corp.	43,532	43,532	13,181	150	(b) (c)
Casey Summit Gold Mines Ltd.	†	4,094	888	50	(a)
Central Canada Mines Ltd.	200	350	21	12	(a) (m)
Central Patricia Gold Mines Ltd.	11,680	11,536	6,373	50	(b)
Dalsvik Exploration Co. Ltd.	803	230	1,082		(c)
Duport Mining Co. Ltd.	†	25	65		(c)
Howey Gold Mines Ltd.	477,044	481,757	45,985	1,100	(b)
J. M. Cons. Gold Mines Ltd.	†	3,443	1,019	25	(a) (b)
Little Long Lac Gold Mines Ltd.	5,600	5,485	2,457	175	(a) (b)
McMillan Gold Mines Ltd.	12,313	12,313	1,959	100	(b)
Matasheuan Cons. Mines Ltd.	10,005	4,680	679	100	(b)
Minto Gold Mines Ltd.	22,189	22,184	4,912	90	(b)
Northern Empire Mines Co. Ltd.	22,759	22,507	5,663	90	(a) (b)
Parkhill Gold Mines Ltd.	19,455	19,431	8,984	75	(b)
St. Anthony Gold Mines Ltd.	5,626	(j) 37,610	3,571	125	(b)
Sol D'Or Gold Mines Ltd.	130	130	74	3	(a)
Young Davidson Mines Ltd.	51,842	51,842	3,878	600	(b)
Miscellaneous			370		
Total Other Ontario Gold Mines		759,718	107,120		
Copper-Nickel mines			60,374		(c)
Grand Total Ontario			2,105,339		
<b>MANITOBA—</b>					
Central Manitoba Mines Ltd.	48,406	43,862	12,560	150	(a) (b) (c)
Diann Gold Mines Ltd.	6,663	5,284	1,980	30	(a)
Island Lake Mines Ltd.	9,191	6,984	3,231	50	(a) (c)
Oro Grande Development Co. Ltd.	†	†	146	75	(a)
San Antonio Gold Mines Ltd.	66,457	64,294	21,638	225	(a) (b)
Copper-Gold ores and miscellaneous			92,760		
Total Manitoba			132,321		

Table 34.—Production of Gold in Canada by Principal Mines, 1934—Concluded

Property	Ore raised	Ore treated	Gold† recovered	Mill capacity 24 hours	See footnote
	Tons	Tons	Fine ounces	Tons	
<b>SASKATCHEWAN—</b>					
Copper-Gold ores.....			5,405		
<b>ALBERTA—</b>					
Placer gold.....			393		
<b>BRITISH COLUMBIA—</b>					
Bralorne Mines Ltd.....	98,664	98,664	45,971	450	(a) (c)
Bunker Hill Gold Mines Ltd.....	†	(h) 92	56		(c)
Cariboo Gold Quartz Mining Co. Ltd.....	28,447	27,693	10,263	100	(b)
Carmin Gold Mines Ltd (3).....	165	(h) 165	86		(c)
Clubine Comstock Gold Mines Ltd.....	102	(h) 102	116		(c)
Columnario Cons. Gold Mines Ltd.....	2,300	2,300	483	90	(c)
Danzig Mines Ltd.....	33	(h) 33	67		(c)
Dawson Cons. Gold Mines Ltd.....	†	(h) 8	67	25	(a) (c)
Dentonia Mines Ltd.....	22,610	22,464	3,784	135	(c)
Dynanmo Mining & Milling Co. Ltd.....	56	(h) 56	20		(c)
Euphrates Mining Co., Ltd.....	58	(h) 58	100		(c)
Evening Star.....	197	(h) 198	230		(c)
Gold Belt Mining Co. Ltd.....	†	(h) 291	608		(c)
Granby Point Mine.....	†	13,948	1,357		(c)
Grandoro Mines Ltd.....	3,000	(h) 546	576x		(c)
Grange Mines Ltd.....	3,330	3,330	545	50	(a) (c)
Hercules Cons. Mining, S. & P. Corp.....	18	(h) 18	31x		(c)
Island Mountain Mines Co. Ltd.....	2,894	2,894	1,591	50	(b)
I. X. L. Mine.....	127	(h) 127	748		(c)
Jenny Long Gold Mines.....	200	100	†	30	(c)
Keystone Mine.....	†	(h) 105	142		(c)
Kootenay Belle Gold Mines Ltd.....	2,824	(h) 824	1,529	60	(c)
Livingstone Mining Co. Ltd.....	563	(h) 563	436		(c)
Midnight Mine.....	266	(h) 266	365		(c)
Minto Gold Mines Ltd.....	2,878	1,439	142	50	(a) (c)
Morning Star Gold Mines Ltd.....	2,652	(b) 2,652	1,444		(c)
Nicola Mines & Metals Ltd.....	6,095	6,095	775	50	(c)
Noble Fine Mines Ltd.....	164	(h) 164	175		(c)
Oscarson Bros. (Eric).....	408	(h) 408	507		(c)
Pioneer Gold Mines of B.C. Ltd.....	130,066	130,198	87,536	300	(b)
Precambrian Gold Mines.....	3,154	3,100	1,178	25	(c) (i)
Premier Gold Mining Co. Ltd.....	154,693	154,693	38,371	500	(c)
Relief-Arlington Mines Ltd.....	14,614	11,663	5,787	25	(a) (c)
Reno Gold Mines Ltd.....	26,895	26,895	15,979	100	(a) (b) (c)
Superior Gold Mines Ltd.....	3,415	3,415	57	50	(c)
Surf Point Mine (N.A. Timmins).....	7,814	5,658	3,582	20	(c)
Taylor Windfall Mining Co. Ltd.....	83	83	185x	5	(a)
Twin Lakes Gold Mining Co. Ltd.....	5,471	5,471	1,675	40	(a) (c)
Union Mine (J. F. McCarthy).....	†	(j) 18,143	424	200	(b) (c)
Vancouver Island Gold Mines Ltd.....	40	(h) 40	116		(c)
Velvet Gold Mining Co.....	2,000	740	747	50	(c) (k)
Vidette Gold Mines Ltd.....	7,228	7,216	3,589	30	(c)
Waterloo Gold Mines Ltd.....	†	(h) 59	54		(c)
Wayside Cons. Gold Mines Ltd.....	2,381	513	84	40	(a)
Wilcox Mine.....	3,320	1,660	651	20	(a) (c)
Windpass Gold Mining Co. Ltd.....	9,005	11,316	7,819	40	(c) (k)
Ymir Cons. Gold Mines Ltd.....	3,677	(h) 4,261	2,254	(l) 100	(c)
Ymir Dundee Gold Mining Co. Ltd.....	313	(h) 313	113		(c)
Ymir Yankee Girl.....	†	(h) 13,966x	(h) 9,104x	(l) 100	(c)
Placer mines.....			20,145		
Copper-gold, silver-lead and other gold mines.....			24,541		
Total British Columbia.....			206,196		
<b>YUKON—</b>					
Placer.....			38,703		
Other sources.....			95		
Total Yukon.....			38,798		
<b>Total Canada.....</b>			<b>2,972,074</b>		

## NOTE.—

(a) Amalgamation.

(b) Cyanidation.

(c) Shipments to smelter.

(d) No clean up.

(e) Includes O'Brien &amp; Fowler.

(f) Cyanided.

(g) Includes tailings, etc.

(h) Shipped.

(i) Also includes bullion.

(j) Tailings.

(k) Includes ore and concentrates.

(l) Under construction.

(m) Concentrates also produced.

† Output reported by mines producing crude gold bullion represents fine gold contained in bullion or other material shipped.

\* Subject to revision.

‡ Information not available.



Table 35.—Production of Gold in Canada, 1925-1934

Year	Fine ounces*	Value	Year	Fine ounces*	Value
		\$			\$
1925.....	1,735,735	35,880,826	1930.....	2,102,068	43,453,601
1926.....	1,754,228	36,263,110	†1931.....	2,693,892	55,687,688
1927.....	1,852,785	38,300,464	†1932.....	3,044,387	62,933,063
1928.....	1,890,592	39,082,005	†1933.....	2,949,309	60,967,626
1929.....	1,928,308	39,861,663	†1934.....	2,972,074	61,438,220

Note.—For years 1858 to 1924, see previous reports.

\* Calculated from the value \$1=0.048375 ounces.

† Value of gold in Canadian dollars, 1931—\$ 58,093,396.

† Value of gold in Canadian dollars, 1932—\$ 71,479,373.

† Value of gold in Canadian dollars, 1933—\$ 84,350,237.

† Value of gold in Canadian dollars, 1934—\$102,536,553.

Table 36.—Quantity and Value of Gold produced in Canada, by Provinces, 1925-1934

(For the years 1862 to 1924, see Mineral Production of Canada, 1928)

Year	Nova Scotia			Quebec		
	Fine oz.	Statutory value \$	Value in Canadian dollars \$	Fine oz.	Statutory value \$	Value in Canadian dollars \$
1925.....	1,626	33,612		1,602	33,116	
1926.....	1,678	34,687		3,680	76,072	
1927.....	3,151	65,137		8,331	172,217	
1928.....	1,290	26,067		60,006	1,240,434	
1929.....	2,687	55,545		90,798	1,876,961	
1930.....	1,272	26,295		141,747	2,936,170	
1931.....	400	9,509	9,920	300,075	6,303,101	6,471,075
1932.....	964	19,928	22,634	401,105	8,291,576	9,417,572
1933.....	1,382	28,568	39,525	382,886	7,914,956	10,950,519
1934.....	3,525	72,868	121,613	390,997	8,064,020	13,458,347

Year	Ontario			Manitoba		
	Fine oz.	\$	\$	Fine oz.	\$	\$
1925.....	1,461,039	30,202,357		4,424	91,452	
1926.....	1,497,215	30,950,180		188	3,886	
1927.....	1,627,050	33,634,108		182	3,762	
1928.....	1,578,434	32,629,126		19,813	409,571	
1929.....	1,622,267	33,535,234		22,455	464,186	
1930.....	1,736,012	35,886,552		23,180	479,359	
1931.....	2,085,814	43,117,609	44,980,280	102,669	2,128,558	2,220,512
1932.....	2,280,105	47,133,952	53,534,743	122,507	2,532,444	2,876,350
1933.....	2,155,519	44,558,351	61,647,843	125,310	2,590,388	3,583,866
1934.....	2,105,339	43,521,218	72,634,195	132,321	2,735,318	4,665,075

Year	Saskatchewan			Alberta		
	Fine oz.	\$	\$	Fine oz.	\$	\$
1925.....						
1926.....						
1927.....				42	868	
1928.....				68	1,406	
1929.....				5	103	
1930.....						
1931.....				195	4,031	4,205
1932.....	11	227	258	83	1,716	1,949
1933.....	5,400	111,628	154,440	324	6,698	9,267
1934.....	5,405	111,731	186,472	393	8,124	13,558

Year	British Columbia			Yukon		
	Fine oz.	\$	\$	Fine oz.	\$	\$
1925.....	219,227	4,531,824		47,817	988,465	
1926.....	225,866	4,669,055		25,601	529,220	
1927.....	183,094	3,784,889		30,935	639,483	
1928.....	196,617	4,064,434		34,364	710,367	
1929.....	154,204	3,187,680		35,892	741,954	
1930.....	164,331	3,397,023		35,517	734,202	
1931.....	160,069	3,308,920	3,451,865	44,310	915,969	955,539
1932.....	199,004	4,113,778	4,672,429	40,608	839,412	953,438
1933.....	238,995	4,940,465	6,835,257	39,493	816,392	1,129,500
1934.....	296,196	6,122,915	10,218,762	38,798	802,026	1,338,531

## DOMINION BUREAU OF STATISTICS

Table 37.—Total Gold Production in Ontario\*

Year	Total production	Poreupine belt		Kirkland Lake belt		N.W. Ontario (c)	
	\$	\$	per cent	\$	per cent	\$	per cent
1866-1891.....	1190,258						
1892-1909.....	12,509,492						
1910.....	68,498	35,539	51.8				
1911.....	42,637	15,437	36.2				
1912.....	2,114,086	1,730,628	81.8				
1913.....	4,558,518	4,294,113	94.1	86,316	1.9		
1914.....	5,514,979	5,206,006	93.8	114,154	2.0		
1915.....	8,501,391	7,462,111	88.6	551,069	6.5		
1916.....	10,339,250	9,391,408	90.8	702,761	6.8		
1917.....	8,608,735	8,229,744	94.5	404,346	4.6		
1918.....	8,502,480	7,767,007	91.4	632,007	7.4		
1919.....	10,451,709	9,941,803	95.1	486,809	4.7		
1920.....	11,686,043	10,597,572	90.7	1,033,478	8.8		
1921.....	14,692,357	13,103,529	89.5	1,524,851	10.4		
1922.....	20,579,569	18,374,658	89.3	2,150,581	10.5		
1923.....	20,136,287	17,313,115	85.9	2,719,939	13.5		
1924.....	25,669,303	22,135,534	86.2	3,446,632	13.4		
1925.....	30,206,432	24,733,120	81.8	5,385,256	17.8		
1926.....	30,950,753	23,680,670	76.5	7,174,083	23.2		
1927.....	33,627,040	23,851,857	70.9	9,674,114	28.7		
1928.....	32,629,111	20,246,319	62.0	12,233,524	37.5		
1929.....	33,535,226	19,281,286	57.6	14,046,596	41.8	22,988	0.07
1930.....	35,886,558	17,558,842	49.6	17,172,770	47.9	461,730	1.3
1931.....	43,117,615	19,891,521	46.2	21,734,729	50.4	1,037,756	2.3
1932.....	47,284,621	21,422,117	45.2	23,782,313	50.3	1,697,831	3.4
1933.....	44,558,514	21,624,617	48.5	20,817,277	46.7	1,352,017	3.0
1934.....	43,521,249	19,634,097	45.0	20,424,716	46.9	2,214,385	5.0
1935 (a).....	44,464,498	20,019,335	45.0	19,597,312	44.0	3,964,133	8.9
<b>Total to end of 1934.....</b>	<b>571,067,218</b>	<b>367,742,882</b>	<b>64.1</b>	<b>185,991,633</b>	<b>32.4</b>		

\* Supplied by Ontario Department of Mines. All values given are standard.

† Estimated.

‡ Maximum yearly output was \$424,568 in 1899.

(a) Preliminary.

(c) Recent production only.

Table 38.—World Production of Gold Ore, 1932-1934

(In terms of metal)

(Supplied by Imperial Institute)

Country	1932	1933	1934	Country	1932	1933	1934
	Fine ounces	Fine ounces	Fine ounces		Fine ounces	Fine ounces	Fine ounces
<b>BRITISH EMPIRE—</b>				<b>FOREIGN COUNTRIES—Con.</b>			
United Kingdom.....	6	57	51	Hungary.....	2,690	3,099	2,167
Anglo-Egyptian Sudan.....	700	4,400	5,398	Sweden.....	138,631	288,643	246,687
Bechuanaland Protectorate.....	2,247	5,332	9,485	Belgian Congo.....	255,271	283,081	337,382
Gold Coast.....	278,782	305,908	326,040	Spain.....	(a)	7,716	7,596
Kenya.....	9,052	10,531	12,110	Egypt.....	16		201
Nigeria.....	2,701	17,718	37,023	Eritrea.....	1,897	3,569	(a)
Northern Rhodesia.....	6,349	2,588	2,113	French Equatorial Africa.....	15,368	26,556	29,160
Southern Rhodesia.....	574,135	642,499	691,152	French West Africa (ex-ports).....	66,420	68,608	98,957
Sierra Leone.....	10,500	14,484	21,205	Madagascar.....	11,338	14,468	15,979
South West Africa.....	890	956	926	Mozambique.....	2,665	1,705	10,196
Swaziland.....	365	630	379	Mexico.....	584,198	637,727	661,390
Tanganyika Territory.....	25,687	32,516	42,606	United States (b).....	2,269,459	2,291,724	2,775,504
Union of South Africa.....	11,558,532	11,013,712	10,479,857	Costa Rica (c).....	8,088	2,969	13,660
Canada.....	3,044,387	2,949,309	2,972,074	Guatemala.....	10,332	(a)	(a)
Newfoundland.....	17,661	15,689	11,219	Honduras.....	16,054	17,211	12,996
British Guiana.....	13,926	23,352	25,420	Nicaragua (c).....	14,045	6,681	18,362
Federated Malay States.....	27,159	28,973	30,221	Panama (c).....	3,290	3,295	21,101
Unfederated Malay States.....	289	2,131	2,324	Salvador.....	(c) 927	(c) 2,691	6,824
India.....	329,600	336,100	322,100	Argentina (estimated).....	1,000	1,000	1,000
Sarawak.....	8,178	18,712	28,842	Bolivia.....	218	30	112
Australia.....	714,135	830,207	887,524	Brazil.....	124,163	122,534	206,471
Fiji.....	311	1,844	931	Chile.....	38,096	147,052	238,547
New Guinea (years ended June 30).....	63,483	121,913	190,000	Colombia.....	248,210	298,243	311,310
New Zealand.....	166,354	161,755	160,248	Dutch Guiana (crude gold).....	8,961	12,378	11,896
Papua.....	9,904	9,850	12,591	Ecuador.....	56,147	69,000	66,000
Uganda.....	586	1,200	5,842	French Guiana (exports).....	48,450	48,000	47,453
Cyprus.....			13,092	Peru.....	86,101	96,775	98,850
Total.....	16,870,000	16,550,000	16,280,000	Venezuela.....	91,534	95,720	109,055
<b>FOREIGN COUNTRIES—</b>				China.....	72,900	(a)	(a)
Czechoslovakia.....	6,544	9,836	11,990	Formosa.....	65,700	61,590	(a)
France.....	92,110	94,521	101,498	French Indo-China.....	219	145	7,105
Germany.....	2,205	5,494	5,789	Japan.....	401,784	441,374	486,963
Italy.....	1,842	2,725	2,500	Korea.....	327,000	300,000	420,000
Yugoslavia (estimated).....	15,000	28,000	33,000	Netherlands East Indies.....	78,187	78,829	71,765
Roumania.....	102,591	142,585	120,016	Philippine Islands.....	244,287	296,258	332,974
Norway.....			129	Manchukuo.....	(a)	21,640	(a)
				Cameroon (French).....			450
<b>Total*</b>				<b>World's Total*</b>	<b>5,500,000</b>	<b>6,200,000</b>	<b>7,100,000</b>
					<b>22,400,000</b>	<b>22,800,000</b>	<b>23,400,000</b>

\* Excluding the production of U.S.S.R. (Russia). Owing to the wide divergences in the scattered data published (mainly relative figures) it is not possible to form any reliable estimate for the years under review, but the available information indicates that the production of that country was probably within the following ranges—

1932.....	1,500,000	—	2,090,000	fine ounces
1933.....	2,200,000	—	2,700,000	"
1934.....	3,700,000	—	4,300,000	"

(a) Information not available. (b) Amount recovered. (c) Imports into the United States from the country indicated.

Table 39.—Comparative Figures of Gold Production for the World Since the Discovery of America, Transvaal, United States and Canada

Period	Transvaal since the commencement of Fields (b)	*United States	Canada since the recording of Production in 1858	(a) World since the discovery of America
	Fine ounces	Fine ounces	Fine ounces	Fine ounces
1493-1600				24 266,820
1601-1700				29 330,445
1701-1800				61 088,215
1801-1840				20 488,552
1841-1850		(c) 1,187,170		17 605,918
1851-1860			220,039	64 482,933
1861-1870		(d)58,279,778	1,477,999	61 098,343
1871-1880		(e) 15,281,264	904,093	55 670,618
1881-1890	1,070,651	15 808,339	584,102	51 280,184
1891-1895	6 870,158	9 106,834	291,564	39 412,823
1896-1900	12 578 869	15 728 572	3 469 791	62 234 698
1901-1905	13 632 908	19 393 722	4 592 261	78 033 650
1906	5 792 823		556 415	19 471 080
1907	6 450 740		405 517	19 977 260
1908	7 056 266	22 993 218	476 112	21 422 244
1909	7 295 108		453 865	21 965 111
1910	7 527 108		493 707	22 022 180
1911	8 249 461	4 687 053	473 159	22 397 136
1912	9 107 512	4 520 719	611 885	22 605 068
1913	8 798 336	4 299 781	802 973	22 928 579
1914	8 394 322	4 572 976	773 178	23 875 618
1915	9 093 902	4 887 604	918 056	23 010 348
1916	9 296 618	4 479 057	930 492	22 400 370
1917	9 018 084	4 051 440	738 831	20 457 475
1918	8 418 292	3 320 784	699 681	18 701 294
1919	8 331 294	2 918 628	766 704	17 376 201
1920	8 158 226	2 476 166	765 097	16 130 273
1921	8 128 681	2 422 006	926 329	16 006 695
1922	7 009 767	2 363 075	1 263 364	15 576 270
1923	9 148 771	2 502 632	1 233 341	17 977 807
1924	9 574 918	2 528 900	1 525 382	18 667 063
1925	9 597 573	2 411 087	1 735 735	18 734 102
1926	9 954 762	2 335 042	1 754 228	19 251 794
1927	10 122 459	2 197 125	1 852 785	19 180 231
1928	10 554 157	2 233 251	1 890 592	19 399 121
1929	10 412 326	2 208 386	1 928 308	19 585 536
1930	10 716 349	2 285 603	2 102 068	20 836 318
1931	10 877 708	2 395 878	2 693 892	22 329 525
1932	11 557 858	2 449 032	3 044 387	24 150 761
1933	11 017 495	2 556 246	2 949 309	24 962 408
1934	10 486 393	2 916 373	2 972 074	27 339 233
<b>Total</b>	<b>291,699,895</b>	<b>231,798,641</b>	<b>49,277,285</b>	<b>1,161,729,483</b>

\* Including Philippine Islands production received in United States.

† Preliminary estimate—American Bureau Metal Statistics.

(a) Supplied by United States Mint. (b) Supplied by Transvaal Chamber of Mines.

(c) 1792-1847. (d) 1848-1872. (e) 1873-1880.

Table 40.—Source of Canadian Fine Gold Production by Percentages, 1931-34

	1931	1932	1933	1934
	%	%	%	%
In alluvial gold	2.4	1.8	2.0	2.0
In coarse gold bullion*	80.6	79.3	79.8	78.68
In base bullion (from silver-lead ores, etc.)	0.6	1.0	0.7	1.09
In blister copper	13.8	15.1	14.2	13.41
In ores, mattes, slimes, etc., exported	2.9	2.8	3.3	4.82
	100.00	100.00	100.00	100.00

\* Includes a relatively small quantity of gold contained in inter-chemical shipments of gold ores to smelters.

Table 41.—Imports into Canada and Exports of Gold, 1933 and 1934.

	1933	1934
	\$	\$
<b>IMPORTS—</b>		
Coin and bullion—		
Coins, British, Canadian and foreign gold coins.....	822.236	708.010
Gold bullion in bars, blocks, ingots, drops, sheets or plates, unmanufactured.....	35.316	56.343
<b>Total.....</b>	<b>857.552</b>	<b>764.353</b>
Gold, other—		
Bullion or gold fringe.....	4.554	8.456
Manufactures of gold and silver—		
Leaf.....	52.790	61.908
Sweepings.....	4.119	140
Manufactures, n.o.p.....	17.729	23.860
Electro-plated ware.....	260.176	384.400
Gold, unmanufactured, for commercial purposes, from April 1, 1933.....	168.382	157.691
<b>Total.....</b>	<b>507.750</b>	<b>636.455</b>
<b>EXPORTS—</b>		
Coin and bullion—		
Gold coin—		
Canadian.....	\$ 10	
Foreign.....	\$ 5,963,594	83,480
Gold bullion—		
Canadian, n.o.p.—		
To United Kingdom..... oz.	1,974.105	788.027
United States..... oz.	59,925.558	26,762.697
Foreign.....	735.248	2,256.781
Foreign.....	\$ 18,019.577	78,570.316
<b>Total—Canadian coin and bullion..... oz.</b>	<b>2,709.363</b>	<b>3,044.808</b>
<b>Foreign coin and bullion.....</b>	<b>\$ 77,915.135</b>	<b>105,333.013</b>
<b>Total coin and fine gold bullion.....</b>	<b>\$ 80,624.498</b>	<b>108,377.821</b>
Gold-bearing quartz, dust, nuggets and crude bullion obtained direct from mining operations \$	2,299,650	3,997,992
Jewellers' sweepings (gold, silver and platinum)..... \$	592.506	520.067
<b>Total.....</b>	<b>\$ 2,892,156</b>	<b>4,518,059</b>

Table 42.—Estimated Average Monthly Value of an Ounce of Fine Gold, Expressed in Canadian Funds, 1931-1934

	1931	1932	1933	1934
	\$	\$	\$	\$
January.....	20.71	24.24	23.64	33.05
February.....	20.67	23.67	24.74	35.29
March.....	20.67	23.11	24.78	35.08
April.....	20.68	22.98	25.33	34.93
May.....	20.68	23.38	27.75	34.94
June.....	20.73	23.83	28.24	34.73
July.....	20.74	23.73	30.58	34.50
August.....	20.73	23.61	30.09	34.19
September.....	21.55	22.88	31.79	34.18
October.....	23.22	22.65	31.48	34.27
November.....	23.22	23.73	32.68	34.16
December.....	25.01	23.85	32.14	34.57
Yearly average.....	21.55	23.48	28.60	34.50



Table 43.—Gold held by the Canadian Minister of Finance, Calendar Years, 1920-1934†

Calendar Year	Gold Reserve Held on Postal Savings Bank Deposits (a)	Gold Held for Redemption of Dominion Notes	Total Gold Held by Minister of Finance
	\$	\$	\$
1920	4,957,897	98,751,773	102,819,670
1921	3,666,909	64,568,064	88,234,973
1922	3,293,287	89,939,108	93,232,395
1923	3,154,358	120,651,627	123,805,985
1924	3,308,575	107,257,428	110,566,003
1925	3,241,490	119,714,819	122,956,309
1926	3,162,930	109,369,550	112,532,480
1927	3,083,440	107,417,631	110,501,071
1928	2,994,001	89,218,454	92,212,455
1929	2,709,169	59,345,233	62,054,402
1930	2,483,959	79,000,297	81,484,256
1931	2,405,030	74,209,510	76,614,540
1932	2,324,216	66,854,214	69,178,430
1933	2,311,866	69,793,861	72,105,727
1934	2,257,367	70,249,952	72,507,319

†Yearly averages.

(a) In the Savings Bank Act (c. 15, R.S.C., 1927) it is provided that the Minister of Finance shall hold 10 per cent gold reserve against postal savings bank deposits.

Table 44.—Composition of Canadian Gold Reserves on December 31, 1924-1934

December 31st	British Coin	U.S. Coin	Canadian Coin	Bullion	Total
	\$	\$	\$	\$	\$
1924	20,342,019	77,173,105	3,327,125	34,905,387	141,747,636
1925	29,894,943	67,135,310	3,315,710	37,512,195	137,858,178
1926	32,133,941	72,423,610	3,221,930	23,415,643	131,195,124
1927	28,948,085	51,179,390	3,089,010	47,516,079	130,732,564
1928	34,163,297	31,018,970	2,931,835	25,292,771	93,316,873
1929	32,164,284	10,995,220	2,801,520	17,034,256	62,995,280
1930	30,634,058	28,748,085	2,733,150	34,096,809	96,212,102
1931	17,736,296	4,270,780	2,732,880	42,220,192	64,960,148
1932	17,638,240	4,271,455	2,704,930	49,429,889	73,044,414
1933	17,637,435	4,266,835	2,704,880	47,356,454	71,965,604
1934	17,637,445	4,266,850	2,791,865	49,291,619	74,900,779

Table 45.—World's Monetary Stocks of Gold at the Close of 1932 and 1933 (Subject to Revision)

(Compiled by United States Mint from available data)  
(Stated in United States money)

Country	Total Gold Stock Value, 1932	Per capita	Total Gold Stock Value, 1933	Per capita
	\$	\$	\$	\$
United States	4,513,001,000	36.04	4,322,599,000	34.63
Canada	124,265,000	11.97	113,889,000	10.97
Belgium	360,842,000	44.59	379,960,000	46.56
Denmark	35,693,000	10.01	35,689,000	9.94
France	3,254,247,300	77.78	3,022,242,400	72.24
Germany	299,015,000	3.23	109,411,000	1.69
Great Britain	582,950,000	12.62	932,843,000	20.10
Italy	397,158,000	7.45	466,281,000	11.15
Netherlands	415,101,300	51.69	370,615,000	45.29
Norway	38,658,000	13.73	38,494,000	13.64
Poland	56,344,000	1.75	53,359,000	1.66
Portugal	23,829,000	3.54	34,080,000	5.07
Roumania	57,161,000	3.17	59,373,000	3.25
Russia (Soviet Union)	(a) 367,692,000	2.26	(b) 415,622,000	2.51
Spain	435,904,000	18.23	436,418,000	18.52
Sweden	55,409,000	9.02	99,416,000	16.06
Switzerland	535,890,000	123.84	385,628,000	93.60
British India	161,933,000	0.45	164,148,000	0.46
Japan (including Chosen, Taiwan, Kwantung) (c)	211,953,000	2.34	(c) 211,894,000	2.29
Netherlands East Indies	41,749,000	0.68	43,568,000	0.71
Egypt	32,936,000	2.22	30,848,000	2.06
Australia	42,573,000	6.52	2,333,000	0.37
New Zealand	24,600,000	16.17	(f) 24,600,000	16.91
Other Countries	710,888,000		881,386,000	
<b>Total</b>	<b>12,569,791,000</b>	<b>(d) 6.31</b>	<b>12,634,726,000</b>	<b>(e) 6.31</b>

(a) On August 31, 1932.

(b) On January 1, 1934.

(c) Incomplete.

(d) World population estimated at 1,981,764,000.

(e) World population principally from the U.S. Commerce Yearbook.

(f) Gold and silver.

Table 46.—Canadian Security Price Index Numbers 1929-1934

1926 = 100

	Common stocks		Bond yields of province of Ontario	Common stocks		
	Total	Indus- trials		Mines total	Gold	Base metals
1929						
October.....	186.4	255.4	103.3	90.1	59.3	.....
December.....	156.5	210.0	102.3	74.5	54.3	.....
1930						
December.....	103.1	120.3	93.9	59.2	57.8	.....
1931						
December.....	64.8	74.3	108.6	59.0	59.0	.....
1932						
December.....	52.2	58.9	102.7	63.1	62.7	.....
1933						
March.....	48.9	50.1	100.0	68.4	66.6	78.9
July.....	88.5	122.3	96.7	100.9	98.7	133.5
October.....	73.3	103.6	94.6	112.2	108.6	131.8
1934						
January.....	81.6	118.6	97.2	108.9	104.7	128.3
February.....	80.5	123.8	96.0	114.4	110.1	134.2
March.....	88.0	128.5	90.1	128.1	124.3	147.1
April.....	90.7	133.0	87.7	137.2	132.0	162.3
May.....	88.6	128.0	84.8	129.8	124.2	156.5
June.....	87.2	126.1	85.4	138.5	133.4	164.2
July.....	81.3	116.6	83.1	137.2	133.3	158.3
August.....	83.8	120.1	82.3	141.1	137.4	161.7
September.....	83.8	118.8	82.0	139.2	136.7	154.9
October.....	85.2	122.0	82.9	133.5	132.9	141.4
November.....	86.0	125.3	81.0	125.5	125.7	129.0
December.....	86.2	125.6	76.2	124.9	124.7	129.6

The relative stability of Canadian price levels in 1934 offered a marked contrast to the violent changes occurring in the preceding four years. This new movement toward equilibrium could be discerned in common stock prices, and foreign exchange, as well as in commodity markets. A pronounced rise in bond prices, indicative of a plentiful supply of investment funds, furnished the only major exception to the tendency in other price fields.

It is a striking fact that the steadiness in price levels followed closely after gold prices began to move within narrow limits at approximately 65 per cent above the former mint price of \$20.67 per ounce. The premium on gold averaged 68 per cent in February, 1934, as compared with 20 per cent in February, 1933. During the last ten months of 1934, gold prices varied less than 2 per cent, and fluctuations of the official Canadian wholesale price index were within even narrower limits. Between February, 1933, and February, 1934, wholesale prices had advanced 13.5 per cent, a much less pronounced increase than that recorded for gold.

Mining stock prices advanced rapidly during the first quarters of 1934, and were fairly steady during the second and third quarters. They declined rather sharply in October and November, but advanced moderately during December. An index of gold stock prices showed a net increase for the year of roughly 24 per cent. Gold stocks continued to advance for six months after prices for gold itself had ceased to rise, and similarly the total appreciation in gold stock prices since the mint par of \$20.67 per ounce was abandoned, has been very much greater than the currency premium established on gold. An index of base metal stock prices was 129.6 in December, as compared with 128.3 in January, and 164.2 in June, when prices were at the highest point of the year.

#### THE ALLUVIAL GOLD MINING INDUSTRY IN CANADA, 1934

Placer gold was reported in Canada as early as 1823 when the metal was discovered on the Chaudière river, Quebec. Later, in 1855, alluvial gold was found at the mouth of Pend d'Oreille river, B.C., by the ex-servants of the Hudson's Bay Company and by 1859 placer miners had penetrated to Cariboo and Quesnel. Later years witnessed many important discoveries of placer gold in both British Columbia and the Yukon, the most outstanding of which was the finding of the sensationally rich Klondike deposits in 1896. At the present time the greater part of the Canadian production of alluvial gold comes from the Yukon Territory and British Columbia; smaller amounts are recovered in Alberta and Quebec.

**Quebec.**—Placer gold production in Quebec during 1934 was confined to the counties of Compton and Beauce. In the first mentioned county small shipments of crude alluvial gold were made by the Gold River Mining Co., Ltd., from its workings in Ditton township, the property of this company was reported at the close of the year as temporarily shut down. In the Seigneurie Rigaud Vaudreuil, Beauce county, the Unit Company, Ltd., was in operation from July 21 to November 1st, both underground and surface operations were conducted and a small recovery of gold reported. At St. Simon les Mines, Gilbert river, placer gold shipments were also made by Cooke and Lloyd.

**Alberta.**—Placer gold was discovered on the North Saskatchewan river in 1859 or 1860 and mining has been carried on, chiefly by hand methods and partly by the use of dredges, at intervals down to the present time. In 1934 the greater part of Alberta's gold production originated in the dredging operations of the McLeod River Mining Corp. Ltd. This company operated from May 1st to September 10th, 155,000 cubic yards of slough bed material being handled by the single dredge. During the year the company conducted extensive exploration of river leases and it was stated that much greater values per cubic yard, than on the beach lands were indicated with coarser gold in evidence.

**British Columbia.**—The British Columbia Department of Mines reports that while placer output in 1934 was approximately the same as in 1933 it is worthy to note that two larger-scale operations in the Cariboo are under way and an increase may be reasonably expected in 1935. In the Northwestern mineral survey district placer prospecting was very active but no new discoveries in new areas were made; numerous individuals, syndicates and companies were engaged and in this regard the British Columbia Department of Mines stresses that placer prospecting in this district is no easy task and requires not only experience but a grub stake and funds to see the prospector through the season in the event of failure.

A marked general increase in placer-mining activity featured the year in the Northeastern survey district. Much additional plant was installed during the year by various operators, including several drag-lines, and two small dredges of new type. Operating control of two well-known mines was secured by different English interests, the property of Consolidated Gold Alluvials of British Columbia, Ltd. (Wingdam) on the one hand, and that of Bullion Placers Ltd. (Bullion) on the other. In the Omineca Mining Division activity continued in the Manson section; in the McLeod river area operations were carried on by the Northern Reef Gold Mines Ltd., on McDougall river. Operations were also conducted in the Two Brothers Lake area this being the most northerly operation in the district and is served by aeroplanes based on Takla lake. A considerable recovery of placer gold was made by the many individual bar-workers on the Fraser and other rivers.

**Yukon.**—According to a report issued by the Comptroller of the Yukon Territory the amount of placer gold mined during the year ending March 31, 1935, in the Territory on which royalty export tax was paid was 48,887.45 ounces, produced as follows:—Dawson District, 47,464.90 ounces; Mayo District, 752.17 ounces; Whitehorse District, 670.38 ounces. The royalty collected was \$18,332.85. During the year six hundred and sixty-two new placer location grants were issued; ninety-seven relocation grants and 2,094 renewal grants were also issued. Two new dredging leases were issued covering twenty miles; four dredging leases were renewed covering twenty-three miles; and six hydraulic leases were renewed. This reflects the greater interest in placer mining and indicates the increase in the area of alluvial deposits now being held for development.

The Yukon Consolidated Gold Corp. Ltd., operated three electric sixteen cubic foot dredges throughout the season on hydraulic lease No. 18, on the Klondike river, one seven and one-half cubic foot dredge on Upper Dominion creek and one seven and one-half cubic foot dredge at Granville. No hydraulic operations were conducted by the company. Data pertaining to 1934 dredging operations are as follows:—

Dredge	Location	Started digging	Shut down	Cu. yds. handled
Canadian No. 2	Klondike River	May 8	Nov. 28	2,061,735
Canadian No. 3	Klondike River	May 22	Oct. 31	1,115,189
Canadian No. 4	Klondike River	May 3	Nov. 13	1,879,892
N.W. No. 1	Upper Dominion	May 16	Oct. 21	299,138
N.W. No. 2	Granville	May 11	Oct. 28	669,231



The ground ahead of Canadian No. 3 was frozen and was thawed by water points. Thawing plants were also operated ahead of Northwest dredges Nos. 1 and 2.

Reconstruction of one five cubic foot dredge and one seven and one-half cubic foot dredge was started in 1934 and will be completed in 1935.

The Holbrook Dredging Company continued operations on Sixtymile river with a steam driven dredge commencing on June 1st and continuing to November 6th, 1934. Material handled amounted to 207,216 cubic yards and 4,817.80 ounces of gold dust were recovered, the value being \$156,936.54 for gold and \$396.69 for silver. Two thousand feet of hydraulic pipe was laid to a creek on the right limit of Sixtymile opposite creek claims No. 13 above Discovery, to convey water for cold water thawing and stripping.

At Miller creek, McDonald, McCormick and Stewart moved 1,825 cubic yards of dirt by tunnelling and sinking, 6,444 yards by drifting and 45,200 yards by hydraulicing, the maximum number of men employed in these operations was 13.

On Iron Creek, a tributary of Nisutlin river the Inca Mining Corp., Ltd., constructed some 20 miles of road, 6,500 feet of flume and 2,000 feet of pipe line, this corporation employing three monitors moved 75,000 cubic yards of gravel before the freeze up in 1934.

More individuals were mining during the year on the old placer creeks in the Territory than for many years past, and all appear to have met with a certain measure of success. No new discoveries of any importance have been made, but the new high price received for gold has made it profitable to work old diggings over again, as well as the lower grade ground hitherto unworked.

Table 47.—Summary Statistics of Alluvial Gold Mining in Canada, 1933 and 1934

	1933			1934		
	British Columbia	Yukon	(a) Quebec and Alberta	British Columbia	Yukon	Quebec and Alberta
Number of firms and individual operators*	65	3	5	85	4	4
Time in operation .....	6-10	6-8	6-8	6-10	6-8	6-8
Capital employed .....	\$ 3,854,721	6,539,997	6,187	2,074,138	10,117,273	2,124,290
Number of employees .....	254	189	11	352	248	15
Salaries and wages paid .....	\$ 268,119	431,533	4,499	442,957	571,423	13,189
Fuel and electricity used .....	\$ 17,045	18,101	19	29,334	42,139	5,142
Electricity generated for own use .....	K.W.H. 95,002	11,206,060	.....	325,000	11,926,000	100,000
Crude gold recovered .....	crude ounce 23,928	48,967	504	25,181	48,379	293
Platinum recovered .....	crude ounce 40	.....	.....	53	.....	.....
Value of platinum recovered .....	1,400	.....	.....	2,051	.....	.....
Quantity of material handled .....	cu. yds. 1,326,721	5,605,522	(c)	2,034,522	6,315,070	155,000
Length of ditches .....	miles(d) 84	125	.....	124	25	.....
Total value of alluvial products(b) .....	408,176	832,439	8,568	430,128	822,443	7,912

\*In addition to the number shown in the table, there were several other small operators from whom no returns were obtainable.

(a) Includes data relating to one property in Nova Scotia.

(b) Value of crude gold based on statutory price of the metal (\$20.67) and estimated at \$17 per crude ounce.

(c) Information not available.

(d) Includes flume.

## THE AURIFEROUS QUARTZ MINING INDUSTRY

The great part of the gold of Canada comes from the Canadian Shield, an immense area of precambrian rocks extending from the Labrador Coast westward almost to the mouth of MacKenzie river. The area of the shield is roughly 1,825,000 square miles, almost half of Canada. The deposits of the shield are of two main types, namely quartz veins, from which most of the gold up to the present time has been won, and sulphide deposits, which produce a smaller but increasing proportion. The second great source of gold in Canada has been the Western or Cordilleran section, comprising British Columbia and Yukon territories, the gold production from this section was largely of placer origin until recent years. The third principal area in which gold deposits occur is the Acadian region of Eastern Canada the metal occurring principally in Nova Scotia where it has been mined since 1862.

The increase of approximately 67 per cent in the price of gold since 1930 is distinctly reflected in the almost steady expansion in gold mining during recent years. The number of auriferous quartz mines in operation in 1934 totalled 416, an increase of 93 per cent over 1933; employment



in 1934 totalled 17,762 as compared with 12,823 in the preceding year and salaries and wages amounted to \$27,156,887 as against \$20,536,012 in 1933. Ore milled in 1934 totalled 7,475,278 tons and the gold content of bullion, ores, etc., shipped amounted to 2,490,513 fine ounces, a comparison of these figures with corresponding data for 1929 is especially interesting in that they show a decline in the gold content of ores milled of from .42 ounce per ton in 1929 to .33 ounces per ton in 1934. This decrease results directly from the milling of lower grade ores made economically permissible by the increase in gold prices. Dividends reported by the auriferous quartz mines as being distributed in 1934 totalled \$27,888,731 as compared with \$20,030,200 in 1933, total dividends paid by these mines to the end of 1934 totalled \$299,064,915.

The Department of Mines, Ottawa, reports that the cost of small milling plants in Canada ranges from \$800 to \$2,000 per ton of ore treated daily, depending on factors such as location, new or second-hand machinery installed, the size of the unit and the type of plant, the department also stresses the importance of having the ore investigated for treatment methods before building a milling plant. The Dominion Department of Mines maintains ore dressing and metallurgical laboratories for this purpose.

**Nova Scotia.**—The Department of Public Works and Mines for Nova Scotia reports that a great amount of interest was taken in the gold deposits of the province during the fiscal year ended September 30th, 1934, some notable developments were conducted and the output for the next twelve months should show a very material increase. In the province the modern powdered coal plant will no doubt supply a large percentage of the cheap power required for mining in the future. This type of power plant will be situated near the collieries and will be used to augment the power supplied by Hydro-developments. In Guysboro county development or exploration work was conducted on gold properties in the Cochran Hill, Country Harbour, Forrest Hill, Ecum Secum, Gogogan, Goldenville, Isaac's Harbour, Little Liscombe Lake, Liscombe Mills, Lower Seal Harbour, Sangster Lake, Upper Seal Harbour and Wine Harbour districts. Properties were active in Halifax county in the districts of Beaver Dam, Caribou, Killag, Lake Catcha, Lawrence town, Montague, Mooseland, Moose River, Oldham, Salmon River and Waverly; work was especially intensive at the Montague mine where extensive underground mining was conducted, milling commenced at this property in May. In Hants county mining operations were carried on in the Central Rawdon, East Rawdon, Mount Uniacke, South Uniacke and Renfrew districts. Mining operations in Lunenburg county were conducted in the Blockhouse, Gold River and Ovens districts. More prominent among the developments in Queens county were the operations conducted by the United Gold Fields of Nova Scotia Ltd., this company completed extensive underground work and commenced milling in February of 1934, in the same county exploration work was conducted on properties in the districts of Fifteen Mile Brook, Mill Village, Molega, West Caledonia, Westfield and Whiteburn.

For more comprehensive information regarding gold mining in this province communicate with the Department of Public Works and Mines, Halifax, Nova Scotia.

**New Brunswick.**—The only gold mining activity reported in this province during 1934 was the examination of a prospect on Guagus stream, a branch of the North Branch Little South West Miramichi River, its commercial possibilities were not indicated.

**Quebec.**—Gold mining operations were particularly widespread and varied in N.W. Quebec during 1934. Particulars relating to some of the more important developments are as follows: "After ore had been found by Lamaque Gold Mines Ltd., on all levels that had been opened up to a depth of 700 feet, plans were made in August 1934, for a construction and mine development program designed for an initial treatment capacity of 225 tons of ore per day to commence June 1st, 1935. The company reports a technical estimate of "positive ore" reserves at January 1st as follows:—

	Tons per ton	Average- grade Pen- nyweights	Total gold in penny- weights
Blocked ore .....	53,263	6.08	323,985
Broken ore in mine .....	669	12.88	8,604
Broken ore on surface .....	20,563	6.48	133,111
<b>Totals and average .....</b>	<b>74,495</b>	<b>6.25</b>	<b>465,700</b>

Canadian Malartic Gold Mines Ltd., reported that the first seven months of the year were devoted to exploration and development for the purpose of establishing an ore reserve position that would warrant the construction of a mill, subsequent to August 1st, underground work was confined to mine preparation. The mill under construction will be an all cyanide unit having a treatment capacity of 125 to 150 tons daily. The crushing section will have a capacity of 400 tons daily. The estimated ore reserves as of December 1st are as follows:—

		Value gold at \$34.00
Assured ore reserves.....	198,000 tons at .238 oz.	\$ 8.07
Indicated ore.....	340,000 tons at .186 oz.	6.32
<b>Total.....</b>	<b>538,000 tons at .205 oz.</b>	<b>6.97</b>

During 1934 active exploration work was carried on by Beattie Gold Mines Ltd., and it is reported that the property of this company is now at a stage where development work during 1935 should add materially to the already large reserves of ore. It was stated at the end of the year that the metallurgical treatment of the ore still remained the chief problem at the mine. The fineness of the mineral particles and the refractory nature of the ore presents great obstacles to a satisfactory recovery by simple flotation and cyanidation and much work was still necessary before the best method could be evolved. The fundamental question of ore reserves is reported sound, the mill treated 359,200 tons averaging 0.1812 ounces per ton for an operating profit of \$491,425.90 after very liberal expenditures of \$224,123.88 on mine development.

In June, 1934, it was reported that Siscoe Gold Mines Ltd., had completed shaft sinking to the 1,350 feet level, with three new levels established. The present program of development it was reported consists in developing, both horizontally and downward, the ore bodies already discovered and in the exploration of new territory. As a result of the development work ore reserves were increased 37 per cent to a total of 283,426 tons having an average value of \$15.56 per ton. The mine and mill were both in continuous operation throughout 1934, the company employing both amalgamation and cyanidation.

The Bussi res mine in Louvicourt township was active throughout the year, 5,065 ounces of crude gold were recovered by amalgamation and 277 tons of concentrates shipped to the Noranda smelter. At the McWatters gold mine a 50 ton amalgamation mill was erected and placed in operation in September. Since the beginning of 1935 it was decided to add a cyanide unit to the present mill and on completion of this work tonnage will be stepped up to 100 tons per day. It is reported that from stope developments and mill results, there exists an unbroken reserve of 50,000 tons of \$25 (gold at \$35) ore. In addition there are 6,768 tons on the surface ore dump estimated to average \$15 (gold at \$35).

Arntfield Gold Mines Ltd., conducted extensive underground and surface operations during 1934 and it was reported that the new 125 ton mill under construction at the property would be ready to turn over in July, 1935.

The Green Stahell mine located in Dubuisson township was productive throughout the year, 4,099 ounces of crude gold were recovered by amalgamation and 2,298 crude ounces by cyanidation, concentrates were shipped to the Noranda smelter; a progress report issued in April, 1934, estimated two years' ore reserves averaging approximately 0.4888 ounces per ton.

In Cadillac township the mine and mill of the O'Brien Gold Mines Ltd., were in continuous operation throughout the year, recoveries were made by amalgamation and concentrates were shipped to the Deloro Smelting and Refining Co., for experimental purposes.

Perron Gold Mines Ltd., located in Pascalis township carried out extensive underground and surface operations and commenced milling operations in July, amalgamation is employed in this mill.

Mining and milling operations commenced in May, 1934, at the Sullivan Mine located in Dubuisson township, the company recovered 2,430.71 ounces of crude gold by amalgamation and 3,470.15 ounces by cyanidation. Milling capacity will be increased to 100 tons per day. The company estimates probable ore reserves at 46,300 tons at .467 ounces per ton; presently

possible and possible ore, 22,000 tons, expected to be of average mine grade. In the Chibougamau are extensive prospecting and exploratory operations were conducted by Consolidated Chibougamau Goldfields Ltd., and other companies.

For more detailed particulars relating to gold mining in Quebec, mining laws, etc., communicate with the Bureau of Mines, Quebec, P.Q.

**Ontario.**—The Department of Mines, Ontario, reports that the year 1934 showed marked improvement in gold mining and while the ounces recovered in the province declined the quantity of ore treated increased, moving up from 5,621,000 tons during 1933 to 6,505,000 tons in 1934. The performance indicates the increased milling facilities and also the ability of operators to treat much lower grade ore, thereby increasing the life of the mines and the communities now dependent on this industry. At Porcupine the average value per ton of ore treated at the Canadian price of gold was \$8.56, at Kirkland Lake, \$17.18 per ton, in Matachewan, \$6.13 and in Northwestern Ontario, \$4.82 per ton. While the output from the Northwestern portion of the province was small and mainly produced by one mine, the Howey, it is of interest to record the reopening of many old properties which were producers in the nineties. In addition important new mines, including the Little Long Lac, have recently come into production. When it is remembered that favourable gold formations are known to exist and that new finds are becoming general over a wide area, the developments in gold mining in this part of the province promise to be of considerable importance during the next few years. In the late summer new finds were reported from the Sturgeon river area, east of Lake Nipigon. A gold "rush" followed and hundreds of claims were staked and recorded. Very rich veins on the claims of the Sturgeon River Gold Mines have been found both on surface and by diamond drilling. Favourable developments at Little Long Lac mine and also at the Central Patricia and Pickle-Crow mines near the Albany river, with continued interest at Red Lake suggest a general revival of gold mining in the Northwestern part of Ontario. McKenzie Red Lake, the second producer at Red Lake, turned over its new 125 ton mill in February, 1935, and expects to be in production in March. The 100 ton cyanide mill of the Matachewan Consolidated Mines Ltd., was brought into production in 1934. As soon as the mine has been opened up sufficiently and ore conditions warrant, it is the plan of the company to increase the daily tonnage to around 300 tons per day, indicated ore reserves are estimated at 1,170 tons per foot of depth, averaging 0.199 ounces gold per ton. The following figures show mill feed and production for the months of November and December:—

	Ore delivered	Waste sorted	Ore treated	Head sample average grade
	tons	tons	tons	oz.
November.....	2,302	260	2,042	0.22
December.....	2,712	74	2,638	0.26

The mill of the Young-Davidson Mine at Matachewan went into operation on September 8, 1934, open pit operations were continued throughout the winter, but under many difficulties, and plans are under way for underground mining during this season. The gold content in the ore has been \$1.76 on the \$20.67 basis or \$2.88 on the new price. Ore treated to the end of 1934 amounted to 51,842 tons and operating profits amounted to \$53,605.

The Hollinger Consolidated Gold Mines Ltd., reported that operations at the Hollinger Mine, Timmins, were carried on at all levels from the surface to the 3,950 foot level; 35.8 per cent of the ore milled came from above the 800 foot level, during the year 877,837 tons of backfill were placed. Ore reserves on December 31, 1934, consisted of 7,061,926 tons of a total value of \$51,440,260, having an average value of \$7.28 per ton; at the end of 1933 the reserves were 6,487,559 tons of a total value of \$48,430,451, having an average value of \$7.47 per ton. Total cost per ton of ore milled in 1934 was \$3.9281. In the calculations dealing with ore reserves, the statutory price of gold, \$20.67 per ounce, was used and the same minimum ore grade as used in former years continued; the net profits of the company for 1934 from all sources was \$6,505,363.

Dome Mines Ltd., hoisted 587,200 tons of ore, of this 547,600 tons were milled and 39,600 tons waste, 16,200 tons of waste were dumped into old stopes. The 547,600 tons of ore milled yielded bullion containing 203,896.878 ounces of gold, the yield per ton being 0.3723 ounces. The ore reserves are estimated at 2,000,000 tons. Ore in the sediments is estimated at 212,000



tons and the ore in the greenstones and contact is estimated at 1,788,000 tons. Ore from stopes wholly in the sediments yielded in 1934, 95,171 tons, averaging 7.45 dwt. per ton. Ore from stopes wholly in the greenstones and partially in the greenstones yielded 402,829 tons averaging 7.88 dwt. per ton. Operating costs for the year were \$3.877 per ton milled. The net operating profit, before depreciation and income taxes, for the year was \$4,549,617.

In its report for the fiscal year ended March 31, 1935, McIntyre Porcupine Mines Ltd., states "that in accord with the policy projected previously, development work and stoping operations were further extended into what was previously considered marginal ground. While this had the effect of decreasing the grade of ore treated, we increased the mill capacity to an extent sufficient to compensate, and the gross value of our production closely approximates the total of a year ago." Data pertaining to operations of the company during the past year are as follows:—

Ore treated.....	862,100 tons
Value per ton (.294 oz. at \$34.67).....	\$ 10.23
Gold recovered, per ton.....281 oz.....	\$ 9.79
Operating costs:—	
Costs per ton ore milled	
Exploration.....	\$ 0.0922
Development.....	\$ 0.5122
Breaking and stoping.....	\$ 2.7461
Total mining.....	\$ 3.3505
Milling.....	\$ 0.7187
Administration and general.....	\$ 0.1193
Grand Total.....	\$ 4.1885

Ore reserves were reported as follows:—

	Tons	Fine oz. gold
Estimated.....	3,219,460	1,046,226
Broken.....	211,021	57,600
Total.....	3,430,481	1,103,826
Average per ton.....		.3217

In the Kirkland Lake camp, Lake Shore Mines Ltd., reports that for the fiscal year ending June 30, 1934, receipts from bullion amounted to \$16,382,274 from 836,991 tons of ore milled, giving a value per ton of \$19.57. The production in ounces amounted to 485,384 gold and 99,041 silver. Dividends and bonuses for the period totalled \$6,000,000. Ore hoisted from development totalled 29,571 tons and from mining, 809,878 tons. The company states that the very considerable tonnage of lower grade material made available for mining to a large extent by the increase in the world price received for gold, has removed, for the immediate future, the necessity of intensive explorations in lower horizons of the mine. All of the ore mined was extracted by cut and fill methods or over stulls in narrow sections of No. 1 vein. Back fill to the extent of 407,835 tons was placed during the period. The total cost per ton of ore mined and milled was \$7.168. Broken ores reserves stood at 230,858 tons with a value of .81 ounces per ton, reserves of ore in place, available for immediate mining were fully maintained.

During the fiscal year ending August 31, 1934, the Teck-Hughes Gold Mines, Ltd., treated 474,700 tons of ore, the recovery of bullion and precipitate was the equivalent of 181,453 Troy ounces of fine gold which realized \$5,877,974. After the addition of other income the gross revenue was \$5,983,525 or \$12.60 per ton of ore milled. After making provision of \$224,016 for taxes and adding \$19,104, a profit derived from the sale of bonds, the surplus was \$3,048,602. The estimate of gold in "positive ore" decreased from 375,495 ounces at August 31, 1933, to 323,088 ounces at August 31, 1934. Mine workings within the ore zone were deepened from



5,074 feet to 5,735 feet. The company states that while decreasing earnings from gold production may be expected, present indications are that the Teck-Hughes mine can be profitably operated for several years to come. The following is an analysis of operating costs:—

	Cost per ton of ore treated	Cost per ounce of gold produced
Development and exploration.....	\$ 0.93	\$ 2.44
Mining.....	2.79	7.29
Milling.....	0.96	2.52
General expense.....	0.49	1.27
Examination of new properties.....	0.05	0.13
Depreciation.....	0.53	1.39
<b>Total.....</b>	<b>5.75</b>	<b>15.04</b>

Miscellaneous operating data supplied by Howey Gold Mines, Ltd., are as follows for 1934:—

Tonnage milled and sorted.....	481.757
Tonnage discarded by sorting.....	85.648
Tonnage milled.....	396.109
(x) Value a ton hoisted.....	\$ 2.20
(x) Value a ton material discarded.....	\$ 0.21
(x) Value a ton ore milled.....	\$ 2.64
(x) Loss in tailings a ton milled.....	\$ 0.214
(x) Loss a ton of ore hoisted (in milling or sorting).....	\$ 0.213
Net recovery percentage a ton of ore hoisted.....	90.3
(x) Gold at \$20.67 per ounce.	

Analysis of costs at the Howey Mine, Red Lake, 1934, is as follows:—

	Cost per ton
Mining operation.....	\$ 1.032
Outside exploration.....	0.005
Crushing and conveying.....	0.093
Ore sorting.....	0.049
Milling.....	0.452
General expense.....	0.133
<b>Total plant cost.....</b>	<b>1.764</b>
<b>Total costs, including depreciation, etc.....</b>	<b>2.396</b>

Broken ore reserves in the Howey mine as of December 31, 1934, amounted to 301,990 tons and unbroken reserves totalled 1,853,097 tons. The value of broken and unbroken reserves is estimated to be approximately \$3.50 per ton based on the current price of gold.

The three-compartment vertical shaft at the Little Long Lac Mine reached its objective of 719 feet during August. The following is a concise summary of the results on the second, third and fourth and fifth levels as at December 30, 1934.

Level	Ore length	Average width	Average grade
	feet	feet	oz.
Second.....	364	5.85	0.688
Third.....	760	4.80	0.735
Fourth.....	754	5.04	0.678
Fifth.....	245	5.27	0.840

Milling commenced at the mine in November, 1934. The same year also witnessed the bringing into operation of new mills at the Central Patricia and St. Anthony mines.

For more complete information relating to gold mining in Ontario, Ontario mining laws, etc., communicate with the Ontario Department of Mines, Toronto, Ontario.

**Manitoba.**—Mining activities were almost general throughout the gold bearing areas of Manitoba in 1934. Idle properties in the older camps were investigated as to their economic possibilities under the current price for gold and development and exploration programs were intensified in the newer areas.

The mine and mill of the Central Manitoba Mines Ltd., were operated continuously in 1934, the mill recovered 10,033.66 ounces of crude gold by amalgamation and 15,050.50 crude ounces by cyanidation from 43,862 tons of ore; considerable diamond drilling was conducted on the property. Ore reserves were estimated in June, 1934, at 17,836 tons averaging .324 oz. gold to the ton.

San Antonio Gold Mines Ltd., operated throughout the year, 66,457 tons of ore were raised and 21,638 fine ounces of gold recovered by amalgamation and cyanidation from 64,294 tons of ore milled. It was announced at the close of the year that the joint operation of the company and Forty-Four mines in which a drive is being made from the company's 600 foot level into Forty-Four ground was progressing favourably, this intersected three veins which otherwise might not have been touched for years. Ore reserves were estimated at December 31, 1933, to be 154,000 tons averaging .425 oz. per ton. At the close of 1932 costs were estimated at \$7.21 a ton milled.

Mining and milling were recommenced in June by Diana Gold Mines, Ltd., 6,663 tons of ore were hoisted and 1,980 ounces of pure gold recovered by amalgamation from 5,284 tons of ore milled. Extensive surface and underground work was conducted throughout the year by God's Lake Gold Mines Ltd., and it was announced that an initial mill unit to handle 150 tons daily is being planned, the mill is expected to be in operation in the fall of 1935.

According to the second annual report of the company, indicated ore reserve as at the end of 1934 is as follows:—

	Tonnage	Ounces grade	Value at \$34 per oz.
Total.....	63,400	.52	\$ 17.68
Allowing for possible 20 per cent dilution in mining.....	76,000	.43	14.62

Salvage work on the small high-grade lenses of gold ore was carried on during the year by Island Lake Mines Ltd., together with further underground development work and diamond drilling. Mining operations were continuous and milling commenced in April; 6,984 tons of ore were milled for a recovery, by amalgamation, of 2,931 ounces of fine gold and in addition ore shipments were made to the Flin Flon smelter. It was announced in 1935 that the main vein had been intersected beyond the fault, the first hole showed three feet averaging 3.0 oz. gold and the second hole cut 5.7 feet averaging 1.05 oz. gold.

Other important gold mining developments in 1934 included those of Gunnar Gold Mines Ltd., in the Beresford Lake section; Laguna Gold Mines Ltd., at Herb Lake; Smelter Gold Mines Ltd., God's Lake; Vanson Manitoba Gold Mines Ltd., Rice Lake district; Wingold Mines Ltd., Bisset; Oro Grande Development Co. Ltd., Beresford Lake and Gabrielle Mines Ltd., at Bisset.

For further information pertaining to gold mining in Manitoba communicate with the Department of Mines and Natural Resources for Manitoba, Winnipeg, Manitoba.

**Saskatchewan.**—Gold mining activities in this province were reported from Anisk, Douglas and Wekach Lakes sections in the eastern part of Saskatchewan, while encouraging results were stated to have been obtained from prospecting and exploration work in the Lake Athabaska district, no production in 1934 was reported from properties in these areas.

For further information apply to the Department of Natural Resources, Regina, Saskatchewan.

**British Columbia.**—The British Columbia Department of Mines reports that in the northwestern mineral survey district prospecting was carried on at the La Porte group near Port Essington and the Mastodon group at Hastings Arm, in both of which values in gold are present. In the Liard area a lode discovery on Quartz Creek, tributary to McDames Creek, was reported late in the season and resulted in a small stampede. In the Alice Arm area gold showings were prospected on the Homestake and Gold Reef groups. Though this area has been comparatively

inactive the gold aspects of the west side of the Upper Kitsault valley area are attracting the attention of examining engineers. In the Skeena division construction and renovation work has been carried out at the old Surf Inlet mine and in the Portland Canal area a crew of about 60 men has been employed on the Big Missouri and work was done on the Unicorn, Troy, Salmon Gold, and Portland groups. Development of the Atlin Pacific Mining Company's property (Norgold) continued throughout the season and it is anticipated that the old Engineer mine will be opened up in 1935. Production from lode operations in the district came chiefly from the Premier and Dunwell mines, Stewart, Granby Consolidated and Surf Point mine. During 1934 the Premier Gold Mining Co. Ltd., mined and milled 154,693 tons with an average assay content of 0.25 ounce of gold and 4.3 ounces silver per ton. The estimated ore reserves as of December 31, 1934, were as follows:—ore broken in stopes, 50,113 tons, averaging 0.20 ounces of gold and 6.4 ounces of silver; assured and probable unbroken ore down to the 6th level of the present mine workings amounts to 130,687 tons, averaging 0.26 ounces of gold and 5.0 ounces of silver; exploration and development by the company during 1934 represented 10,203 feet of diamond drilling at a cost of \$1.39 per foot and 10,992 feet of drifting, cross-cutting and raising at a cost of \$11.43 per foot.

In the Northeastern Mineral Survey District prospecting and development of lode gold properties were carried out at Hudson Bay Mountain, near Smithers, Dome Mountain near Telkwa, near Babine lake and in the northern part of the district. Two encouraging discoveries were made during the year:—that of the Patmore group near Doreen in the Skeena section and that of the Timber line group near McKee lake, in the Horsefly section. In the Cariboo section, it may be said of lode gold operations generally that although some have been discontinued, a comparison between the present position and that of two years ago showed clearly that real progress has been made. The discovery of the markedly auriferous pyrite replacement deposit in limestone at the property of Island Mountain Mines Co. Ltd., last year and development there this year has aroused much interest at this property and at that of the Cariboo Gold Quartz Mining Co. Ltd., at which mineralization of similar type, although less extensive, has been found.

The greatest activity in numbers 3 and 4, Mineral Survey Districts took place in the Hedley, Osoyoos and Greenwood areas where known deposits of gold occur and where practically all the facilities for mining are at hand. Many old mines have been reconditioned and extended exploration has produced more ore. The Hedley mine has been rejuvenated by the Kelowna Exploration Co. and more ore discovered.

In the Kamloops mining division recent discoveries on the Sweet Home claim belonging to the Windpass mining company are most attractive and appear to suggest extensive exploration of the region near Chu-Chua. Taking the district as a whole, developments have been favourable and the British Columbia Department of Mines states that several mines should come into production in the future.

Gold mining in No. 5 or the Eastern district has contributed in an important degree to the improvement in the district employment situation. Production of gold for 1934 was better than any year since large scale production by the Consolidated Company ceased at Rossland. The gold mining industry of the district is now showing evidence of permanence with increased production when milling operations such as at the Yankee Girl (Ymir-Yankee Girl Gold Mines Ltd.), Kootenay Belle Gold Mines Ltd., and Queen (Sheep Creek Gold Mines Ltd.) get under way. Shipments were suspended from the first two mentioned properties and the Goodenough (Ymir Consolidated Gold Mines Ltd.) pending consummation of milling plans. Expansion to say 60 or 70 tons a day may occur at the Second Relief Mill (Relief-Arlington Mines Ltd.), though this is dependent upon the results of exploration under way by the Premier Gold Mining Co. Ltd.

A substantially larger annual production from the Reno Gold Mines Ltd., no longer handicapped by power shortage, is assured. Increased output can also be expected from some of the properties entering the production stage such as the Gold Belt Mining Co., and Ymir-Dundee. Lode Gold development and exploration were conducted on numerous prospects in the Nelson Mining Division and at points in the Fort Steele Division. Long dormant properties in the area south of Nelson are being investigated and exploration resumed at former producers such as the Porto Rico and Fern.



In the Lardeau division mill construction was announced by the Meridian Mining Co. A satisfactory feature in the district is the provision of adequate and dependable power in the Nelson-Ymir-Salmo-Erie area through the newly constructed transmission lines of the West Kootenay Power and Light Co.

Gold mining activities in No. 6, the western mineral survey district, were widespread; at the Vidette mine a 35 ton milling plant was operating on an ore stated to average about 0.75 ounces of gold to the ton; gold production also came from the Grange Property near Clinton where a 25 ton mill, more recently stepped up to 60 tons, was in operation from some months. A small production also came from the Taylor-Windfall mill (3 ton) in the Taseke Lake country. The Wayside property was equipped with a 35-50 ton milling plant of the amalgamation type and the Minto Gold Mines recently completed the installation of a 50 ton mill. In the Shoal Bay-Phillips Arm section the Hercules Consolidated Mining, Smelting and Power Corp., and the Shoal Bay Syndicate were active. In the main Bridge River camp the Principal Producers Pioneer and Bralorne increased their ore reserves substantially; particularly interesting have been the developments in the lowest level of the Pioneer mine and the present programme of shaft-sinking which is to go to the 3,100 foot level should result in important developments, total ore reserves were reported in 1934 at 432,000 tons averaging .95 oz. per ton. In the latter part of May the Pioneer increased its milling rate to 400 tons per day.

In the Bralorne mine interesting and very promising sections have been opened up on the 6th, 7th, 8th, 9th and 11th levels. The new milling plant at the property was placed in operation and tonnage was gradually being raised to a production rate of approximately 400 tons per day. In 1935 it was stated that the west drift on the 11th level was in an excellent grade of ore, fully as good as that opened up on the 8th and 10th levels, and it was decided to deepen the main shaft another 200 feet and open up the 12th level. Indicated ore reserves as at December 31, 1933, were reported at 230,000 tons, averaging around .60 oz. of gold per ton. The company ratified an agreement whereby 26 claims being the southerly and eastern portion of the company's properties would be acquired by a new company to be known as Bradian Mines Ltd. In December, 1934, it was announced that operations of this company were proceeding satisfactorily with both shafts completed to their objectives.

In the Bridge River camp, outside of the two producing mines and a few other properties, it may well be considered that most of the work being done is primarily of a prospecting nature. For more complete information relating to the gold mining industry in this province communicate with the British Columbia Department of Mines, Victoria, British Columbia.

**Yukon and North West Territories.**—The Lands, Northwest Territories and Yukon Branch of the Department of the Interior, Ottawa, reports that one hundred and ninety-one quartz grants were issued in the Dawson District during the fiscal year. Many claims were staked for which grants are pending. The staking was done principally in the Carmacks area. At the close of the fiscal year in that area there were two hundred and seventy-eight mineral claims in good standing.

The N. A. Timmins Corporation has taken options on four groups, comprising about thirty-five claims in the Carmacks area. About thirty-five miles of winter sled road was grubbed out, connecting Mt. Free gold with the overland trail, and about seventy-five tons of equipment and supplies were hauled into the new camp by tractors. A Diesel engine and compressor were installed and work was started on the "La Forma" group. To date about 800 feet of tunnel have been driven and unofficial reports indicate the results are satisfactory. Prospecting by individual claim owners and several syndicates now working should prove the value of this district in the near future. Extensive exploration and development work was also conducted in 1934 on gold bearing claims located some twenty-five miles from the mouth of the Yellowknife river at Great Slave Lake in the Northwest Territories.

For more complete information relating to mining in the Yukon Territory apply to the Lands, Northwest Territories and Yukon Branch, Department of the Interior, Ottawa.



Table 48.—Ores Mined and Milled, Crude Bullion Recovered and Crude Bullion and Concentrates Shipped in the Auriferous Quartz Mining Industry, 1933 and 1934  
(Ton=2,000 lb.)

	Nova Scotia, Saskat- chewan and Manitoba	Quebec	Ontario	British Columbia	Canada
<b>1933</b>					
Number of producing mines	12	7	28	40	87
Ore mined	117,130 tons	360,041	5,632,869	418,814	6,528,854
Ore milled	106,719 tons	344,747	5,612,199	383,111	6,446,776
Tailings retreated	tons			3,658	3,658
Concentrates produced	7 tons	11,428	1	18,812	30,248
Bullion recovered by amalgamation	12,203 crude oz	80,238	186,365	36,689	315,195
Bullion recovered by cyanidation	37,942 crude oz	5,564	2,523,309	128,124	2,691,839
Bullion shipped	50,538 crude oz	86,168	2,711,059	164,813	3,012,578
Content of bullion shipped—Gold	37,305 fine oz	76,919	2,116,142	122,293	2,353,659
Silver	6,070 fine oz	5,918	404,744	26,579	413,311
Value	\$ 770,215	\$ 1,591,596	\$ 43,897,662	\$ 2,544,653	\$ 18,806,211
Exchange premium	\$ 293,653	\$ 655,973	\$ 15,503,709	\$ 1,001,456	\$ 17,454,791
Net value of ores, slags and residues sold	\$ 1,075	\$ 554,480	\$ 165,088	\$ 2,169,890	\$ 2,890,933
<b>Total value of all shipments</b>	<b>\$ 1,067,028</b>	<b>\$ 2,402,049</b>	<b>\$ 59,563,459</b>	<b>\$ 5,715,999</b>	<b>\$ 69,151,533</b>
<b>1934</b>					
Number of producing mines	15	10	42	81	118
Ore mined	152,945 tons	653,035	6,451,743	589,131	7,845,854
Ore milled	135,111 tons	621,984	6,290,836	427,347	7,475,278
Tailings retreated	tons		9,092	18,143	27,235
Concentrates produced	474 tons	24,895	304	22,875	48,548
Bullion recovered by amalgamation	21,519 crude oz	95,778	191,317	51,171	359,785
Bullion recovered by cyanidation	34,086 crude oz	19,645	2,609,813	143,089	2,863,633
Bullion shipped	65,815 crude oz	115,423	2,784,296	211,592	3,177,126
Content of bullion shipped—Gold	42,349 fine oz	98,166	2,038,445	151,862	2,331,822
Silver	6,489 fine oz	8,061	418,115	31,081	48,746
Value	\$ 876,061	\$ 2,032,084	\$ 42,362,320	\$ 3,153,879	\$ 48,424,344
Exchange premium	\$ 580,992	\$ 1,283,535	\$ 26,407,278	\$ 2,084,059	\$ 30,414,861
Net value of ores, slags and residues sold	\$ 17,180	\$ 1,307,820	\$ 140,585	\$ 3,425,644	\$ 4,891,229
<b>Total value of all shipments</b>	<b>\$ 1,474,236</b>	<b>\$ 4,623,439</b>	<b>\$ 69,000,183</b>	<b>\$ 8,663,582</b>	<b>\$ 84,761,410</b>

Table 49.—Ores, Concentrates and Slags Shipped from the Auriferous Quartz Mines in Canada, 1933 and 1934

Item	*Ontario mines shipping		British Columbia mines shipping		Canada
	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	
1933					
Number of mines.....	9	4	29	9	51
Tons of ore, etc., shipped.....	352	10,483	30,289	21,954	63,078
Metal content—					
Gold.....oz.	6,353	24,241	10,157	55,955	102,703
Silver.....oz.	12,575	12,096	159,911	1,015,900	1,200,482
Copper.....lb.	1,142	551		1,471	3,161
Lead.....lb.			701,541	696,390	1,397,931
Zinc.....lb.				48,954	48,954
Net value.....\$	133,233	587,410	432,825	1,737,065	2,890,534
1934					
Number of mines.....	15	4	62	17	98
Tons of ore, etc., shipped.....	3,714	22,347	47,086	22,152	95,299
Metal content—					
Gold.....oz.	7,242	47,574	34,438	69,437	158,691
Silver.....oz.	2,818	27,812	225,119	679,787	915,516
Copper.....lb.	740,899			154,873	895,772
Lead.....lb.			269,713	2,335	272,048
Zinc.....lb.					
Arsenic.....lb.		12,000			12,000
Net value.....\$	225,969	1,239,616	984,713	2,440,931	4,891,229

\*Includes two mines in Quebec and two in Manitoba in 1933 and seven mines in Quebec, two in Manitoba and two in Nova Scotia in 1934.

**Table 50.—Gold Content of Bullion, Ores, Concentrates, etc., Shipped, and Ore Milled by Auriferous Quartz Mines in Canada, with Average Price of Gold in Canadian Funds, 1929-1934.**

Year	Tonnage milled	Gold content of shipments fine oz.	Ounces of fine gold per ton	Average price of gold
1929.....	4,252,994	1,771,526	.42	20.67
1930.....	4,306,869	1,884,791	.44	20.67
1931.....	5,450,576	2,271,278	.42	21.55
1932.....	5,924,359	2,502,327	.42	23.48
1933.....	6,446,776	2,455,365	.38	28.00
1934.....	7,475,278	2,490,513	.33	34.50

**Table 51.—Capital Employed in the Auriferous Quartz Mining Industry in Canada, 1933 and 1934**

Province	Operating mines	Capital employed as represented by				Total
		Present value of land, buildings, fixtures, machinery, tools, equipment, etc.†	Inventory value of materials on hand, stocks in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	
1933	No.	\$	\$	\$	\$	\$
* Nova Scotia.....	12	423,727	34,809	9,000	30,476	498,012
Quebec.....	64	19,456,293	368,139	132,979	1,761,111	21,718,522
Ontario.....	54	78,480,305	2,483,512	849,286	26,934,101	108,747,204
Manitoba.....	15	6,071,066	163,755	30,901	108,068	6,373,790
British Columbia.....	71	17,029,930	349,338	297,430	3,585,705	21,262,403
Canada.....	216	121,451,321	3,399,533	1,319,595	32,419,461	158,599,931
1934						
* Nova Scotia.....	16	2,465,906	125,768	13,226	21,682	2,626,582
Quebec.....	118	30,262,502	739,518	306,646	3,043,015	34,351,681
Ontario.....	115	97,612,171	3,141,414	1,465,813	25,712,799	127,952,200
Manitoba.....	31	9,506,714	292,621	22,982	520,457	10,342,774
Saskatchewan.....	3	11,000	200	.....	14,678	25,878
British Columbia.....	133	33,576,735	586,027	161,028	4,432,454	38,759,244
Canada.....	416	173,435,031	4,885,548	1,972,695	33,775,085	214,068,359

\*In Nova Scotia there are usually a few small operations that are unreported.

†Does not include value of ore reserves.

**Table 52.—Employees, Salaries and Wages in the Auriferous Quartz Mining Industry in Canada, by Provinces, 1933 and 1934**

Province	1933					1934						
	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	Under-ground	Mill				Surface	Under-ground			Mill
					\$					\$		
Nova Scotia.....	7	26	10	3	47	38,399	27	98	86	23	234	198,657
Quebec.....	222	665	495	61	1,444	1,986,074	376	1,031	754	110	2,371	2,957,352
Ontario.....	499	2,150	6,203	658	9,521	15,907,512	709	3,030	7,043	756	11,627	18,918,830
Manitoba.....	50	145	186	29	410	636,525	103	377	269	49	793	1,125,922
Saskatchewan.....							2	9			11	8,367
British Columbia.....	165	547	595	93	1,400	1,967,482	317	981	1,350	173	2,821	3,947,759
Canada.....	913	3,542	7,491	844	12,823	20,536,012	1,623	5,526	9,502	1,111	17,762	27,156,887

Table 53.—Wage Earners, by Months, in the Auriferous Quartz Mining Industry, 1932-1934

Months	1932	1933	1934
January.....	9,476	10,764	13,329
February.....	9,494	10,815	13,540
March.....	9,383	10,808	13,897
April.....	9,557	10,918	14,516
May.....	9,819	11,229	15,556
June.....	9,984	11,836	16,404
July.....	10,119	12,381	17,145
August.....	10,171	12,754	17,734
September.....	10,168	12,636	18,187
October.....	10,292	13,060	18,342
November.....	10,373	12,841	17,712
December.....	10,255	12,443	16,938

### The Copper-Gold-Silver Mining Industry

The copper-gold-silver mining industry comprises a group of mines producing ores in which copper is usually the predominating metal in both value and quantity. The precious metals in these ores, especially during periods of depressed base metal prices, are often very deciding factors in the economic working of some mines of this type.

In northwestern Manitoba and in the Rouyn district of Quebec, important ore deposits of copper-gold sulphide ores, some of which contain zinc in commercial quantities, have been successfully developed and mined during recent years.

The mining of copper-gold-silver ores in 1934 was confined to the provinces of Quebec, Manitoba, Saskatchewan and British Columbia. It is to be noted, however, that a considerable quantity of gold is recovered from copper-nickel ores mined in the Sudbury area of Ontario; statistics relating to this industry are contained in the Chapter "Nickel-Copper Mining and Smelting." A summarized review of the copper-gold mining industry in Canada, by provinces, follows:—

**Quebec.**—At Eustis in the Eastern Townships, the Consolidated Copper and Sulphur Company operated its mine and mill throughout the entire year; 71,709 tons of ore were raised and 9,701 tons of copper concentrates and 46,626 tons of iron-pyrites concentrates produced. Concentrates of this company are exported to the United States.

In Boischatel township, Aldermac Mines Ltd., conducted mining operations at its property at Arntfield from March 1 to November 11. Considerable work was carried out underground and the mill was in operation from May 1st to November 11th; 33,604 tons of ore were raised and milled and 1,624 tons of copper concentrates and 7,312 tons of iron pyrites concentrates produced. The copper concentrates were shipped to both Canadian and United States smelters and the iron pyrites to a chemical plant.

At Rouyn, exploration at the Horne Mine by Noranda Mines, Ltd., was largely confined to the work of further outlining and developing the "lower H" ore body below the 2,475 foot level, and to the investigation on a number of levels of the area immediately west of No. 4 shaft, to determine the suitability for a location of a proposed new shaft.

The tonnages and average grade of ore shipped from the Horne mine to the smelter and concentrator in 1934 were as follows:—

	Gold	Copper	Gold per ton	Silver per ton
		%	oz.	oz.
Direct smelting sulphide ore.....	471,861	3.20	0.232	0.43
Concentrating sulphide ore.....	918,288	2.34	0.125	0.32
Silicious fluxing ore.....	386,872	0.31	0.134	0.13

The above total represents an increase of 15.2 per cent over that for the previous year.

During 1934 the smelter treated 1,050,684 tons of ore, concentrate and refinery slag (1933--1,010,629 tons) and produced 70,607,764 pounds of anodes, the average analysis of which was 99.39 per cent copper, 7.04 oz. gold per ton, and 15.66 oz. silver per ton. During 1934 the concentrator treated 920,363 tons of ore from the Horne Mine, the average assay of which was 2.34 per cent copper, 0.125 oz. gold per ton and 0.32 oz. silver per ton, from which 181,938 tons of concentrates were produced and sent to the smelter. In April, 1934, the rated daily capacity of the concentrator was increased from 2,000 to 3,000 tons and following an extensive campaign of research a hundred ton experimental cyanide unit designed to extract additional gold from the pyrite residue of the retreated mill tailing was constructed and placed in operation in June, 1934. The results obtained were so satisfactory that it was decided to construct a separate 500 ton cyanide mill to treat the entire pyrite portion of the tailing and it was expected that this would be completed and ready for operation in April, 1935. From the information obtained in drifting, diamond drilling, inclined raising and other openings in the various ore bodies, there is now indicated above the 2,725 level the following tonnage of ore:—

	Tons	Copper	Gold per ton
		%	oz.
Sulphide ore over 4% copper.....	6,826,000	7.25	0.166
Sulphide ore under 4% copper.....	20,497,000	1.04	0.191
Silicious fluxing ore.....	982,000	0.15	0.142

The above estimate means that 6,258 tons of new sulphide ore were developed or put in sight in 1934. This increase is made possible largely by the fact that the increased price of gold, together with decreased operating costs, permitted the inclusion of material that was formerly too low grade. At the present rate of mining sulphide ore, the reserve tonnage is sufficient to keep the plants operating for 18 years.

Encouraging ore discoveries were reported to have been made in 1934 by Opemiska Copper Mines Ltd. The number of high grade leases of copper-gold-silver ore was increased by four excellent new showings, one of which proved to be the best so far found. Its full limits have not yet been disclosed, but so far it is claimed to show close to 17% copper and about \$7.00 in gold and silver across seven feet for a length of 150 feet.

The property of Normetal Mining Corp. Ltd., located in Desmeloizes Tp., was under active development during the year, the shaft being completed to 950 feet and new levels opened up on the 675 and 800 foot horizons. The ore is heavy sulphide in character, the average tenor is 2% copper, 12.5% zinc, 3.9 oz. silver and .04 oz. gold. Development has proven sufficient tonnage to justify the installation of a mill of 500 tons daily capacity and consideration will be given to the installation of such a plant when metal prices justify. Other copper-gold-silver mines active during the year included those of Clericy Cons. Mines Ltd., Bagamac Rouyn Mines Ltd., Astoria Rouyn Mines Ltd., and Robb-Montbray Mines Ltd. The Waite-Amulet Mines were not re-opened in 1934 as the prices of copper and zinc were considered too low to make profitable operation possible.

**Manitoba and Saskatchewan.**—Production of copper-gold-silver ores in the provinces of Manitoba and Saskatchewan during 1934 came entirely from the Flin Flon Mine of the Hudson Bay Mining and Smelting Co. Ltd. This property is rather unique in that the interprovincial boundary between the provinces passes through the deposit and production by the company is divided between Manitoba and Saskatchewan according to the location of ore mined. The mine and mill were in continuous operation throughout the year, 1,477,341 tons of ore were raised, 1,463,716 tons milled and 921,388 tons of tailings cyanided. Copper concentrates produced totalled 250,615 tons and zinc concentrates 76,149 tons. Metal content of ore, concentrates, etc., sent to the copper smelter and zinc plant was as follows: gold, 107,509 oz.; silver, 1,593,953 oz.; copper, 43,528,759 pounds and zinc 69,331,636 pounds. At the annual meeting in 1933, it was stated that the company had 12 to 13 years of ore ahead, without considering any new development.

The Sherritt-Gordon mine remained inactive in 1934; a report issued by the company in October stated that some sales of copper were made at prices better than those now prevailing and the shut-down expense at the property, although considerable, was being kept at the lowest possible point compatible with the proper care of such a valuable and extensive plant. The actual cost price of copper on hand is reported by the company at 6.2429 cents.



**British Columbia.**—The system of leasing at the Centre Star and other properties of the Consolidated Mining and Smelting Co. of Can. Ltd., was continued; some sixty leases being in operation, with the employment of 200 to 225 men; shipments to Tadanae totalled 39,397 tons. In general the lessees were able to make wages, and the operations were of considerable benefit to the community. The Coast Copper property of the Consolidated Mining and Smelting Co. of Can., was not worked in 1934, the plant and equipment were, however, kept in condition by watchmen.

At Britannia Beach in the Vancouver mining division the mine and mill of the Britannia Mining and Smelting Co. Ltd., were operated continuously throughout the entire year, 786,412 tons of ore (wet) were raised and 759,697 tons of dry ore milled. Copper concentrates produced totalled 22,536 tons, zinc concentrates, 5,662 tons, iron pyrites, 26,746 tons and copper precipitate 988 tons. The copper concentrates and the greater part of the iron pyrites production of this company went to United States metallurgical plants while the zinc concentrates were consigned to Japan.

In the Nass river mining division the Granby Consolidated Mining, Smelting and Power Co. Ltd., conducted continuous mining operations at the Bonanza and Hidden Creek mines. The mill of the company treating ores from both deposits was in operation throughout the year. Ore shipments from the Bonanza Mine totalled 133,476 tons from which were produced 8,584 tons of copper concentrates. Shipments of ore from the Hidden Creek mine amounted to 1,744,524 tons, of which 1,742,324 tons were milled for the production of 112,047 tons of copper concentrates. Concentrates produced from ores of both mines were treated in the Anyox smelter of the company. The British Columbia Department of Mines in its Report on the Mineral Industry of the Province for 1934 refers to the Anyox operations as follows: "During 1934 the continued low copper price has adversely affected the Granby operations at Anyox and the bulk of the blister output has necessarily been stored. A generally lower tenor of ore has been met by a slight increase of tonnage to the mill, which towards the end of the year was treating about 5,200 tons of ore per day. About 1,100 men are employed at Anyox with a pay-roll of \$135,000 per month. In view of the discouraging low copper price and outlook for this metal, at a shareholders' meeting held in December the directors were empowered to cease operations at any time in accordance with their discretion." The Allenby property of the company continued inactive in 1934, it has been reported that this deposit has a known life of about ten years with copper higher than 10 cents per pound.

**Table 54.—Capital Employed in the Copper-Gold-Silver Mining Industry in Canada, 1933 and 1934**

Province	Number of operating mines	Capital employed as represented by					Total
		Present value of land, buildings, fixtures, machinery, tools, equipment, etc.	Inventory value of materials on hand, stocks in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)		
1933	No.	\$	\$	\$	\$	\$	
Ontario, Minitoba and Saskatchewan.....	4	13,928,110	1,098,754	735,038	86,106	15,948,608	
Quebec.....	17	7,102,815	56,836	11,244	288,665	7,459,669	
British Columbia.....	8	15,351,459	341,668	654,080	573,151	16,920,358	
Canada.....	29	36,382,384	1,497,358	1,400,362	947,922	40,228,626	
1934							
Quebec.....	13	5,215,096	198,001	145,578	2,145,622	7,704,897	
British Columbia, Manitoba and Saskatchewan	10	25,558,173	1,325,886	2,443,229	2,860,202	32,187,490	
Canada.....	23	30,773,869	1,523,887	2,588,807	5,005,824	39,892,387	

Table 55.—Employees, Salaries and Wages in the Copper-Gold-Silver Mining Industry in Canada, 1933 and 1934

	1933		1934	
	Number	Salaries and wages \$	Number	Salaries and wages \$
<b>SALARIED EMPLOYEES—</b>				
Total.....	159	300,363	204	446,790
<b>WAGE-EARNERS—</b>				
Surface.....	610	3,632,415	747	4,423,002
Underground.....	1,671		1,874	
Mill.....	401		344	
Total.....	2,682	3,632,415	2,965	4,423,002
<b>Grand total.....</b>	<b>2,841</b>	<b>3,938,778</b>	<b>3,169</b>	<b>4,869,801</b>

Table 56.—Wage-earners by Months in the Copper-Gold-Silver Mining Industry, 1932, 1933 and 1934

Month	1932	1933	1934
January.....	3,099	2,657	2,813
February.....	3,137	2,298	2,827
March.....	3,114	2,398	2,817
April.....	3,089	2,565	2,856
May.....	3,067	2,651	2,958
June.....	3,039	2,678	2,923
July.....	2,804	2,726	2,985
August.....	2,795	2,867	3,104
September.....	2,775	2,826	3,122
October.....	2,837	2,878	3,088
November.....	2,706	2,807	3,147
December.....	2,666	2,793	2,930

Table 57.—Shipments from Copper-Gold-Silver Mines of Canada, 1933 and 1934

	Quantity Tons	Net value (a) \$	Total metal content as determined by settlement assay				
			Gold Fine oz.	Silver Fine oz.	Copper Pounds	Sulphur Tons	Zinc Pounds
<b>1933</b>							
9 mines shipped to Canadian plants—							
Ores.....	867,789	914,642	223,494	328,918	39,561,914		
†Copper concentrates.....	495,370	4,859,812	171,954	1,019,387	107,952,457		
Zinc concentrates.....	80,780	565,460					55,938,867
Iron pyrites concentrates.....							
4 mines shipped to Foreign plants:							
Ore.....							
Copper concentrates.....	28,541	1,104,146	12,933	65,989	14,654,498		
Zinc concentrates.....	8,929	70,460					9,374,675
Iron pyrites concentrates.....	58,604	180,050				28,178	
<b>Total.....</b>	<b>1,540,013</b>	<b>7,703,570</b>	<b>408,381</b>	<b>2,014,274</b>	<b>162,168,869</b>	<b>28,178</b>	<b>65,313,542</b>
<b>1934</b>							
8 mines shipped to Canadian plants—							
Ores.....	868,467	829,308	162,797	282,391	33,173,070		
†Copper concentrates.....	553,515	5,769,226	194,664	1,918,638	120,185,486		
Zinc concentrates.....	76,149	451,563	5,417	144,559	1,324,297		69,331,636
Iron pyrites concentrates.....	1,199	3,769				593	
‡ mines shipped to Foreign plants:							
Ores.....							
Copper concentrates.....	31,866	1,039,511	11,261	79,358	15,348,073		
Zinc concentrates.....	5,889	72,493					5,374,023
Iron pyrites concentrates.....	35,957	99,201	2,889		84,097	4,908	
<b>Total.....</b>	<b>1,573,042</b>	<b>8,265,071</b>	<b>377,028</b>	<b>2,424,946</b>	<b>170,115,623</b>	<b>5,501</b>	<b>74,705,659</b>

† Includes some cyanide precipitate.

(a) See footnote under table 19, in Chapter I.

Table 58.—Ore Mined and Milled in the Copper-Gold-Silver Mining Industry, in Canada, 1933 and 1934

	Quebec, Manitoba, and Sask- atchewan	British Columbia	Canada
	tons	tons	tons
<b>1933</b>			
Ore mined.....	3,232,581	2,215,909	<b>5,448,690</b>
Ore milled.....	2,363,981	2,157,320	<b>4,521,301</b>
Copper concentrates produced.....	397,422	123,977	<b>521,399</b>
Pyrite concentrates produced.....	40,070	19,284	<b>59,354</b>
Zinc concentrates produced.....	80,780	7,865	<b>88,645</b>
<b>1934</b>			
Ore mined.....	3,359,588	2,706,104	<b>6,065,692</b>
Ore milled.....	2,499,392	2,637,797	<b>5,127,189</b>
Tailings re-treated.....	921,388		<b>921,388</b>
Copper concentrates produced.....	443,878	143,167	<b>587,045</b>
Pyrite concentrates produced.....	53,938	26,746	<b>80,684</b>
Zinc concentrates produced.....	76,149	5,662	<b>81,811</b>

† Includes 200 tons mined in Ontario.

## CHAPTER III

## THE SILVER MINING INDUSTRY IN CANADA

Including the Silver-Cobalt Mining Industry, the Silver-Lead-Zinc Mining Industry, and Commodity Statistics Tables on Arsenic, Cobalt, Silver, Lead and Zinc.

1. General Review.
2. The Silver-Cobalt Mining Industry.
3. The Silver-Lead-Zinc Mining Industry.
4. Commodity Statistics—including tables showing production by provinces, imports, exports, prices, and world output of Arsenic, Cobalt, Silver, Lead and Zinc.

## 1. General Review

(a) **Definition of the Industry.**—Silver mining is not a distinct industry in Canada, as silver is found, as an ore, usually in association with those of other commercially valuable metals; with lead and zinc, as in many of the western mines; with the cobalt and nickel arsenides of northern Ontario; with radium and uranium at Great Bear Lake, N.W.T.; and in copper and other metalliferous ore deposits. Silver is nearly always found alloyed or associated with both alluvial and lode golds from which it is recovered in the refining of the crude gold bullion. This precious metal is, therefore, a rather common constituent in many of our mineral deposits, especially in those of the non-ferrous ores, and its value as a mine product is sometimes a deciding factor in the economical working of an ore body. It is the paramount value in the rich native silver-cobalt ores of Ontario, while in the silver-lead-zinc industry it is usually recovered as an important by-product. The mining and smelting of argentiferous lead and zinc ores are very important industries, especially in British Columbia, and the silver recovered from this type of ore is a distinct contribution to the mineral production of Canada. It is therefore realized that the mining and metallurgy of silver bearing ores are closely interwoven with those of other important metals principally lead and zinc and in order to make a comprehensive survey of the Canadian silver production it is imperative to consider its various sources of origin.

(b) **Historical.**—History pertaining to early Canadian silver and lead mining is meagre. We find in Cape Breton, evidence of early colonial efforts to mine galena ores, and from the records of the French regime we find mention by Champlain of argentiferous galena on the east shore of Lake Temiskaming, this deposit was later worked under the name of the Wright mine. It is stated that early last century small shipments of galena ore were made to Europe from deposits on the east shore of Hudson's Bay. In Ontario, silver-bearing veins were found as early as 1846 in the vicinity of Thunder Bay on Lake Superior. It was not until 1866 that Thomas McFarlane discovered in this district high grade silver ore in important commercial quantities. This, a sensational "find", was made on a small rocky island not more than 90 feet in diameter and located but a short distance off Thunder Cape. The property, later known as the Silver Islet mine, produced until 1884, the year of its abandonment, approximately \$3,250,000 in silver. Some of the other producing mines of this period in the Port Arthur district were the Silver Mountain, Beaver, Rabbit Mountain and Porcupine.

Construction of the Temiskaming and Northern Ontario railroad during 1903 was highly instrumental in the finding of one of the world's richest silver areas. Grading operations along what was then known as Long Lake in northern Ontario revealed veins possessing a mixture of unfamiliar minerals, leaves and wires of a white sectile metal were found on the surfaces of pinkish coated (erythrite) vein fillings. It was only after specimens of these "queer rocks" were sent south for identification and the announcement officially made of the discovery of important native silver and cobalt ores that the country became keenly interested. Silver discoveries and mine development in the South Lorrain and Gowganda areas followed shortly after the original finds at Cobalt and represent the results attained in the widened sphere of the prospecting activity subsequent to the first "boom" in Coleman township.



History is silent as to any important silver production or discoveries in the Prairie Provinces. Small amounts have been recorded as coming from either Manitoba or Alberta and chiefly represent the metal recovered in the refining of crude gold bullion, however, during the past few years increasingly important quantities of silver have been recorded from the Copper-Gold ores of the Flin Flon mine situated on the Saskatchewan-Manitoba boundary. The dawn, or perhaps more aptly put, the false dawn of the silver-lead mining industry in British Columbia reaches back into the early decades of placer prospecting. The gravel miners penetrating the unexplored upper waters of the auriferous streams eventually encountered widespread evidence of metalliferous deposits. Rich float found in the valley bottoms was sometimes traced up the mountain sides to its source of origin, resulting in the discovery of potential mines. Early development and exploration were greatly delayed by lack of railroad facilities and it was not until late in the eighties that any appreciable production was registered. Small shipments aggregating \$37,925 were made in 1887 from various camps in the Kootenay district. It may be of interest, to note here, that the Monarch mine at Field, discovered in 1884, was a small shipper during 1887 and after 45 years of intermittent operation was reopened under sound financing in 1930 and again commenced shipping silver-lead-zinc ores under modern and more efficient mining methods. Active operations in the Ainsworth camp date from about 1888 and those in the Sardon-Silverton areas from about 1892. The discoveries of the North Star, Saint-Eugène and famous Sullivan deposits were made in East Kootenay during 1892 and 1893.

In 1930 high grade silver-radium ores were discovered at Great Bear Lake, Northwest Territories, these have been actively developed and small annual shipments of ore have since been made to metallurgical plants.

Gold was discovered in the Yukon river as early as 1869 and we find, in succeeding years, a synchronous silver production which originated in the alluvial recoveries of the former crude metal. These silver values mounted to impressive figures during the height of the Klondike placer operations. Some argentiferous lode discoveries were made in the Yukon during 1899, but there appears to have been little, if any, production therefrom until 1910, in which year an output of 37,418 ounces of vein silver was recorded. In July, 1919, L. Beauvet made the first outstanding discovery of valuable silver-lead ores in commercial quantities. This find occurred at Keno Hill, 40 miles northwest of the town of Mayo. Ore shipments from these deposits commenced during the winter of 1920-1921. It was during the latter year that the rich Sadie-Friendship vein was found. All ores and concentrates from this area are shipped to outside plants for smelting.

**(c) Sources and Status of Silver, Lead, Zinc, Cobalt and Arsenic.**—Statistics on the production of silver from Canadian ores include (a) silver contained in silver and gold bullion produced, (b) silver contained in blister copper or lead bullion made, and (c) silver estimated as recoverable from ores of all kinds exported for treatment in foreign smelters.

Figures on lead for 1934 include lead contained in base bullion made at the Trail smelter and lead estimated as recoverable from ores exported from mines in the Yukon and British Columbia. Small quantities of lead, recovered by the smelters treating cobalt or pitchblende-silver ores are also included.

Canada's 1934 zinc output comprised refined metal produced by the Consolidated Mining and Smelting Company at Trail, B.C., and the Hudson Bay Mining and Smelting Company at Flin Flon, Manitoba, together with the zinc contained in ores exported.

For two decades the ores of the Cobalt district of Ontario had been the main source of the world's supply of cobalt, but since 1926, owing to the production of cobalt by the Union Minière du Haut Katanga, from Central African copper-bearing ores, Canada's production was reduced to less than half of the world's output.

From 1904 to 1910 the Canadian cobalt production figures represent an estimate of the cobalt content of the ores shipped from the mines. From 1911 until the present time cobalt production is computed by adding the cobalt metal and the cobalt content of all cobalt oxides and salts manufactured and sold by the Ontario smelters to the cobalt paid for in ores and residues exported for treatment in foreign smelters.

Arsenic is produced in Canada from the cobalt-silver-nickel-arsenic ores of the Cobalt district by the smelter of the Deloro Smelting and Refining Company Limited, at Deloro, Ontario. Prevailing low prices and an instability of demand have prevented any expansion in the production of arsenic in Canada during recent years.

Among the metals produced in Canada during both 1933 and 1934, zinc held fourth position, lead fifth and silver sixth in point of value and among the metal producing countries of the world Canada ranked second in the output of zinc, third in silver and cobalt and fourth in lead.

The average monthly price for lead on the London market in 1934 was £10·935 per long ton as compared with £11·670 in 1933. London lead prices have shown almost continuous declines since 1930 in which year the average price of the metal was recorded at £18·077. The average London January price for lead in 1934 was £11·304; the price remained fairly steady until mid-year from which period it declined gradually to an average of £10·316 for December.

Zinc in London averaged £13·657 per long ton in 1934, representing a considerable decrease from the average of £15·666 for the preceding year. In 1930, on the same market, the price was £16·570 which, when compared with 1934, constitutes a 21·3 per cent decrease during the period specified. The average price for the metal in London for January, 1934, was £14·688; the monthly quotations remained fairly constant until June following which an almost continuous decline was recorded to December in which month the average price was £11·730 per long ton.

Silver prices showed a decided improvement in 1934. The average price for the year based on the New York market was 47·973 cents per fine ounce as compared with 34·727 cents in 1933. The metal averaging 44·188 cents in January showed little monthly fluctuations until July when, following the signing, on June 19th, by President Roosevelt, of the Silver Purchase Act, the price rose steadily to 54·390 cents as the average for December. The average price for 1934 was the highest recorded since 1929.

Quotations for white arsenic on the New York market remained, as during recent years, at a nominal price of 4 cents per pound. Cobalt metal and cobalt oxide prices remained unchanged as compared with the previous year.

## 2. The Silver-Cobalt Mining Industry.

Only mining and milling are considered in this chapter. Smelting of the cobalt ores, in so far as the Canadian operations are concerned, is treated in the chapter on "The Non-Ferrous Smelting and Refining Industry."

Following the production derived from Silver Islet and other properties of the Port Arthur district, comparatively little silver was produced in Ontario until the discovery in 1903 of the sensationally rich ores of the Cobalt area. From 1904, when the output of silver was over 3,000,000 ounces, the production increased rapidly until the peak was reached in 1910. In that year Ontario produced 30,366,366 ounces of silver, two years later production declined to 29,000,000 ounces and thereafter followed a generally downward trend until 1921 when less than 10,000,000 ounces were reported.

Silver recovered as a by-product in the treatment of gold, copper-gold and copper-nickel ores is of increasing importance in offsetting the decline in the recovery of this metal from arsenical-cobalt ores. Ontario is the only province producing cobalt and refined arsenic.

The mining of silver-cobalt-arsenic ores in Canada is confined to Northern Ontario. Since 1921 the annual volume of production has fluctuated to a considerable extent and in 1934 the total silver production of Ontario amounted to 5,321,160 fine ounces of which the cobalt-silver ores contributed 3,067,216 fine ounces. The Ontario Department of Mines reports that a revival of activity has recently been observed in the old Cobalt camp which was so famous for many years as a silver producer. Advancing prices for silver and a keener demand for cobalt ores indicate some measure of prosperity for this old district. During 1934 twelve properties at Cobalt and one at Gowganda made shipments totalling 2,899 tons. The properties, some of which were operated under lease, were as follows: Beaver, Cobalt Properties, Crown Reserve, Drummond lease, Dominion Reduction Co. lease, Foster lease, Hudson Bay lease, Mining Corporation lease, McKinley-Darragh lease, Nipissing, O'Brien and Temiskaming; the Miller Lake O'Brien shipped from Gowganda and in addition to these shippers development work was conducted by the Smith Cobalt Mines Ltd. and Windsor Cobalt Silvers Ltd., both located at Cobalt.

The shipments of ores and concentrate from the Cobalt area in 1934 as reported by the Temiskaming and Northern Ontario Railway were 940·27 tons to Deloro; 210·5 tons to Trail, B.C.; 821·63 tons to the Noranda smelter; and 926·11 tons for export; a total of 2,898·51 tons. In 1933 ore shipments as reported by the railway were only 1,445·09 tons and the increase is proportional to the revival in silver-cobalt mining operations.

Table 59.—Statistics of the Silver-Cobalt Mines and Mill Operations in Canada, 1924, 1933 and 1934

	1924	1933	1934
Number of mines in operation (x).....	34	14	16
Ore mined..... tons	433,176	60,326	54,498
Ore treated..... tons	428,509	59,304	52,337
Concentrates produced..... tons	7,360	1,063	795
Quantity of material cyanided..... tons	168,193		
Bullion recovered..... fine oz.	5,577,875	(b) 11,616	(b) 8,525
Bullion sold or shipped..... fine oz.	5,004,992	(a) 39,781	202,535
Value of bullion, ore, concentrates and residues sold..... \$	3,369,664	1,071,602	1,350,318

(x) All mines located in Northern Ontario.

(a) Base bullion from clean-up.

(b) From direct smelting of nuggets, etc.

Table 60.—Capital Employed in the Silver-Cobalt Mining Industry in Canada, 1933 and 1934

	1933	1934
Capital employed as represented by:—	\$	\$
†(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	439,436	275,502
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	70,514	261,299
(c) Inventory value of finished products on hand.....	1,112,533	485,462
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	1,743,272	4,080,229
<b>Total</b> .....	<b>3,365,755</b>	<b>5,102,491</b>

†Does not include value of ore reserves.

Table 61.—Employees, Salaries and Wages in the Silver-Cobalt Mining Industry in Canada, 1933 and 1934

	1933		1934	
	Number	Salaries and wages	Number	Salaries and wages
		\$		\$
<b>SALARIED EMPLOYEES—</b>				
Total.....	25	59,929	30	78,013
<b>WAGE-EARNERS—</b>				
Surface.....	66	262,352	92	283,713
Underground.....	117		132	
Mill.....	34		32	
Total.....	217	262,352	256	283,713
<b>Grand Total</b> .....	<b>242</b>	<b>322,281</b>	<b>286</b>	<b>361,726</b>

Table 62.—Number of Wage-Earners on Payroll or Time Record on the 15th of Each Month or Nearest Representative Date in the Silver-Cobalt Mining Industry in Canada, 1932-1934

Month	1932	1933	1934
January.....	489	208	234
February.....	435	203	233
March.....	370	201	230
April.....	344	204	219
May.....	333	204	235
June.....	343	200	257
July.....	339	205	262
August.....	312	228	269
September.....	281	236	270
October.....	266	236	308
November.....	257	233	281
December.....	237	225	277



### 3. The Silver-Lead-Zinc Mining Industry

#### CANADA

Silver-lead-zinc ores are widely distributed in Canada. Deposits containing these metals have been either investigated or developed in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, British Columbia, the Yukon, and the Northwest Territories. The mining and metallurgical treatment of this type of ore is largely confined to British Columbia where the growth of this particular branch of the mining industry is closely associated with the successful development and treatment of the Sullivan mine ores by the Consolidated Mining and Smelting Company of Canada.

#### QUEBEC

No shipments of lead-zinc ores or concentrates were made from Quebec mines in 1934. However, considerable development and exploratory work was conducted on deposits located in Lemieux township, Gaspé County, and at Montauban les Mines, where silver-lead-zinc ores were mined from 1910 to 1929 at the Tetreault Mine; during the latter year 29,798 tons of flotation concentrates were shipped from this property to foreign smelters.

#### ONTARIO

Lead and zinc mineralization is fairly common in certain sections of Ontario. Several years ago lead ores were mined and smelted in Frontenac and Hastings counties. During the years immediately preceding 1931 the greater part of the Ontario lead production came from the now abandoned Kingdon mine at Galetta. All of these deposits in eastern Ontario possess more or less common characteristics; veins are usually in or associated with crystalline limestones of the Grenville series and the vein matter generally consists of calcite, galena, and zinc blende. A distinctly different type of lead deposit was developed at the Errington mine in the Sudbury field, where ore deposition occurs in a major fault zone passing through slates and tuffs of pre-Cambrian age. The crushed zone is, in sections, several hundred feet wide; development indicates that the ore occurs in a number of separate and often parallel shoots. Ore consists of quartz, lead, zinc and copper sulphides, carbonate, rock inclusions and massive iron pyrites; the last mineral has been replaced, in part, by zinc blende, galena and copper pyrites. No lead mines have been operated in Ontario since 1931.

#### MANITOBA

Silver production in Manitoba during 1934 amounted to 1,252,920 fine ounces valued at \$594,647. This was contained in blister copper made at the Flin Flon smelter and in crude gold bullion produced from auriferous quartz ores. No lead ores are mined in Manitoba; important quantities of zinc are removed from the Flin Flon deposit.

#### SASKATCHEWAN

The production of silver recorded for Saskatchewan in 1934 totalled 87,551 ounces valued at \$41,552 and represents the estimated quantities of the metal recovered from Flin Flon ores mined on the Saskatchewan side of the Manitoba boundary by the Hudson Bay Mining and Smelting Co. Ltd.

#### BRITISH COLUMBIA.

The British Columbia Department of Mines' annual report for 1934 contains the following information relating to silver-lead-zinc mining operations: "During the period under review the Trail plants of the Consolidated Mining and Smelting Company were operated on the largest scale in their history. Lead and zinc production established an all-time high volume record, with an accompanying large increase in silver. This is due primarily to the greater output of the Sullivan mine at Kimberley to meet the requirements of the smelter. The Monarch mine of the Base Metals Mining Corporation at Field contributed substantially to the production of these metals, lead and zinc concentrates having gone forward regularly to European smelters. Customs shipments to the Trail smelter, chiefly gold ores and concentrates, show a substantial increase, with contributions from thirty-four properties in the Nelson division, twenty-eight in the Slocan camp (including portions of the Ainsworth and Slocan City divisions), eleven in the Trail Creek division (exclusive of the large output made by lessees at the Rossland mines of the Consolidated



Mining and Smelting Company), and three in the Lardeau, Arrow Lake and Fort Steele divisions. The Slocan camp shipments, with few exceptions where the ores contained gold, consisted of silver-lead-zinc ore and concentrates chiefly derived from leaching operations. . . . It is worthy of note that in the peak years of silver production in the Slocan the value of lead produced was not far below that of silver. Under existing conditions, little or nothing can be obtained for the lead content of these ores, so that for the immediate future production will have to be estimated on the silver content only. Even under such conditions an appreciable increase in silver production may be anticipated. . . . the volume of lead production is likely to remain about the same. The present price of the metal is low beyond reason, and while the price of 1925 may never again be reached, a reasonable appreciation in value should be attained within the next few years. . . . while it is anticipated that the volume of zinc will be maintained, due to a demand for electrolytic zinc, and the position which the British Columbia metal has won in world markets in spite of keen competition, it is not anticipated that any appreciable increase in the price of the metal will be realized."

The total production of the Sullivan mine in 1934 amounted to 1,748,401 tons, comprising 1,745,992 tons of lead-zinc ore, shipped to the concentrator at Kimberley and 2,409 tons of crude lead ore to the smelter at Tadanac, an increase of 335,023 tons over the shipments of the previous year. The concentrator treated 1,745,992 tons and produced 221,680 tons of lead concentrates and 192,552 tons of zinc concentrates. The average feed to the ball mills contained .5 ozs. per ton more silver, 9 lb. more lead and 5.2 lb. less zinc than in the previous year. The Consolidated Mining and Smelting Company reports that consumption in Canada was higher than for several years past and sales in the United Kingdom—our largest market—reached record volume in both lead and zinc. However, foreign production, being in excess of foreign demand, has precipitated distress selling by foreigners in the British market and an effort is now being made to have "world prices" interpreted in the spirit of the Ottawa agreements.

Following is the metal production and tonnage treated at Kimberley and Trail plants together, from 1894 to date, and for 1934:—

	1894 to 1934 (inclusive)	1934
Tons ore treated.....	24,463,646	1,792,298
Gold produced..... ounces	2,381,581	35,328
Silver produced..... ounces	113,951,029	7,316,231
Lead produced..... pounds	3,797,121,176	345,346,312
Copper produced..... pounds	184,673,769	1,567,078
Zinc produced..... pounds	2,020,575,232	221,955,701
Cadmium produced..... pounds	2,650,668	293,611
Bismuth produced..... pounds	576,871	246,092

The company announced that the further downward extension of the Sullivan mine orebody was confirmed by diamond drilling from the 3,350 and 3,200 stations and indicated as maintaining average width and satisfactory grade.

The Monarch mine of Base Metals Mining Corporation, Ltd., was operated at full capacity during 1934, except for a short delay in February to push forward the production drift. Another temporary closedown for the same reason was made in February, 1935. Advantage is being taken of this temporary closedown to get well under way with an extensive development programme which has been in contemplation for some time past. This company milled in 1934 94,880.4 dry tons of ore assaying 2.08 ounces of silver, 10.9 per cent lead and 14.7 per cent zinc. The costs of milling, including all overhead, office, insurance and contingencies were equivalent to \$1.16 per ton milled.

#### NORTHWEST TERRITORIES

In April, 1934, it was officially announced that the concentrator of Eldorado Gold Mines located at Great Bear Lake would be increased to 75 tons per day. It was stated that on the 125 foot level of the company's mine, 393 feet of drifting, up to the end of May, 1935, had exposed two important orebodies. West of the shaft 210 feet of ore was exposed and east of the shaft 145 feet of ore. Both exposures compare in width and grade with that on the adit level. On the 250 foot level, up to May 31, 1935, 175 feet of drifting had been completed, the last 50 feet of which, it is reported, disclosed an important silver and pitchblende deposit. In 1934 the Port Hope Radium Refining plant of the company received from the Great Bear Lake mine 77 tons of

pitchblende and silver ore and 7 tons of silver concentrates. It was announced in the press that twenty-six tons of ore were treated during the year with a recovery of radium, uranium, silver and lead amounting to \$210,000.

Consolidated Mining and Smelting Company of Canada, Ltd., reported that underground development was continued on its Echo Bay group, with somewhat favourable results. The main crosscut intersected a vein, not previously located on the surface, but parallel in strike to number two vein, which carried fair values in silver for 85 feet, with some sections of high grade composed of leaves, wires and plates of silver. No pitchblende ore was encountered and no shipments of silver ore made. Other important mining operations in this territory included those of Bear Exploration and Radium Ltd., Great Bear Lake Mines, Ltd., and White Eagle Silver Mines, Ltd.

### YUKON

The Comptroller of the Yukon Territory reports that during the fiscal year ending March 31, 1935, the Treadwell Yukon Company, Ltd., carried on mining operations during the early part of the year on the "Silver King" claim. There were 2,985 tons of ore produced from which 1,610 tons of shipping ore was sorted. The number of tons of ore shipped during the year was 2,242 of which 632 tons were produced during 1933. The metal content of ore shipped was 506,058 ounces of silver, 1,832,117 pounds of lead, and the market value was \$326,621. In addition, 177 tons of ore were shipped by this company for individual operators, the metal content of which was 72,967 ounces silver, 208,660 pounds of lead, and the market value, \$46,367. This company plans to dismantle its mill at Wernecke and move it to one of their properties on Galena Hill during the summer of 1935. Considerable development work was also carried out on the "Bunny" and "Highlander" claims on Keno Hill; this was conducted by the York Investment Company of Vancouver.

**Table 63.—Shipments of Lead Ores and Concentrates from Canadian Mines, 1925-1934**

(For years 1913 to 1924 see 1928 report of the Mineral Production of Canada)

Year	Shipments		Lead content in pounds	Silver content in ounces
	Tons	Value		
		\$		
1925.....	208,588	15,420,756	237,675,311	6,024,213
1926.....	255,048	17,546,728	273,903,827	8,616,164
1927.....	275,328	13,044,514	308,903,620	8,831,840
1928.....	255,944	12,178,879	322,239,859	10,287,591
1929.....	258,203	15,990,117	328,877,236	10,177,926
1930.....	259,630	11,024,912	336,976,074	10,172,485
1931.....	193,370	5,678,421	253,963,266	8,502,392
1932.....	190,700	4,241,652	246,051,119	8,031,587
1933.....	200,686	5,756,420	266,522,718	7,405,322
1934.....	247,014	6,954,706	339,932,667	7,735,304

Since 1932 figures include silver in silver-radium ore shipped from Northwest Territories.

NOTE.—For complete metal contents of silver-lead-zinc ore shipments for 1933 and 1934 see Table 65.

**Table 64.—Ore Mined and Milled in the Silver-Lead-Zinc Mining Industry in Canada, 1933 and 1934**

		Yukon, Northwest Territories and Quebec	British Columbia	Canada
<b>1933</b>				
(x) Ore mined.....	tons	4,909	1,451,078	1,455,987
Ore milled.....	tons		1,435,357	1,435,357
Concentrates produced—Lead.....	tons		178,379	178,379
Zinc.....	tons		182,142	182,142
Others (data not available for publication).....				
<b>1934</b>				
(x) Ore mined.....	tons	5,776	1,850,480	1,856,256
Ore milled.....	tons	2,742	1,836,622	1,839,364
Concentrates produced—Lead.....	tons	154	234,404	234,558
Zinc.....	tons	350	229,062	229,412
Others (data not available for publication).....				

(x) Includes silver-pitchblende ores mined in Northwest Territories.

NOTE.—Concentrates produced in Quebec were not shipped in 1934.

Table 65.—Destination of Shipments from Silver-Lead-Zinc Mines of Canada,† 1933 and 1934

Products shipped	Tons shipped	Net value at shipping point	Total metal content as determined by settlement assay:			
			Gold	Silver	Lead	Zinc
		\$	fine oz.	fine os.	lb.	lb.
<b>1933</b>						
To Canadian smelters—						
Lead ore	17,315	351,754	2,563	747,107	8,960,712	1,561,005
Lead concentrates	172,882	4,598,533	4,749	4,312,318	245,193,821	14,803,258
Zinc ore						
Zinc concentrates (x)	175,240	1,767,130	2	344,193	11,969,713	179,473,005
Dry ore (a)	596	23,207	183	54,457	23,787	
<b>Total</b>	<b>366,033</b>	<b>6,740,624</b>	<b>7,497</b>	<b>5,438,075</b>	<b>266,148,033</b>	<b>185,837,269</b>
To foreign smelters—						
Lead ore	2,619	371,363	253	1,273,190	1,764,243	
Lead concentrates	7,274	411,503	67	1,018,241	10,580,155	
Zinc ore						
Zinc concentrates (x)	6,966	46,317				8,408,405
Dry ore						
<b>Total</b>	<b>16,859</b>	<b>829,183</b>	<b>320</b>	<b>2,291,431</b>	<b>12,344,398</b>	<b>8,498,405</b>
<b>1934</b>						
To Canadian smelters—						
Lead ore	9,470	435,909	529	982,292	3,746,086	1,173,828
Lead concentrates	222,921	6,029,344	158	6,015,793	315,207,427	16,310,514
Zinc ore						
Zinc concentrates (x)	192,821	1,764,463		427,558	14,341,082	196,681,577
Dry ore (a)	471	75,437	215	109,904	17,839	
<b>Total</b>	<b>425,692</b>	<b>8,305,213</b>	<b>902</b>	<b>7,535,607</b>	<b>333,312,434</b>	<b>214,171,919</b>
To foreign smelters—						
Lead ore	2,225	175,348	111	494,284	1,818,569	6,348
Lead concentrates	11,918	238,608		132,971	19,142,746	
Zinc ore						
Zinc concentrates (x)	22,223	165,912		2,715	71,293	26,901,816
<b>Total</b>	<b>36,666</b>	<b>579,868</b>	<b>111</b>	<b>629,970</b>	<b>21,032,608</b>	<b>26,908,164</b>

(a) Does not include zinc concentrates produced from copper-gold-zinc ores in Manitoba or British Columbia.

(x) Includes shipments of silver ores and pitchblende from Northwest Territories. Information relating to radium content of pitchblende is not available for publication.

† Shipments of silver-lead ores were made entirely from mines in British Columbia and the Yukon in 1933 and 1934; shippers from whom returns were received numbered 27 in 1933 and 35 in 1934.

Note.—In addition to the metal contained in shipments listed above, there are important quantities of lead and silver contained in ores shipped from certain gold mines in British Columbia.

Table 66.—Capital Employed in the Silver-Lead-Zinc Mining Industry in Canada, 1933 and 1934

Province	Capital employed as represented by				
	Present value of land, buildings, fixtures, machinery, tools, equipment, etc.†	Inventory value of materials on hand, stocks in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
	\$	\$	\$	\$	\$
<b>1933</b>					
Quebec, Yukon and N.W.T.*	4,535,108	224,375	34,741	719,486	5,513,710
British Columbia	10,845,796	894,739	79,039	371,142	12,191,316
<b>Canada</b>	<b>15,380,904</b>	<b>1,119,114</b>	<b>114,380</b>	<b>1,090,628</b>	<b>17,705,026</b>
<b>1934</b>					
Quebec, Yukon and N.W.T.*	3,116,211	182,582		385,629	3,684,422
British Columbia	8,137,237	845,032	4,976	252,160	9,239,405
<b>Canada</b>	<b>11,253,448</b>	<b>1,027,614</b>	<b>4,976</b>	<b>637,789</b>	<b>12,923,827</b>

\* Includes data relating to silver and silver-pitchblende ores mined in the Northwest Territories.

† Does not include value of ore reserves.



Table 67.—Employees, Salaries and Wages in the Silver-Lead-Zinc Mining Industry in Canada, 1933 and 1934

Province	1933						1934					
	On salary	Mine			Total	Salaries and wages	On salary	Mine			Total	Salaries and wages
		Surface	Under-ground	Mill				Surface	Under-ground	Mill		
British Columbia...	110	223	407	235	975	\$ 1,252,016	107	246	504	298	1,155	\$ 1,685,395
† Yukon and Quebec.	28	50	47	.....	125	248,996	29	71	32	5	137	249,889
Canada.....	138	273	454	235	1,100	1,501,012	136	317	536	303	1,292	1,935,284

† Includes data on silver-radium mining operations in Northwest Territories.

Table 68.—Wage-Earners, by Months, in the Silver-Lead-Zinc Mining Industry, 1932, 1933 and 1934

Month	1932	1933	1934
January.....	1,012	832	1,021
February.....	1,016	820	1,012
March.....	1,031	830	1,069
April.....	1,019	797	1,091
May.....	1,003	795	1,119
June.....	980	839	1,128
July.....	973	853	1,147
August.....	973	942	1,186
September.....	966	976	1,237
October.....	919	1,007	1,270
November.....	905	1,017	1,266
December.....	886	944	1,322

4. Commodity Statistics—including tables showing production by provinces, imports, exports, prices, and world output of Arsenic, Cobalt, Silver, Lead and Zinc

ARSENIC

Arsenic in the native state is a metallic mineral but is produced at the present time in Canada only in the oxide form. The entire production is recovered at Deloro, Ontario, in the smelting of the silver-cobalt arsenides of Northern Ontario by the Deloro Smelting and Refining Company.

Occurrences of arsenical minerals are fairly numerous in Canada and arsenical gold-bearing ores have been worked in Nova Scotia, Quebec, Ontario, Manitoba and British Columbia.

Arsenic is utilized for various purposes; as an insecticide it is one of the principal constituents of Paris green and of lead and calcium arsenates; it is also employed as sodium arsenite for weed killing. Other uses include its adoption in the manufacture of certain glasses, cattle and sheep dips, paints, tanning supplies, wood preservatives and pharmaceutical preparations.

In 1934, for the first time in some years, arsenical gold concentrates were exported from Nova Scotia; these went to European plants for metallurgical treatment. The treatment of arsenical gold ores in the province of Quebec has been investigated but no commercial recovery of arsenic has been thus far reported. Arsenic bearing gold ores were exported for some years from British Columbia by the Heeley Gold Mining Company.

The Chemical Trade Journal, London, comments as follows on the outlet for arsenic: "With world supplies of, and production capacity for arsenic considerably exceeding consumption, research directed specifically to finding new uses for the material is doubtlessly being carried out in various parts of the world. New bulk tonnage possibilities are, however, at the moment not unduly numerous. Fortunately, from the viewpoint of arsenic producers, the arsenates of lime and lead do not look like being displaced as yet from their position as the leading insecticides of the stomach-poison group, whilst the value which powdered sodium arsenite has been shown to possess, should mean a useful regular outlet for arsenic. In Sweden where the arsenic disposal problem is most acute, research is being directed towards arsenical wood preservatives and to the employment of white arsenic in cements and concretes. The latter-mentioned new use, about which very little of a detailed nature has been published, has the advantage of being one of the few cases in which arsenic may be safely employed for purposes depending upon factors other than its toxicity."



Table 69.—Production of Arsenic in Canada, 1925-1934

(For production from 1885-1924, see Annual Report Mineral Production, 1928)

Year	Arsenic in ore		White arsenic		Year	Arsenic in ore		White arsenic	
	tons	\$	tons	\$		tons	\$	tons	\$
1925.....	714	21,513	1,003	103,780	1930.....	1,011	34,523	1,250	95,004
1926.....	545	12,687	1,992	134,124	1931.....			1,787	135,170
1927.....	607	15,644	2,447	196,335	1932.....			1,212	98,714
1928.....	708	16,539	2,008	176,513	1933.....			734	56,534
1929.....	766	17,314	1,849	154,006	1934.....			824	56,412

\* A relatively small quantity of auriferous arsenical pyrites was exported from Nova Scotia in 1934; no payment was made for arsenic content.

Table 70.—Production ( $\text{As}_2\text{O}_3$ ), Exports and Imports of Arsenic, for Canada, 1932-1934

	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
PRODUCTION—						
From arsenical concentrates exported... lb.						
White arsenic and arsenic in other forms lb.	2,424,342	98,714	1,468,022	56,534	1,647,513	56,412
<b>Total</b> ..... lb.	<b>2,424,342</b>	<b>98,714</b>	<b>1,468,022</b>	<b>56,534</b>	<b>1,647,513</b>	<b>56,412</b>
EXPORTS—						
Arsenic, $\text{As}_2\text{O}_3$ ..... lb.	1,788,600	65,287	934,400	33,778	1,291,900	45,012
IMPORTS—						
White arsenic..... lb.	425,995	16,694	164,642	5,674	1,637,382	41,888
Sulphide of arsenic..... lb.	111,106	4,277	27,694	3,117	33,986	4,264
Arsenate of soda and stannate of..... lb.	5,603	1,159	390	101	638	211
Arsenate of lead..... lb.	830,120	80,488	498,673	44,256	450,748	37,758
Calcium arsenate..... lb.	521,546	27,852	287,420	17,426	165,077	9,123

\* A small tonnage of auriferous arsenopyrite was exported from Nova Scotia in 1934; no settlement was made for the arsenic content.

Table 71.—World Production of Arsenic, 1932-1934

(Long tons)

(Supplied by Imperial Institute)

Country and product	1932	1933	1934	Country and product	1932	1933	1934
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom—				Greece—			
White arsenic and arsenic				White arsenic.....	278	331	(a)
root.....	247	121	185	Pyrites (As. content)....	227	443	(a)
Union of South Africa—				Portugal—			
White arsenic.....	4			White arsenic.....	10	2	40
Canada—(Sales)				Sweden—			
White arsenic.....	1,082	655	736	Ore (arsenic content).....	19,719	37,839	28,106
Australia—				White arsenic.....		847	7,288
White arsenic.....	1,964	1,776	2,230	Roumania—			
FOREIGN COUNTRIES				Pyrites (As. content)....	27	61	(a)
Belgium (exports)—				Mexico—			
White arsenic.....	2,013	2,538	3,498	White arsenic.....	3,707	4,623	7,736
Czechoslovakia—				United States—			
Ore (As. content).....	1	55	44	White arsenic.....	11,343	9,509	11,693
France—				China— (Estimated)			
Ore (arsenic content).....	4,390	5,787	6,589	Ore (As. content).....	470	400	(a)
White arsenic.....	8,482	11,350	8,463	Japan—			
Germany—				White arsenic.....	2,596	2,338	2,691
Ore (arsenic content).....	193	(a)	1,930	Korea—			
				White arsenic.....	(a)	150	327
				Turkey—			
				Arsenic ore (As. content)	3	20	13
				Brazil—			
				White arsenic.....	372	317	(a)

White arsenic is produced in Germany and U.S.S.R. (Russia).

(a) Information not available.

## COBALT

Since the discovery of the Cobalt camp in 1903, and until recent years, the greater part of the world's supply of cobalt was derived from the treatment of cobalt-silver-arsenic ores mined in Northern Ontario. During the past few years Canada's production of cobalt decreased sharply in contrast to the totals for earlier years. This was due largely to depleted ore reserves and to new competition in the world's markets arising from the development of cobaltiferous deposits in Central Africa. There is at present only one metallurgical works in Canada treating cobalt ores; this is the plant of the Deloro Smelting and Refining Company, Ltd., situated at Deloro, Ontario. This company conducted continuous operations throughout 1934 producing cobalt metal, cobalt salts and cobalt oxide.

"Cobalt has shown very substantial progress in the last two or three years, and the production is in excess of 1929, which is still the high-level year for most mine products. The chief use of cobalt was formerly in the ceramic business, and there is now a possibility of an important development as a drier in paint. In metallurgy there has been a large advance in the use of stellite (tungsten-cobalt-chromium alloy) of which cobalt is an ingredient. It is also employed in the production of ferro-magnetic alloys, but its uses in this respect fluctuate with progress of experimental research. The world production at the present time is probably of the order of 1,400 tons as compared with, say, 1,200 tons of the element in 1929. Detailed figures, however, are impossible to obtain. Sales are controlled by an association of producers, the metal being generally recovered as a by-product, principally from silver and copper ores. With the extension of uses and the consequent expansion of production it has been possible to reduce prices from 7s. or 8s. per pound in 1933 to 4s. 6d. and the policy of producers is to encourage experiments in the uses of the metal in every possible way. The leading producers to-day are Katanga, Del Oro, Rhokana and certain French interests in Morocco, which latter at present ship their product in the form of picked ore, while the older producers turn out a ferro-alloy. Quite recently a combine has been formed in Germany, where production is derived from a number of small producers, of which the Burma Corporation appears to be the largest, and this group forms a fifth element in the association. . . . the cobalt in the ore on the Mindola section (Rhodesia) of Rhokana is significant; according to a recent statement by Sir Edmund Davis, for the fourteen months to the end of August, 1934, the by-product cobalt recovered was 1,217,925 pounds valued at £318,310 13s. 0d." (The Mining Journal, London).

The Union Minière du Haut Katanga states in its annual report for 1934 that the cobalt market has developed substantially, the tonnage of sales being heavier than for any previous year.

Cobalt occurs as carrollite in the copper ore of the Nkana mine of the Rhokana Corporation, Northern Rhodesia.

Table 72.—Production of Cobalt from Canadian Ores, 1925-1934

Year	Pounds	Year	Pounds
1925.....	1,116,402	1930.....	694,163
1926.....	664,778	1931.....	521,051
1927.....	880,590	1932.....	490,631
1928.....	956,590	1933.....	466,702
1929.....	929,415	1934.....	594,671

Note.—For years 1904 to 1924 see previous reports.

Table 73.—Production in Canada, and Exports of Cobalt, 1932-1934

	1932		1933		1934	
	Pounds	\$	Pounds	\$	Pounds	\$
Production— Cobalt, computed as cobalt in metal, oxides and salts sold, and in ores and residues exported.....	490,631	587,957	466,702	597,752	594,671	592,497
Exports— Cobalt alloys, cobalt metallies, cobalt oxides, cobalt salts and cobalt ores.....		539,334		552,450		614,361

Table 74.—World Production of Cobalt, 1932-1934

(Supplied by Imperial Institute)

Country	1932	1933	1934
	Cwt.	Cwt.	Cwt.
<b>BRITISH EMPIRE</b>			
Canada (c).....	4,381	4,167	5,310
India (b).....	2,500	2,300	2,800
Australia (metal).....	60	125	160
Northern Rhodesia.....		2,330	11,429
<b>FOREIGN COUNTRIES</b>			
Belgian Congo (d).....	6,590	12,160	(a)
French Morocco.....	1,500	1,500	3,200
United States (e).....		11	(a)

NOTE.—Complex ores containing Cobalt are also found in Germany and China, but Cobalt content is not available.

(a) Data not yet available.

(b) Estimated Cobalt content of nickel-speiss exported to Hamburg.

(c) Metal recovered from smelter products plus Cobalt contained in Cobalt residues exported.

(d) Content of metal, oxide and salts produced at Oolen (Belgium) from material shipped from the Belgian Congo.

(e) Recovered at an electrolytic zinc plant.

### Silver

By virtue of two Presidential Proclamations, the United States Government's buying price for newly mined domestic silver was raised to 77·57 cents an ounce on April 24, 1935. The proclamation, establishing that price, followed one made on April 10, that fixed the price at 71·11 cents. Necessity for the second proclamation, states the Engineering and Mining Journal, New York, developed when the world price of the metal advanced on April 24 to a level higher than that paid domestic producers. This last proclamation was the third made by President Roosevelt for the purpose of fixing the price of newly mined domestic silver, the first having been made on December 21, 1933; this earlier proclamation fixed the price of the metal at 64·64 cents an ounce.

The Mining Journal, London, comments on the silver situation as follows:—"One effect which deserves to be noted is that by nationalizing silver and putting a 50 per cent tax on all speculative transactions, the New York market has been entirely destroyed. The first development was the establishment of a silver exchange in Montreal, but as a result of the large amount of silver dealing which took place in London, a silver market was opened here (London) on the 1st of May, and with peculiar advantages which London offers as a centre for dealing in all the metals, it is probable that the open market which existed here up to 1913 may now become the recognized international centre for the silver trade." It is interesting to note that the London Metal Exchange has now adopted a "fine price" as the basis of its silver quotations, formerly the exchange quoted the price per troy ounce of standard silver based on the old standard of English coins (925 per mille).

The opinion of "Handy and Harnan," New York, is that "the silver market will show great steadiness so long as the United States remains a buyer, and prices should tend to advance. It is impossible, however, to predict with accuracy the future price level, since this depends largely upon the volume and rate of United States Treasury Department purchases."

### CANADIAN GOVERNMENT ACTION REGARDING SILVER

At the London Monetary and Economic Conference of July, 1933, important action was taken with a view to mitigating fluctuations in the price of silver. The Monetary and Financial Sub-Commission unanimously adopted a resolution recommending to all Governments, parties to the Conference, that, among other things, they refrain from further debasement of their silver coinage below a fineness of 800/1000 and that where possible they substitute silver coins for low-value paper currency.

In addition to the above recommendations of general applicability, definite agreements were entered into between the chief silver-holding countries and the main silver-producing nations. Under the Eight-Power Agreement, signed July 22, 1933, India and Spain agreed to limit total sales during the ensuing four years to 140 million and 20 million ounces respectively,

while China undertook during the same period to cease entirely selling silver from demonetized coins. On the other hand, the chief producing countries—Australia, Canada, Mexico, Peru and the United States—agreed not to sell any silver but to make aggregate purchases from (or otherwise arrange for withholding from market) domestic production totalling 35 million ounces annually. Under a separate Five-Power Agreement, of the same date, Canada accepted the quota of 1,671,802 ounces as her share of the total amount to be so purchased (or otherwise withheld from sale). The action of the delegate of Canada in signing this agreement at London was approved by Parliament on February 26, 1934.

In 1934 the Minister of Finance purchased 1,671,802 ounces of newly mined Canadian silver. This silver was purchased by tender or by agreement from the mines at the price prevailing for silver at the time of purchase. This silver was held as additional security for the redemption of Dominion notes in accordance with an amendment to the Dominion Notes Act of June 26, 1934.

On March 11, 1935, when the Bank of Canada commenced operations the silver then held by the Government was transferred to that institution, which assumed the liability of the Dominion notes outstanding. The silver transferred to the Bank of Canada and future purchases by it will form part of the reserve of the Bank of Canada (Section 26 (a), Bank of Canada Act). On July 24, 1935, the Bank of Canada reported in its weekly statement silver bullion held as \$1,211,642.30.

It is of interest to note that the Royal Canadian Mint, Ottawa, coined and issued the first Canadian silver dollars on April 17, 1935: the weight of this coin is 360 grains, 8/10 fine silver.

**Table 75.—Production of Silver in Canada, by Provinces and by Sources, 1933 and 1934**

	1933		1934	
	Quantity	Value	Quantity	Value
	fine oz.	\$	fine oz.	\$
NOVA SCOTIA—				
In gold bullion—Total.....	104	39	321	152
QUEBEC—				
In gold ores, in blister copper, and in copper ores exported—Total....	471,419	178,351	470,254	223,187
ONTARIO—				
In silver bullion and nuggets.....	2,762,748	1,045,225	2,681,104	1,272,476
In gold bullion.....	404,744	153,126	418,528	198,637
In blister copper produced; and in ores, concentrates, residues and matte exported or treated in smelters outside the province.....	1,368,188	517,624	2,221,528	1,054,357
Total.....	4,535,680	1,715,975	5,321,160	2,525,470
MANITOBA—				
In gold bullion and in blister copper—Total.....	1,101,578	416,758	1,252,920	594,647
SASKATCHEWAN—				
In ores shipped to Canadian smelters—Total.....	114,604	43,358	87,551	41,552
ALBERTA—				
In alluvial gold—Total.....	32	12	35	17
BRITISH COLUMBIA—				
In alluvial gold.....	4,307	1,629	4,533	2,152
In gold bullion.....	26,579	10,056	44,707	21,218
In blister copper.....	346,120	130,947	344,425	163,467
In base bullion and in ores exported.....	6,360,051	2,406,185	8,336,056	3,956,367
Total.....	6,737,057	2,548,817	8,729,721	4,143,204
YUKON AND NORTHWEST TERRITORIES—				
In alluvial gold.....	8,814	3,335	8,708	4,133
In ores exported or shipped to Canadian smelters.....	2,218,662	839,382	544,612	258,478
Total.....	2,227,476	842,717	553,320	262,611
Canada.....	15,187,950	5,716,027	16,415,282	7,790,840

For 1934 fine silver was valued at 47.4609 cents per ounce, the average price for the metal on the New York market expressed in Canadian funds; for 1933 the corresponding price was 37.8328 cents.



Table 76.—Production of Silver in Canada for Years Specified, 1887-1934

Year	Ounces	Cents per ounce	Year	Ounces	Cents per ounce
1887	355,083	98-00	1924	19,736,323	66-78
1891	414,523	98-00	1925	20,228,988	69-06
1896	3,205,343	67-06	1926	22,371,924	62-11
1901	5,539,192	58-95	1927	22,736,698	56-37
1906	8,473,379	66-79	1928	21,936,407	58-18
1910*	32,809,264	53-49	1929	23,143,201	52-99
1911	32,559,044	53-30	1930	26,443,823	38-15
1916	25,459,741	65-66	1931	20,562,247	29-87
1919	16,020,657	(a) 111-122	1932	18,347,907	31-67
1920	13,330,357	100-90	1933	15,187,950	37-83
			1934	16,415,282	47-46

\*Year of maximum output.

(a) Highest price per ounce recorded since 1887.

From 1887 to 1934 inclusive the silver production of Canada amounted to 680,351,309 fine ounces valued at \$406,298,812. For a complete record of annual production see previous reports.

Table 77.—Production of Silver by Principal Silver-producing Provinces, 1925-1934  
(For the years 1887 to 1924 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		Manitoba		British Columbia		Yukon Territory	
	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value
		\$		\$		\$		\$		\$
1925	214,943	148,451	10,529,131	7,271,944	477	329	8,579,458	5,925,403	904,893	624,964
1926	375,986	233,513	9,274,965	5,760,402	18	11	10,625,816	6,599,376	2,065,027	1,301,159
1927	740,864	417,625	9,307,953	5,246,893	12	7	11,040,445	6,223,499	1,647,295	928,580
1928	908,959	528,796	7,242,601	4,213,456	1,763	1,026	10,943,367	6,366,413	2,839,633	1,651,985
1929	813,821	431,268	8,890,726	4,711,462	2,644	1,401	10,156,408	5,382,185	3,279,530	1,747,822
1930	571,104	217,922	10,205,683	3,893,876	94,653	30,114	11,825,930	4,512,065	1,746,326	1,429,373
1931	530,315	158,414	7,438,951	2,222,014	836,547	249,877	8,061,599	2,408,000	3,604,728	1,103,615
1932†	628,902	199,184	6,335,788	2,006,648	1,036,497	328,275	7,293,462	2,309,958	3,053,188	966,994
1933	471,419	178,351	4,535,680	1,715,975	1,101,578	416,758	6,737,057	2,548,817	2,227,476	842,717
1934	470,254	223,187	5,321,160	2,525,470	1,252,920	594,647	8,729,721	4,143,204	553,320	262,611

†Northwest Territories production included with Yukon since 1932.

For data relating to silver in mine shipments from Cobalt District and nearby camps in Ontario, see previous reports. In 1934 Saskatchewan was credited with 87,551 fine ounces valued at \$41,552, representing the estimated metal recovered from that part of the Flin Flon mine situated in Saskatchewan.

Table 78.—Source of Canadian Silver Production by Percentages, 1932 to 1934

	1932	1933	1934
In silver-cobalt ores	28.5	20.4	18.7
*In base bullion	29.2	34.6	45.1
In gold ores (bullion and placer)	2.5	3.0	7.2
In blister copper	15.5	19.5	23.4
In matte, copper ores and silver-lead ores exported, etc.	24.3	22.5	5.6
	100.0	100.0	100.0

\*Chiefly from silver-lead ores.

Table 79.—Comparative Copper, Silver and Lead Production in Canada for Years Specified

Year	Total copper production, Canada	(*) Silver, Ontario	Total lead production, Canada	Total silver production, Canada
	Pounds	Fine oz.	Pounds	Fine oz.
1907	56,979,205	10,023,311	47,738,703	12,779,799
1911	55,648,011	(†) 31,507,791	23,784,969	32,559,044
1915	100,785,150	24,746,534	46,316,450	26,625,960
1919	75,053,581	11,214,317	43,827,699	16,020,657
1923	80,881,537	10,377,846	111,234,466	18,601,744
1924	104,457,447	9,935,902	175,485,499	19,736,323
1925	111,450,518	10,707,235	253,590,578	20,228,988
1926	133,094,942	10,543,473	283,801,265	22,371,924
1927	140,147,440	8,543,513	311,423,161	22,736,698
1928	202,696,046	6,745,401	337,946,688	21,936,407
1929	248,120,760	7,781,429	326,522,566	23,143,201
1930	303,478,356	9,225,610	332,894,163	26,443,823
1931	292,304,390	5,998,482	267,342,482	20,562,247
1932	247,679,070	4,659,304	255,947,378	18,347,907
1933	299,982,448	3,641,930	266,475,191	15,187,950
1934	364,761,062	3,029,638	346,275,576	16,415,282

(\*) Shipments from silver-cobalt camps as recorded by Ontario Department of Mines—Total output from these fields 423,771,151 ounces—1904-1934 inclusive.

(†) Year of maximum production.

**Table 80.—Average Commercial Ratio of Silver to Gold for Each Specified Year Since 1700**(Supplied by *United States Mint*)

Year	—	Year	—	Year	—
1700.....	14.81	1885.....	19.41	1920.....	20.28
1750.....	14.55	1890.....	19.75	1925.....	29.78
1800.....	15.68	1895.....	31.60	1930.....	53.74
1850.....	15.70	1900.....	33.33	1931.....	71.25
1875.....	16.64	1905.....	33.87	1932.....	73.29
1880.....	18.05	1910.....	38.22	1933.....	59.06
		1915.....	40.48	1934†.....	72.69

†Estimated on averages in Canadian funds.

**Table 81.—Imports into Canada and Exports of Silver, 1933 and 1934**

	1933		1934	
	Quantity	Value	Quantity	Value
<b>IMPORTS—</b>	<b>Fine oz.</b>	<b>\$</b>	<b>Fine oz.</b>	<b>\$</b>
Silver in bars, etc., unmanufactured.....		675,732		2,193,201
Silver, manufactures of, n.o.p., and articles consisting wholly or in part of sterling or other silverware.....		73,666		67,425
Silver and other coin except gold.....		12		
<b>Total.....</b>		<b>749,410</b>		<b>2,260,626</b>
<b>EXPORTS—</b>				
Silver contained in ore, concentrates, etc.....	3,362,354	1,093,464	1,745,152	714,444
Silver bullion.....	10,738,729	3,759,387	10,604,182	4,933,690
<b>Total.....</b>	<b>14,101,083</b>	<b>4,852,851</b>	<b>12,409,334</b>	<b>5,648,134</b>
Silver coin, foreign.....		275,007		615,665
Silver coin, Canadian.....		62,943		30,250

**Table 82.—Monthly Average Prices of Silver, 1932-1934**(From the *Engineering and Mining Journal*)

Month	New York (Cents per fine ounce) ·999 fine			London Spot (Pence per standard ounce) ·925 fine		
	1932	1933	1934	1932	1933	1934
January.....	29.780	25.400	44.188	19.623	16.883	19.382
February.....	30.136	26.074	45.233	19.573	16.885	20.073
March.....	29.810	27.928	45.875	18.336	17.588	20.278
April.....	28.298	30.730	45.180	16.923	18.440	19.740
May.....	27.755	34.072	44.226	16.868	19.046	19.276
June.....	27.466	35.663	45.173	16.844	19.078	19.981
July.....	26.700	37.630	46.310	16.930	18.341	20.512
August.....	27.986	36.074	48.986	18.000	17.877	21.377
September.....	27.870	38.440	49.484	17.998	18.272	21.888
October.....	27.195	38.190	52.375	17.813	18.221	23.581
November.....	26.698	41.974	54.255	18.099	18.428	24.257
December.....	25.010	43.550	54.390	17.110	18.674	24.404
<b>Average.....</b>	<b>27.892</b>	<b>34.727</b>	<b>47.973</b>	<b>17.843</b>	<b>18.144</b>	<b>21.229</b>

The average yearly price of silver in Canadian funds during 1932, computed from daily New York quotations was 31.67163 cents per troy ounce. The average price of silver in Canadian funds based on the New York market in 1933 was 37.8328 cents per fine ounce, and in 1934, 47.4609 cents.

**Table 83.—Comparative Figures of Silver Production, for the World, Mexico, the United States, Peru, and Canada, 1925-1934**

Year	World's Output*	Mexico's Output*	United States Output*	Peru's Output*	Canada's Output
	Fine ounces	Fine ounces	Fine ounces	Fine ounces	Fine ounces
1925	245,213,993	92,885,465	66,106,922	19,917,439	20,228,988
1926	253,795,166	98,291,186	62,672,953	21,499,798	22,371,924
1927	251,096,555	104,573,919	60,394,199	18,295,408	22,736,098
1928	257,925,154	108,537,307	58,426,304	21,607,693	21,936,407
1929	260,970,029	108,871,442	61,233,321	21,495,169	21,143,201
1930†	247,000,000	105,204,059	47,724,903	14,372,593	20,443,823
1931	197,000,000	86,064,457	29,856,628	8,794,407	20,562,247
1932 (a)	165,000,000	69,303,119	22,739,681	3,518,753	18,347,907
1933 (a)	170,000,000	68,101,092	23,128,783	7,595,180	15,187,950
1934 (a)	191,000,000	74,143,301	32,514,118	11,338,212	16,415,282

\* Prior to 1930 from Annual report of the "Director of the Mint," Washington.

† Beginning with 1930, figures from the Imperial Institute.

(a) Excluding the production of U.S.S.R. (Russia), figures for which are not available.

NOTE.—For years 1898 to 1924 see previous reports.

**Table 84.—World Production of Silver Ore, 1932-1934**

(In terms of metal)

(Supplied by *Imperial Institute*)

(Fine ounces)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES— Con.</b>			
United Kingdom	16,043	37,553	138,974	Hungary	12,814	19,186	13,668
Bechuanaland Protectorate	1,676	622	857	Spain	3,374,335	2,929,508	1,788,247
Gold Coast (estimated)	9,000	10,000	11,000	Belgian Congo	1,887,087	2,646,650	3,399,541
Kenya	1,118	1,613	1,949	Sweden	668,849	928,203	754,496
Nigeria	85,368	117,480	81,000	Algeria	58,835	27,300	37,000
Northern Rhodesia	339	25	187	Morocco (Spanish)	10,330	6,870	(a)
Southern Rhodesia	114,555	112,434	128,381	Mozambique	257	224	763
South West Africa (d)	165,000			Tunis	5,459	3,858	22,184
Tanganyika Territory	3,313	3,891	4,876	Mexico	60,303,119	68,101,062	74,143,301
Union of South Africa	1,120,668	1,065,011	1,002,203	United States	22,739,681	23,128,783	32,514,118
Canada	18,347,907	15,187,950	16,415,282	Guatemala (c)	143,500	26	19,068
British Guiana (estimated)	1,830	3,070	3,340	Honduras	3,697,017	3,911,686	3,091,522
India	6,026,737	6,080,241	5,817,524	Nicaragua (c)	55,375	20,859	45,241
Federated Malay States (estimated)	2,400	2,600	2,700	Salvador	(c) 4,822	(c) 174	4,848
Australia	9,460,369	10,817,162	11,357,091	Argentina (b)	50,000	50,000	60,000
New Zealand	592,792	430,492	382,615	Bolivia (exports)	4,115,232	5,469,069	5,216,177
Newfoundland	1,333,968	1,208,280	1,103,091	Brazil	21,638	23,393	22,275
Sierra Leone (estimated)	3,000	4,000	6,533	Chile	73,422	255,078	1,053,073
Total	37,000,000	35,000,000	36,000,000	Colombia	84,000	108,005	127,000
<b>FOREIGN COUNTRIES</b>				Peru	114,167	113,200	110,000
Austria	18,785	39,062	28,189	Guiana (French and Dutch) (estimated)	4,200	6,000	6,000
Czechoslovakia	1,059,969	980,716	982,422	Peru	6,773,733	7,316,828	10,381,397
France	410,877	300,602	300,506	Venezuela (b)	6,000	6,000	7,000
Germany	5,993,499	6,320,700	5,944,021	China	134,000	122,000	(a)
Greece	137,783	593,730	(a)	Formosa	174,100	170,000	(a)
Italy	394,304	342,639	365,600	French Indo-China			3,500
Yugoslavia	2,018,100	2,055,000	2,216,000	Japan	5,260,556	5,967,370	6,984,729
Norway	314,781	252,493	200,096	Korea	620,000	750,000	1,050,000
Poland	69,283	41,377	21,090	Netherlands East Indies	842,365	860,462	773,999
Roumania	186,727	353,489	388,018	Philippine Islands	160,177	170,042	228,524
				Total*	131,000,000	135,000,000	153,000,000
				World's Total*	168,000,000	170,000,000	189,000,000

\* Excluding the production of U.S.S.R. (Russia), figures for which are not available.

(a) Information not available.

(b) Estimates of United States Mint.

(c) Imported into the United States from the country indicated.

(d) Years ended March 31, of the year following that stated.

Table 85.—World Silver Consumption, Production and Other Supplies\*, 1933-1934

(In millions of fine ounces)

Consumption	1933	1934	Production and Supplies	1933	1934
U.S. Government Acquisitions:			Production:		
Domestic production.....		21.4	United States.....	21.0	25.5
Nationalized stocks.....		111.0	Mexico.....	69.1	75.0
Open market purchases.....	1.0	185.0	Canada.....	15.4	16.3
War debt payments.....	22.7		South America.....	13.6	16.0
	23.7	317.4	All other countries.....	45.0	48.4
Other Government Purchases:			<b>Total Production.....</b>	<b>164.1</b>	<b>181.2</b>
Mexico.....	16.0	7.2	Other Supplies:		
Canada.....		1.7	Sales by China, excess of exports		
Peru.....		1.1	over imports.....	10.9	200.0
Australia.....		0.6	Sales by Indian Government:		
Coinage:			a/c British war debt.....	20.0	
Hong Kong.....		9.0	In London.....	27.1	30.0
Cuba.....		7.8	Sales by Russia.....	45.8	25.0
Colombia.....		3.6			
Belgium.....	7.0				
Turkey.....	4.5				
Other countries.....		0.6			
Indian consumption.....	10.0	15.0			
German consumption.....	14.5	12.4			
Arts and Industries:					
In the United States and Canada,....	24.0	25.0			
In England.....	8.0	13.0			
Unaccounted for.....	160.2	(a) 21.8			
<b>Total.....</b>	<b>267.9</b>	<b>436.2</b>		<b>267.9</b>	<b>436.2</b>

\* Supplied by Handy &amp; Harman.

(a) "In assembling the above estimates covering 1934 world supply and demand, we arrive at a total of 436,200,000 ounces for the former classification and 414,400,000 ounces for the latter, which leaves a balance of excess supplies amounting to 21,800,000 ounces, and this figure we have listed under the heading "unaccounted for". It must not be inferred, however, that these 21,800,000 ounces represent the entire floating supply of silver now available, even though the huge speculative holdings which existed in New York at the beginning of 1934 have been absorbed by the United States Government. Speculators have transferred their operations to London, and a large long position has been built up in that market, consisting of both future commitments and the actual metal. Naturally it is difficult to secure accurate information on this subject, but estimates from abroad set the figure as high as 150,000,000 ounces. Stocks in Bombay increased during the year from 10,000,000 ounces to about 15,000,000 ounces, and the present volume of trading on the Montreal Commodity Exchange necessitates a supply there of at least 3,000,000 ounces. In addition to holdings of China banks and the Indian Government covered by published figures, another potential source, unpredictable as to the amount, is the metal hoarded in the interior of the Far East."



Table 86.—World's Monetary Stocks of Silver at the Close of 1933

(Supplied by *United States Mint* and subject to revision)

(Stated in United States money, 000's omitted)

Country	Silver stock in banks and treasuries	Per capita
	\$	\$
United States.....	839,961	6.73
Canada.....	28,032 (1)	2.71
Mexico.....	60,563	3.66
Chile.....	3,249 (3)	0.73
Colombia.....	11,243 (1)	1.27
Peru.....	5,066 (1)	0.81
Venezuela.....	16,390 (1) (3)	5.02
Austria.....	10,069 (1) (2)	1.49
Belgium.....	9,483 (2) (3)	1.16
France.....	109,599 (1)	2.62
Germany.....	321,086 (1)	4.98
Great Britain.....	260,559 (1)	5.64
Greece.....	2,540 (3)	0.39
Irish Free State.....	6,096 (1)	2.05
Italy.....	86,488 (1) (2)	2.06
Latvia.....	8,208 (1)	4.32
Netherlands.....	10,598 (3)	1.29
Norway.....	1,903 (1)	0.67
Poland.....	31,588 (1)	0.98
Roumania.....	1,114	0.05
Russia (Soviet Union).....	4,739 (5) (6)	0.02
Spain.....	124,306	5.27
Switzerland.....	37,712 (1)	9.15
Yugoslavia.....	17,600 (1)	1.26
Ceylon.....	9,981 (1)	1.87
China.....	667,459 (8) (7)	1.45
India—British.....	1,377,870 (1)	3.90
Iraq (Mesopotamia).....	25,000 (1) (2)	7.60
Japan (including Chosen, Taiwan, Kwantung).....	40,887 (7)	0.44
Netherlands East Indies.....	13,914	0.22
Philippine Islands.....	18,862 (1)	1.51
Siam.....	23,963	2.05
Strait Settlements.....	21,371 (1) (2)	19.18
Egypt.....	21,677 (1)	1.45
Ethiopia.....	11,316 (1)	1.13
Kenya and Uganda.....	11,912 (1) (4)	1.82
Sudan—Anglo Egyptian.....	8,797 (1)	1.56
Union of South Africa.....	11,927 (1)	1.46
Australia.....	35,749 (2)	5.47
Tanganyika.....	8,885 (1)	1.81
Others.....	96,821	.....
<b>Total.....</b>	<b>4,414,681</b>	<b>2.29</b>

NOTE.—The amount of silver in circulation in many countries is not obtainable, and in some countries that held by private banks cannot be given.

(1) Estimated silver circulation included.

(2) Prior year's figures.

(3) Includes base metal coin.

(4) June 30, 1933.

(5) On January 1, 1934.

(6) Includes platinum.

(7) Incomplete.

(8) Dollar coins circulating estimated at 2,300,000,000.

Table 87.—Silver Content of Principal World Coins

Coin	Country	Fine silver content— grains
Dollar.....	United States.....	371.250
Dollar.....	Canada.....	288.000
Shilling (new).....	Great Britain.....	43.636
5 Lira (new).....	Italy.....	64.430
2 Zloty (new).....	Poland.....	50.927
Schilling (new).....	Austria.....	59.260
10 Franc (new).....	France.....	104.940
Mark (n).....	Germany.....	38.581
Rouble (new).....	Russia.....	277.782
Rupee.....	India.....	165.000
Yuan.....	China.....	362.559

## LEAD

## CANADA

Canada's lead production includes (a) lead contained in ores and concentrates exported, less deductions for smelter losses, valued at the average price in London for the year; (b) the lead contained in the base bullion made by the Consolidated Mining and Smelting Company, Ltd., at Trail, B.C., and the lead in a silver-lead-bismuth bullion produced at the Deloro smelter in Ontario, valued at the average price in London for the year.

Production in 1934 included lead recovered from silver-cobalt ores mined in Ontario, lead from the Sullivan mine in East Kootenay, British Columbia, and from several other properties producing in the Slocan, Portland canal and other districts of the same province. Important quantities of lead were contained in silver-lead concentrates exported from the Yukon by the Treadwell-Yukon Mining Company; silver ore was also shipped from the Northwest Territories in 1934.

Previous to 1904, lead ores mined in Canada were either exported as ore or smelted in Canadian furnaces to a base bullion which was exported for refining. A lead refinery employing the Betts electrolytic process has been in operation at Trail, B.C., since 1904; this refinery treats the product from the Consolidated Mining and Smelting Company's blast furnaces. A great advance in 1931 at Trail was made in the lead smelting plant through the operation of the new slag-fuming installation.

Canadian lead production during 1934 represented a 29.9 per cent increase in quantity and 32.4 per cent in value over that of the preceding year. These were accounted for through the expanding output in British Columbia and a slight improvement in lead prices. Decreases for the corresponding periods were recorded for both the Yukon and Ontario. Of the total Canadian production, British Columbia contributed 99.5 per cent, and the total quantity of lead produced in the Dominion during 1934 represents an all time high record in the history of Canadian lead production.

Important quantities of lead are consumed in the storage battery, cable and pigments industries; The American Bureau of Metal Statistics shows the use of lead in the United States in 1934 by percentages as follows: cable covering, 7.15 per cent; storage batteries, 34.19 per cent; white lead, 13.53 per cent; building, 6.29 per cent; ammunition, 7.30 per cent; red lead and litharge, 5.87 per cent; foil, 3.40 per cent; and the balance in solder, bearing metals, etc.

It may prove of interest to note that "Chemical and Metallurgical Engineering" announces that a new type of lead alloy is now available possessing all the characteristics of ordinary lead and having some new valuable properties in addition. Tellurium produces a marked change in the physical structure of lead, which results in a lead of greater resistance to corrosion by acid, greater tensile strength, greater resistance to fatigue failure resulting from vibration of some repeated stresses, and it also has better working qualities.

Table 88.—Production of Lead from Canadian Ores, 1925-1934

Year	Pounds	Value	Price per pound in cents*	Year	Pounds	Value	Price per pound in cents*
		\$				\$	
1925†.....	253,590,578	23,127,460	9.120	1930.....	332,894,163	13,102,635	3.927
1926.....	283,801,265	19,240,661	6.751	1931.....	267,342,482	7,260,183	2.710
1927.....	311,423,161	16,477,139	5.256	1932.....	255,947,378	5,409,704	2.114
1928.....	337,946,688	15,553,231	4.576	1933.....	266,475,191	6,372,998	2.392
1929.....	326,522,566	16,544,248	5.054	1934 (a).....	346,276,576	8,436,658	2.436

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.

NOTE.—For years 1887 to 1924 see previous reports.

\*In Canadian funds.

†Year of maximum value of Canadian lead production.

(a) Year of maximum output of Canadian lead.

**Table 89.—Production of Lead from Canadian Ores, by Provinces, 1925-1934**

(For years 1887 to 1924 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		British Columbia		Yukon and Northwest Territories	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$		\$
1925.....	2,051,100	187,060	7,209,534	657,510	242,454,502	22,111,850	1,875,442	171,040
1926.....	3,729,636	251,788	7,398,795	580,730	266,812,461	18,012,509	5,860,373	395,634
1927.....	6,496,577	341,461	7,990,709	528,729	292,770,544	15,388,020	4,165,331	218,929
1928.....	6,218,336	284,520	6,814,757	402,289	317,722,146	14,537,377	7,191,449	329,045
1929.....	5,358,304	270,616	4,769,506	294,431	307,999,153	15,555,189	8,395,603	424,012
1930.....			2,193,856	116,034	321,803,725	12,637,232	8,896,582	349,369
1931.....			985,633	41,647	261,902,236	7,097,812	4,454,613	120,724
1932.....			86,477	1,828	252,007,574	5,326,432	3,853,327	81,444
1933.....			29,910	692	263,345,776	6,298,178	3,099,505	74,128
1934.....			21,558	525	344,467,138	8,392,597	1,786,880	43,536

Production of lead from Canadian ores from 1887 to 1934 inclusive totals 4,432,337,106 pounds valued at \$216,509,909.

**Table 90.—Refined Lead Production in Canada,\* 1925-1934**

Year	Pounds of refined lead produced	Year	Pounds of refined lead produced
1925.....	213,217,605	1930.....	304,471,706
1926.....	257,273,585	1931.....	278,448,457
1927.....	295,766,327	1932.....	253,130,522
1928.....	301,067,819	1933.....	254,565,861
1929.....	304,449,673	1934.....	1314,457,735

\*Includes the electrolytic lead produced from Canadian and foreign ores at Trail, B.C.; and also the pig lead from Galetta, Ont., until 1931.

†Primary lead only.

NOTE.—For years 1904 to 1924 see previous reports.

**Table 91.—Available Statistics on the Consumption of Lead Metal in Specified Canadian Manufacturing Industries, 1933 and 1934**

Industries	Items (Used)	1933	1934
		Pounds	Pounds
Brass and copper products.....	Pig lead.....	204,153	631,925
	Scrap and other lead.....	71,000	119,275
Paints and pigments.....	Pig lead.....	10,771,975	12,569,302
White metal alloys.....	Pig lead, etc.....	7,138,622	8,759,089
	Scrap lead.....	13,593,415	9,700,366
Electrical apparatus.....	Pig lead.....	9,480,166	13,211,023
	Scrap lead.....	185,202	166,684
Iron and steel.....	Lead sheets, etc.....	612,993	556,427
	Lead.....	1,072,660	915,285
<b>Grand Total.....</b>		<b>43,130,186</b>	<b>46,689,379</b>

Table 92.—Imports into Canada and Exports of Lead, 1933 and 1934

	1933		1934	
	Pounds	Value	Pounds	Value
		\$		\$
<b>IMPORTS—</b>				
Old and scrap, pig and block.....	15,038	1,148	102,294	3,921
Bars and sheets.....	88,607	3,820	59,877	2,500
Litharge.....	1,885,300	100,816	1,689,100	91,975
Acetate of lead (not ground).....	102,747	7,897	151,635	11,860
Nitrate of lead (not ground).....	40,385	2,120	243,110	12,504
Other manufactures.....		63,723		78,064
Pipe lead.....	10,686	658	7,254	336
Shots and bullets.....	5,327	340	14,187	939
Ten lead.....	200	12		
Lead arsenate.....	498,673	44,256	450,748	37,788
Lead tetraethyl, compounds of.....	1,571,775	1,212,990	1,821,093	1,053,503
Lead pigments—				
Dry white lead.....	8,880	599	152,409	9,827
White lead, ground in oil.....	21,250	2,540	16,258	1,706
Dry red lead and orange mineral.....	611,696	32,596	544,597	32,397
<b>Total.....</b>		<b>1,473,515</b>		<b>1,337,329</b>
<b>EXPORTS—</b>				
Lead, contained in ore, etc.—				
To United States.....	4,062,000	161,665	1,918,300	76,726
Belgium.....	3,538,000	106,140	21,726,500	432,780
Total lead in ore.....	7,600,000	267,805	23,644,800	509,506
Pig lead, refined lead, etc.—				
To United Kingdom.....	172,653,900	3,047,227	162,055,700	2,963,356
United States.....				
Japan.....	72,955,200	1,190,362	90,887,500	1,706,885
Netherlands.....	4,984,200	94,113	2,195,200	44,120
China.....	7,760,500	125,098	9,963,200	181,222
Brazil.....	4,099,200	70,608	6,184,000	114,712
Germany.....	7,468,500	132,652	1,797,200	35,155
Other countries.....	14,407,800	262,454	10,076,200	192,753
Total pig lead.....	284,329,400	4,922,514	283,159,000	5,238,203
<b>Total Lead Exports.....</b>	<b>291,929,400</b>	<b>5,190,319</b>	<b>306,803,800</b>	<b>5,747,709</b>

Table 93.—Monthly Average Prices of Pig Lead, Montreal,\* New York and London,† 1932-1934

Month	Montreal (Value in cents per pound)			New York (Value in cents per pound)			London† (Value in pounds sterling per long ton)		
	1932	1933	1934	1932	1933	1934	1932	1933	1934
January.....	4.260	3.262	3.924	3.750	3.000	4.000	15.084	10.458	11.304
February.....	4.148	3.400	3.983	3.712	3.000	4.000	14.560	10.431	11.634
March.....	3.850	3.459	4.152	3.150	3.146	4.000	12.345	10.609	11.545
April.....	3.609	3.416	4.139	3.000	3.260	4.179	11.223	10.872	11.500
May.....	3.320	3.636	4.294	3.000	3.651	4.140	10.673	12.095	11.051
June.....	3.145	3.933	4.637	2.993	4.173	3.975	9.698	13.280	11.054
July.....	3.088	4.174	5.095	2.747	4.452	3.772	9.818	13.411	10.813
August.....	3.217	3.889	4.809	3.235	4.500	3.717	11.349	12.182	10.821
September.....	3.482	3.848	4.802	3.465	4.500	3.685	13.122	11.932	10.388
October.....	3.264	3.688	4.657	3.052	4.313	3.654	11.958	11.804	10.359
November.....	3.373	3.848	4.643	3.050	4.288	3.567	12.071	11.537	10.432
December.....	3.386	3.903	4.720	3.009	4.141	3.604	11.144	11.431	10.316
<b>Average.....</b>	<b>3.511</b>	<b>3.705</b>	<b>4.488</b>	<b>3.180</b>	<b>3.869</b>	<b>3.860</b>	<b>11.913</b>	<b>11.670</b>	<b>10.935</b>

\*Producers' prices for car load quantities ex-cars Montreal, as furnished by the Consolidated Mining and Smelting Company.

†From the Engineering and Mining Journal.

‡The average price of lead for 1932, based on daily quotations in London and transposed to Canadian funds, was 2.1136 cents per pound, the average price of lead, based on the same market, was 2.3916 cents per pound for 1933 and 2.4361 cent for 1934.



Table 94.—World Production of Lead Ore, 1932-1934

(Supplied by *Imperial Institute*)

(In terms of metal)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES</b>			
United Kingdom.....	32,913	39,735	53,816	Poland.....	5,000	5,000	6,000
Nigeria.....	440	636	440	Portugal.....	101	209	3
N. Rhodesia (smelter).....		73	184	Romania.....	2,893	3,131	2,729
S.W. Africa (b).....	5,000			U.S.S.R. (smelter)...	18,500	13,455	26,563
Union of S. Africa.....	68	86	71	Spain (smelters).....	103,706	82,175	72,000
Canada (c).....	114,262	118,962	151,587	Sweden.....	7,193	7,401	8,118
Newfoundland.....	35,503	34,374	37,227	Algeria.....	1,924	384	700
India.....	78,800	96,100	88,800	Morocco (French)...	1,750	20	192
Australia.....	210,566	221,889	229,825	Tunis.....	6,289	3,700	5,100
<b>Total.....</b>	<b>480,000</b>	<b>510,000</b>	<b>565,000</b>	Mexico (c).....	135,231	116,818	163,706
<b>FOREIGN COUNTRIES</b>				United States (c)....	261,579	243,462	255,945
Austria.....	4,735	6,209	5,183	Argentina.....	2,748	(a)	(a)
Bulgaria (estimated).....		350	350	Bolivia (exports)....	5,402	7,721	11,023
Czechoslovakia.....	4,171	3,830	3,428	Brazil (estimated)...	500	150	(a)
Finland.....	202	233	246	Chile.....	(a)	32	(a)
France.....	3,109	1,330	876	Peru.....	4,527	1,918	8,959
Germany.....	59,145	52,813	57,995	China.....	3,136	3,156	(a)
Greece.....	6,800	13,200	(a)	French Indo-China...		6,717	7
Hungary.....		10	(a)	Japan (smelter).....	6,313	5,710	6,928
Italy.....	21,275	17,625	18,900	Turkey.....		2,200	(a)
Yugoslavia.....	48,681	60,136	69,062	Morocco (Spanish)...	915	909	(a)
Norway.....	844	800	492	Guatemala.....	164	(a)	(a)
				<b>Total.....</b>	<b>700,000</b>	<b>660,000</b>	<b>750,000</b>
				<b>World's total....</b>	<b>1,180,000</b>	<b>1,170,000</b>	<b>1,310,000</b>

(a) Information not available.

(b) Years ended March 31 of the year following that stated.

(c) Amount estimated as recoverable.

Table 95.—World Metal Production of Lead, 1932-1934

(Supplied by *Imperial Institute*)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES</b>			
United Kingdom.....	7,000	5,500	9,000	Yugoslavia.....	8,190	6,219	9,969
S.W. Africa (d).....	1,028	402		Norway.....	428	359	328
Canada.....	113,097	113,645	140,383	Poland.....	11,714	11,845	10,187
India.....	71,202	72,045	71,815	Portugal.....	107	68	53
Australia (c).....	186,356	205,264	196,005	Romania.....	1,907	4,018	4,387
N. Rhodesia.....		73	181	U.S.S.R. (Russia)...	18,500	13,455	26,563
<b>Total.....</b>	<b>379,000</b>	<b>397,000</b>	<b>417,000</b>	Spain.....	103,706	86,959	71,011
<b>FOREIGN COUNTRIES</b>				Sweden.....	38		
Austria.....	1,955	4,552	5,540	Tunis.....	13,860	14,638	26,880
Belgium (b).....	63,147	68,294	73,569	Mexico.....	135,157	117,700	168,000
Czechoslovakia.....	4,059	3,751	4,002	United States.....	247,396	238,654	276,858
France.....	19,298	20,100	17,585	Argentina.....	9,100	11,900	19,000
Germany (c).....	104,731	130,000	122,022	Peru.....	135	394	1,959
Greece.....	6,380	8,075	8,000	French Indo-China...	16	18	15
Hungary.....		10	41	Japan.....	6,313	6,717	6,928
Italy.....	30,974	24,365	47,087	Korea.....	485	771	1,777
				<b>Total.....</b>	<b>790,000</b>	<b>770,000</b>	<b>900,000</b>
				<b>World's Total....</b>	<b>1,170,000</b>	<b>1,170,000</b>	<b>1,320,000</b>

(a) Information not available.

(b) Includes base bullion as follows:—

1932.....	6,476 long tons.
1933.....	7,087 " "
1934.....	7,972 " "

(c) Includes some secondary. Figures as published by metallgesellschaft, which exclude secondary, are:—

1932.....	93,700 long tons.
1933.....	114,800 " "
1934.....	118,000 " "

(d) Years ended March 31 of the year following that stated.

(e) Includes base bullion as follows:—

1932.....	51,857 long tons.
1933.....	45,871 " "
1934.....	35,804 " "

ZINC

Refined zinc is produced at Trail, British Columbia, by the Consolidated Mining and Smelting Company, Limited, from ores mined chiefly in British Columbia; in 1930 a new electrolytic zinc refinery was brought into production at Flin Flon, Manitoba, by the Hudson Bay Mining and Smelting Company, Limited; the plants of both of these companies were in continuous operation throughout 1934.

No primary zinc was produced in 1934 in Nova Scotia, Quebec or Ontario. The Manitoba and Saskatchewan output came entirely from ores treated at the Flin Flon plants while in British Columbia some of the principal producers of zinc ores in the order of their output were the Sullivan, Monarch, Britannia, Bosun, Highland Lass and Wellington.

Figures for the total Canadian production of zinc are compiled by adding the quantities of refined zinc made at Trail and Flin Flon to the amount of zinc estimated as recoverable from ores and concentrates exported; the value of production is usually calculated at the monthly average price for zinc on the London market for the year, expressed in Canadian funds. In 1934, using the average monthly rate of exchange, the average value of zinc for the year in Canadian funds was 3.04 cents per pound.

Zinc output in the Dominion in 1934 realized a 49.9 per cent increase in quantity and 42.1 per cent increase in value over 1933 and the tonnage was the greatest ever recorded in the history of Canadian zinc production. Of the total output British Columbia contributed 83.4 per cent, Manitoba 15.8 per cent and Saskatchewan 0.7 per cent.

Commenting in May, 1935, on the world zinc situation, the Mining Journal, London, says: "It would appear as though producers, accustomed to the high price level of the immediate pre-war and post-war years, required the stimulus of the depression to take full advantage of the technical improvements in methods of production which had been achieved during these years. Now that the majority of producers can operate profitably with zinc say £13, the way is open for a considerable expansion of consumption without the stimulus to new producers to enter the industry which was provided by the high price levels ruling in previous years."

The American Bureau of Metal Statistics reports the following as the estimated manufacture of zinc by percentage in the United States during 1922, 1932, 1933 and 1934.

	1922	1932	1933	1934
Galvanizing.....	46.69	42.08	42.25	42.23
Brass making.....	32.97	25.48	26.83	27.23
Rolled zinc.....	12.16	15.45	11.79	11.37
Die castings.....	(a)	6.56	7.42	8.89
Other purposes.....	8.18	10.43	11.71	10.28
Total.....	100.0	100.0	100.00	100.00

Production of materials, in whose manufacture zinc dust is used, has increased considerably; including dyestuff intermediates and hydrosulfite, which itself is used as a reducing agent in the textile industry. Organic rubber chemicals, like phenylhydrazine are increasing in popularity and they, too, require zinc dust. Further developments, both in making special dusts for organic use and in expanding consumption of zinc in this field may be expected (1) F. G. Breyer, A.I.M.E.

Table 96.—Production of Zinc from Canadian Ores, by Provinces, 1925-1934  
(For years 1898 to 1924, see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		Manitoba		British Columbia		Canada	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1925.....	9,936,000	757,322	179,545	13,685			99,152,966	7,557,439	109,268,511	8,328,446
1926.....	12,904,176	956,199					137,033,929	10,154,214	149,938,105	11,110,413
1927.....	17,189,046	1,064,690					148,306,479	9,186,103	165,495,525	10,250,793
1928.....	21,057,760	1,156,745	58,724	3,226			163,530,890	8,983,079	184,647,374	10,143,050
1929.....	19,653,440	1,058,731	5,516,806	297,190			172,096,841	9,270,857	197,267,087	10,626,778
1930.....	9,754,160	351,150	3,527,894	127,004	3,882,141	139,757	250,479,310	9,017,255	267,643,505	9,635,166
1931.....					35,173,749	898,338	202,071,702	5,160,911	237,245,451	6,059,249
1932.....					41,736,600	1,004,016	130,546,958	3,140,438	172,283,558	4,144,454
1933.....					43,516,037	1,397,082	152,826,264	4,906,487	199,131,984	6,393,132
1934.....					47,264,342	1,438,538	249,152,403	7,583,202	298,579,683	9,087,571

\*Included in the Canada total is a production of 2,789,683 pounds valued at \$89,553, representing zinc mined during 1933 in that part of the Flin Flon mine located in Saskatchewan; in 1934, the total for Canada includes 2,162,938 pounds valued at \$65,831 credited to Saskatchewan.  
(a) Included in "other purposes."

Table 97.—Refined Primary Zinc Production in Canada, 1925-1934

Year	Short tons	Year	Short tons
1925.....	38,462	1930.....	121,496
1926.....	61,727	1931.....	118,622
1927.....	73,208	1932.....	86,141
1928.....	81,765	1933.....	91,946
1929.....	86,048	1934.....	134,917

NOTE.—For years 1916 to 1924, see previous reports.

Table 98.—Available Statistics on the Consumption of Zinc Metal in Specified Canadian Manufacturing Industries, 1933 and 1934

Industry	Items used	1933	1934
		Pounds	Pounds
Brass and copper products.....	(Zinc castings.....) Zinc ingots and bars..... Zinc plates, slabs and sheets..... Zinc scrap.....	3,807,210	3,920,176
White metal alloys.....	Zinc spelter.....	388,491	1,100,791
Electrical apparatus.....	Zinc scrap.....	396,837	283,278
Paints and pigments.....	Zinc ingots and bars.....	293,851	448,343
Iron and steel.....	Zinc sheets.....	1,491,941	1,587,233
	Zinc and zinc ore.....	1,003,896	1,702,565
	Zinc.....	16,400,446	19,017,095
<b>Grand Total.....</b>		<b>23,804,178</b>	<b>28,142,385</b>

Table 99.—Imports into Canada and Exports of Zinc, 1933 and 1934

	1933		1934	
	Pounds	Value	Pounds	Value
<b>IMPORTS</b>				
Zinc dust.....	841,400	\$ 47,826	1,067,300	\$ 61,135
Zinc in blocks, pigs, bars and rods, and zinc plates, n.o.p.....	16,400	1,074	18,300	1,282
Zinc in sheets and strips, and zinc plates for marine boilers.....	3,969,100	273,439	3,964,900	260,449
Zinc spelter.....	162,300	4,921	3,100	200
Zinc white (zinc oxide).....	9,864,607	428,201	11,754,090	520,911
Zinc sulphate.....	432,604	7,902	1,844,821	27,091
Zinc, chloride of.....	1,018,954	30,971	1,462,592	41,712
Zinc, manufactures of, n.o.p.....		72,499		82,883
Lithophone.....	11,387,409	406,598	14,530,612	510,558
<b>Total.....</b>		<b>1,273,431</b>		<b>1,506,221</b>
<b>EXPORTS</b>				
Zinc, contained in ore—				
To Belgium.....	6,071,600	121,241	9,388,800	175,550
Japan.....	2,254,000	14,008	8,947,500	140,657
United Kingdom.....			4,980,100	86,000
France.....			12,129,600	196,052
Germany.....			3,591,300	56,300
United States.....			6,100	276
<b>Total.....</b>	<b>8,325,600</b>	<b>135,249</b>	<b>39,043,400</b>	<b>654,835</b>
Zinc, scrap, dross and ashes—				
To United Kingdom.....	826,800	12,549	942,600	16,511
United States.....	511,900	2,933	18,000	529
Japan.....	2,911,900	18,220	2,970,200	28,484
Other countries.....	2,051,500	13,358	359,800	3,015
<b>Total.....</b>	<b>6,302,100</b>	<b>47,060</b>	<b>4,290,600</b>	<b>48,539</b>
Zinc, spelter—				
To United Kingdom.....	117,820,500	3,414,465	181,075,000	5,251,861
United States.....	56,000	2,156	127,000	2,928
British India.....	4,161,200	101,616	4,167,100	117,383
Argentina.....	2,354,800	68,294	1,108,100	37,804
Belgium.....	12,209,500	352,354	11,119,900	339,655
Brazil.....	347,400	8,548	459,500	14,639
China.....	2,940,400	90,002	2,089,100	68,250
France.....	1,691,800	49,739	1,669,700	32,709
Germany.....	2,866,300	77,726	851,700	26,443
Italy.....	1,120,400	26,665	2,240,900	64,202
Japan.....	25,701,500	740,398	30,842,300	958,823
Netherlands.....	1,691,900	47,101	1,792,900	56,062
Other countries.....	431,700	11,641	351,500	10,050
<b>Total.....</b>	<b>173,453,400</b>	<b>4,990,705</b>	<b>237,894,400</b>	<b>6,990,639</b>
<b>Grand Total—Exports.....</b>		<b>5,173,014</b>		<b>7,694,013</b>

**Table 100.—Monthly Average Prices of Zinc at Montreal, St. Louis and London, 1932-1934**

Month	Montreal <sup>1</sup> (In cents per pound)			St. Louis <sup>2</sup> (In cents per pound)			London <sup>2</sup> (In pounds Sterling per long ton)		
	1932	1933	1934	1932	1933	1934	1932	1933	1934
January.....	4.063	3.924	4.750	3.011	3.018	4.271	14.416	14.381	14.688
February.....	3.936	3.983	4.658	2.817	2.666	4.384	13.872	13.866	14.844
March.....	3.820	4.152	4.498	2.787	2.987	4.368	12.616	14.647	14.735
April.....	3.634	4.139	4.367	2.725	3.298	4.370	11.670	14.951	14.916
May.....	3.564	4.294	4.174	2.532	3.805	4.346	12.432	15.505	14.722
June.....	3.480	4.637	4.010	2.777	4.348	4.240	11.548	16.988	14.241
July.....	3.355	5.095	3.850	2.537	4.878	4.317	11.592	17.795	13.466
August.....	3.561	4.809	3.824	2.758	4.916	4.281	13.594	16.869	13.682
September.....	3.802	4.802	3.700	3.322	4.099	4.049	15.455	16.810	12.644
October.....	3.667	4.657	3.580	3.027	4.748	3.832	14.869	16.310	12.217
November.....	3.834	4.643	3.627	3.094	4.520	3.732	15.264	15.048	12.000
December.....	3.971	4.720	3.665	3.124	4.461	3.711	15.209	14.826	11.730
<b>Average.....</b>	<b>3.721</b>	<b>4.488</b>	<b>4.059</b>	<b>2.876</b>	<b>4.029</b>	<b>4.158</b>	<b>13.545</b>	<b>15.666</b>	<b>13.657</b>

<sup>1</sup> Supplied by Consolidated Mining and Smelting Co., Montreal, Que.<sup>2</sup> From the Engineering and Mining Journal.

The London zinc price, on the basis of which the greater part of the Canadian production is sold, when converted to Canadian funds, averaged 2.4056 cents per pound in 1932; the corresponding figure for 1933 was 3.21 cents and for 1934, 3.0436 cents.

**Table 101.—World Metal Production of Zinc, 1932-1934**(Supplied by *Imperial Institute*)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES— Concluded</b>			
United Kingdom (b).....	26,875	45,000	54,000	Netherlands.....	15,377	18,186	19,597
Northern Rhodesia.....		18,542	19,540	Norway.....	38,751	44,238	44,316
Canada.....	76,912	82,095	120,462	Poland.....	83,611	81,399	91,453
Australia.....	53,200	53,956	54,629	U.S.S.R. (Russia).....	14,600	16,357	26,660
<b>Total.....</b>	<b>157,000</b>	<b>200,000</b>	<b>249,000</b>	Spain.....	9,355	8,413	8,052
<b>FOREIGN COUNTRIES</b>				Sweden.....	140		
Belgium.....	94,809	135,132	172,138	Mexico.....	29,800	26,400	28,568
Czechoslovakia.....	5,936	6,501	7,513	United States (c).....	184,954	274,270	324,634
France.....	44,975	51,100	46,502	French Indo-China.....	2,244	3,198	4,174
Germany (b) (d).....	44,182	50,000	70,972	Japan.....	26,616	30,173	31,638
Italy.....	17,700	22,915	24,471	<b>Total.....</b>	<b>610,000</b>	<b>770,000</b>	<b>910,000</b>
Yugoslavia (e).....	2,516	2,984	4,299	<b>World's Total.....</b>	<b>770,000</b>	<b>970,000</b>	<b>1,160,000</b>
Peru.....			5,463				

(b) Includes some secondary metal.

(c) The production by grades (including redistilled secondary) was as follows (long tons):—

	1932	1933	1934
A.—High grade.....	39,460	93,663	104,214
B.—Intermediate grade.....	11,871	24,166	29,126
C. and D.—Select and brass special.....	59,682	62,485	38,979
E.—Prime Western.....	87,082	120,820	169,896
<b>Total secondary zinc recovered.....</b>	<b>63,500</b>	<b>49,700</b>	<b>33,500</b>

(d) The figures published by Metallgesellschaft (which exclude secondary) are (long tons):—

(e) Including zinc dust

	1932	1933	1934
	41,300	50,100	71,700



Table 102.—World Production of Zinc Ore (In terms of Metal) 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES— Concluded</b>			
United Kingdom.....	4	1	445	Poland.....	25,000	35,000	40,000
Northern Rhodesia.....		18,542	19,540	U.S.S.R. (Russia).....	14,600	16,357	26,660
Canada (shipments) (b).....	126,486	120,339	141,396	Spain.....	34,000	35,000	31,000
Newfoundland.....	85,405	73,730	86,758	Sweden.....	24,156	24,346	28,661
India.....	41,400	55,400	54,800	Algeria.....	1,831	2,252	2,544
Australia.....	115,672	123,703	136,760	French Morocco.....		50	
Total.....	349,000	392,000	440,000	Mexico.....	50,308	87,028	123,209
<b>FOREIGN COUNTRIES</b>				United States.....	254,671	343,107	391,519
Austria.....	1,585	2,070	2,541	Bolivia (exports).....	12,763	13,200	9,338
Belgium (c).....	3,000	3,000	3,000	Peru.....	209	201	5,463
Bulgaria (estimated).....		150	150	China.....	4,427	3,989	4,000
Czechoslovakia.....	1,592	1,337	1,965	French Indo-China.....	4,918	4,910	4,881
Finland.....	861	1,067	1,000	Japan (c).....	12,000	15,000	20,000
France.....	1,193			Turkey.....	1,600	4,100	5,577
Germany.....	74,086	102,715	129,650	Roumania.....	105	4,129	3,667
Greece.....	6,809	12,160	(a)	Korea (ore).....		3,142	2,883
Italy.....	31,674	28,678	42,000	Portugal.....			18
Yugoslavia.....	47,207	58,326	52,967	Total.....	620,000	810,000	950,000
Norway.....	8,734	9,597	5,551	World's Total.....	970,000	1,200,000	1,390,000

(a) Information not available.

(b) The amount estimated as recoverable was:—

1932..... 76,912 long tons.

1933..... 88,898 “ “

1934..... 133,295 “ “

(c) Metallgesellschaft estimate.

## CHAPTER FOUR

## THE NICKEL-COPPER INDUSTRY IN CANADA

1. General Review.
2. Commodity statistics, including tables showing production by provinces, imports, exports, prices and world output of nickel, copper and metals of the platinum group.

## 1. General Review

(a) **Definition of the Industry.**—The nickel-copper industry in Canada includes the mining, smelting and to a certain extent the refining of the nickel-copper ores of the Sudbury district in the province of Ontario. Smelting and copper refining operations are carried on in close proximity to the mines; nickel refining is conducted at Port Colborne, Ontario. Matte is exported for treatment in plants at Huntington, West Virginia, U.S.A., Kristiansand, Norway, and Clydach, Wales.

As thus described, the industry in Canada constitutes the national source of nickel, most of the platinum group metals and a large part of the Canadian copper production.

Mines in the copper-gold-silver group also contribute largely to the total Dominion copper output; ores from these properties contain, in the aggregate, about 13 per cent of the annual gold production. The activities of the copper-gold mines are reviewed in the chapter on the gold mining industry. Production and trade statistics on nickel, copper and the metals of the platinum group are given in this chapter.

(b) **Historical.**—Construction of railways in Canada has resulted in the discovery of some valuable mineral deposits. One of these was the finding of the nickel-copper ores of the Sudbury area during the building of the Canadian Pacific Railroad in 1883. The first of these ore bodies was mined for copper in 1886 and it was not until 1887 that the presence of nickel was detected. Almost coincident with these discoveries occurred the introduction of nickel in the manufacture of special steels. This stimulated an almost continuous growth in the industry, a growth which has firmly established Canada as the premier nickel producing nation of the world.

For many years the principal use for nickel was in the manufacture of war material, especially in armour plate; this particular consumption of the metal reached its maximum during the late World War. Following the cessation of hostilities the demand for nickel was greatly reduced and it was largely by intensive research that new uses for the metal were developed and production re-established on a firmer and broader basis. The almost universal industrial expansion during the years immediately preceding 1930 was largely responsible for the high production of 110,275,912 pounds of nickel from Canadian mines in 1929. Production of the metal later declined, sharply reflecting the general and severe economic depression of 1930, 1931 and 1932. In 1933 and 1934 there was a pronounced increase in Canadian nickel output, an increase which reflected the almost general improvement in both domestic and world industrial conditions.

(c) **Importance of Nickel, Copper and Platinum Group Metals.**—Canada supplies about 90 per cent of the world's nickel requirements, the remainder being obtained largely from New Caledonia. A small amount of nickel is recovered from the silver-cobalt ores of the Cobalt district, most of the Canadian nickel output is, however, produced from the ores of the Sudbury area.

The Canadian production of nickel in 1934 totalled 128,687,340 pounds, valued at \$32,139,452 as compared with an output of 83,234,658 pounds worth \$20,130,480 in 1933. The 1934 production of the metal comprised nickel in matte exported, electrolytic metal made at Port Colborne, Ontario, and nickel in oxides and salts produced in Canadian plants; the 1934 production of the metal was the greatest on record, surpassing 1929 the previous high year by 17 per cent. Of the total value of all metals produced in the Dominion, throughout 1934, the value of nickel comprised approximately 16.58 per cent, being surpassed only by that of gold.

Copper production in 1934 from the nickel-copper ores in Ontario constituted about 56.2 per cent of the total copper obtained from all Canadian ores. British Columbia, mining and smelting copper and copper-gold ores, produced approximately 13.2 per cent of Canada's copper output. Quebec supplied 20.3 per cent; the Manitoba production accounted for 8.5 per cent, and Saskatchewan 1.8 per cent.

As a world producer of copper in 1934 Canada ranks third; Chile was the leading copper producing country; followed, according to importance, by United States, Canada, Northern Rhodesia, Belgian Congo and Japan. Until within the last three years the amount of refined copper produced in Canada had been relatively small; previously it was found more profitable to ship blister copper or copper in matte or in concentrates to foreign metallurgical plants for conversion to refined metal.

During recent years Canada's new copper refineries located at Copper Cliff, Ontario, and Montreal East, Quebec, have maintained production of electrolytic copper at a most satisfactory rate and the high standard of this Canadian product is receiving ever growing recognition in the copper markets of the world.

Gold, silver, selenium and tellurium together with metals of the platinum group, including, in addition to platinum, the associated metals, palladium, rhodium, osmium and iridium, are present in varying amounts in the ores of the Sudbury district. The amounts of these metals in the different Sudbury nickel deposits vary considerably and their recovery has been a factor of growing importance in the metallurgical treatment of the nickel ores.

At the present time Canada produces a very considerable proportion of the world's supply of platinum and palladium; the refining of these metals is carried out in plants operating outside the confines of the Dominion.

(d) **Mining, Smelting and Refining.**—Practically all of the nickel produced in Canada is derived from the copper-nickel bearing deposits of the Sudbury district, Ontario. Two companies operate mines and metallurgical plants in this area. The International Nickel Company of Canada, Ltd., conducts smelting operations at Copper Cliff and Coniston, Ontario, while the Falconbridge Nickel Mines, Ltd., smelt their ores at the Falconbridge mine located a few miles east of the town of Sudbury. This last named company treat their matte in a refinery at Kristiansand, Norway. The relatively small amount of nickel oxide produced at Deloro, Ontario, is recovered from silver-cobalt-nickel-arsenic ores mined in Northern Ontario. Smelter matte made by the International Nickel Company is treated in plants located at Clydach, Wales; Huntington, West Virginia; at Port Colborne and Copper Cliff, Ontario.

Throughout 1934 ore was mined continuously by the International Nickel Company of Canada, Ltd., from the Frood and Creighton Mines, the total tonnage shipped amounting to 2,690,814 tons, of which the Frood Mine contributed 1,868,186 tons and the Creighton Mine 822,628 tons. At the Frood Mine exploration work was restricted to the lower levels and ordinary development work was regulated to conform with ore requirements. In order to mine efficiently the larger reserves of proven ore in the lower levels, a new shaft is being sunk at the Creighton Mine; it is estimated that this project will be completed early in 1937.

The concentrator of the Company was operated at a uniform rate throughout the year and treated 1,843,146 tons of ore, the greatest tonnage thus far handled; the available capacity in the grinding and flotation sections is 8,000 tons per day. This capacity can be readily increased to 11,000 tons per day should demand call for increased quantities of nickel. The Copper Cliff Smelter produced 92,174 tons of bessemer matte and 97,611 tons of blister copper. Three reverberatory furnaces were in operation throughout the year. For the Orford separation process one blast furnace was used throughout the year and a second for seven months. At the Coniston Smelter three blast furnaces were in operation up to April 1st and four thereafter; during the year 840,980 tons of ore were smelted and 59,732 tons of bessemer matte produced.

At the Port Colborne refinery, six electrolytic circuits were in continuous operation during 1934 and a seventh was in use from April to August inclusive. The total output of nickel, inclusive of nickel in oxide was 70,974,850 pounds. At Clydach, Wales (the Mond Nickel Co., Ltd.,) the output of nickel in various forms was 25,568,644 pounds compared with 20,760,117 pounds for 1933; the construction here of a small high-pressure carbonyl plant was started, this was expected



to be in operation early in 1935. Because of increased nickel production at Port Colborne and Clydach, the Acton (London, England) plant, (Mond) refined more platinum metals than during any previous year. Henry Wiggin's Co., Ltd., (subsidiary of the Mond Nickel Co.), reported that the various departments of its plant in England enjoyed an increased volume of business and by December this works was operating at an average of eighty per cent of present capacity. In the United States the Huntington Works of the International Nickel Co. Inc., was operated throughout the year at approximately 33 per cent of capacity, a rate considerably in excess of the previous year, while at the Bayonne (N.J.) plant total shipments were 41 per cent in excess of 1933, particularly noticeable were shipments of threaded fittings, coated welding wire, and casting block, each of which increased.

The total number of employees of the International Nickel and associated companies at the year-end was 9,154 distributed as follows: Canada 5,474; Great Britain 2,507; United States 1,122; other countries, 51. Employees on December 31, 1933, numbered 8,297. The increase amounting to ten per cent, is due to the increased scale of operations. Capital expenditure scheduled for 1935, covering all properties calls for an estimated total of \$2,500,000. During 1934 the Mond Nickel Co., Ltd., entered into an agreement with the Government of Finland by which that Company has secured the sole rights, subject to the conditions contained in the agreement, to prospect for, mine, and treat nickel-bearing ore which may occur in a defined territory in Finland.

Sales by the Company of nickel in all forms, including nickel in alloys amounted to 91,459,554 pounds compared with 74,356,969 pounds in 1933, an increase of 23 per cent. Sales of nickel in products of the Port Colborne (Canada) and Clydach (Wales) refineries amounted to 73,964,621 pounds compared with 61,353,495 pounds in 1933, an increase of 21 per cent. Sales of nickel in products of the Copper Cliff Smelter amounted to 1,357,008 pounds. Sales of nickel in products of the rolling mills at Birmingham, (England) Glasgow, (Scotland) and Huntington, (West Virginia), and of the foundry at Bayonne, (New Jersey) totalled 16,137,925 pounds compared with 13,003,474 pounds, an increase of 24 per cent.

Copper sales, inclusive of copper in sulphate produced in Wales, increased from 113,682,312 pounds to 194,870,682 pounds or 71 per cent. Gold sales were 74,375 ounces compared with 21,355 ounces in 1933; silver sales were 1,006,808 ounces compared with 876,303 ounces and sales of the platinum metals were 124,424 ounces compared with 77,198. Sales of selenium were 73,516 pounds and sales of tellurium 1,110 pounds.

Proven ore reserves of the International Nickel Company on December 31st, 1934, were 204,399,463 tons. In the ordinary course of mining operations 2,720,779 tons were added to reserves.

Stopping of ore by Falconbridge Nickel Mines Ltd., during 1934 not only broke enough to satisfy the treatment plant requirements, but added 100,962 tons to the broken ore reserve, which stood at 509,742 tons at the end of the year. The tendency in stopping is to break wider than originally calculated, with the consequent increase in tonnage and lowering of grade. Justification for this is found in the fact that the cost of producing nickel in matte has progressively lowered in spite of lowered grade in ore according to the consulting engineer of the Company. By the end of the year the eastern orebody had been developed on the 500 ft. horizon over a length of 1,000 feet with ore still in the eastern face, on the 750 foot level, an advance of 610 feet west disclosed 575 feet of good ore. Preparations for sinking a five compartment shaft at a location some 2,400 feet east from the present working shaft were made, this shaft is thirteen feet four inches by nineteen feet six inches, outside timber, and will be continued to a depth of 1,500 feet; sinking through 100 feet of overburden was commenced in June and bed rock entered in September. Data relating to the treatment plant are as follows:—

	1934		1933	
	Nickel	Copper	Nickel	Copper
	Per cent	Per cent	Per cent	Per cent
Grade of ore treated.....	2.050	.995	2.163	.980
Recovered in matte.....	1.906	.898	2.006	.904
Metallurgical losses.....	.144	.097	.157	.082



From 317,646 tons of ore delivered to the crushing plant 44,116 tons or 13.9 per cent of waste was eliminated by sorting and discarded. The balance, 273,530 tons was transported over the aerial tramway to the treatment plant. The consequent production of matte for shipment to the refinery in Norway totalled 9,271.4 tons containing 10,405,200 pounds of nickel and 4,901,600 pounds of copper plus some precious metals. Refined metals produced in Norway during the period under review totalled 11,692,746 pounds of nickel and 6,241,125 pounds of copper. Of these 9,508,939 pounds nickel and 4,633,235 pounds copper were for account of Falconbridge, the balance being refined for a toll customer. In addition precious metals were recovered which sold for \$82,000; all for Falconbridge account. The plant for separation of precious metals was finished and the refinery operated very steadily throughout the year.

The copper-nickel property of Cuiptau Mines Ltd., located in Strathroy Twp., Northern Ontario, was active throughout 1934, both surface and underground operations were conducted and considerable diamond drilling completed; this Company erected a 60 ton smelter for the production of copper-nickel matte.

During 1934 approximately 130 men were employed by British Columbia Nickel Mines Ltd., the property of this Company is situated 15 miles by road northwest at Hope, British Columbia. Several hundred acres of the company's claims were surveyed with a magnetometer of the Askania type and it is stated that this work indicated some sixty-eight areas of possible nickeliferous-pyrrhotite mineralization. On several of these indicated areas test-pits were sunk to bed-rock and in every case nickeliferous mineralization was reported found, where indicated. About 2,000 feet of diamond drilling was also completed in 1934, most of it being done from underground stations in the No. 1 tunnel which tunnel at an elevation of 3,527 feet was holed through in a length of 4,700 feet to the Emory Creek side of the mountain. No. 2 adit, the portal of which is approximately 2,200 feet west of No. 1 tunnel and at an elevation of 3,275 feet above sea-level, was advanced to a total distance of 2,208 feet from the portal at the end of 1934.

An average of 1.02 per cent nickel and 0.45 per cent copper was obtained from 50 feet of core length, with 20 feet of core length averaging 1.67 per cent nickel. This core came from horizontal hole No. 79 located 1,706 feet from the portal of No. 2 adit.

Nickel production as an economic factor of growing importance in Canada is reflected in an amount of \$16,170,000, expended by this industry for consumable stores, equipment, freight and insurance during 1934.

**Table 103.—Principal Statistics of the Complete Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1932-1934**

	1932	1933	1934
Number of firms.....	3	4	4
Number of mines.....	6	7	7
Number of smelters.....	3	3	4
Number of refineries.....	1	1	1
Capital employed..... \$	78,188,204	84,836,327	88,574,427
Number of employees—On salary.....	188	191	223
On wages.....	2,218	3,407	5,394
<b>Total.....</b>	<b>2,406</b>	<b>3,598</b>	<b>5,617</b>
Salaries and wages—Salaries..... \$	611,496	617,599	740,191
Wages..... \$	3,309,099	4,971,011	8,124,581
<b>Total..... \$</b>	<b>3,920,595</b>	<b>5,588,610</b>	<b>8,864,772</b>
Fuel and electricity used..... \$	1,371,985	2,582,216	4,202,810
Estimated value of matte exported and refinery products produced..... \$	14,003,637	25,052,622	52,906,920

**Table 104.—Output from Canadian Nickel-Copper Mines and Metallurgical Plants, 1932-1934**

	1932	1933	1934
	Tons	Tons	Tons
Ore and concentrates treated.....	793,552	1,523,814	2,896,359
Refined nickel (x) produced in Ontario.....	7,063	20,748	35,487
Blister copper produced in Ontario.....	30,020	61,385	97,611
Matte exported.....	21,778	43,315	46,755
Nickel content of matte.....	8,068	20,811	28,771
Copper content of matte.....	8,825	12,323	6,692

(x) Includes nickel in salts and oxides.

Table 105.—Proportion of Nickel and Copper in Sudbury Matte, 1925-1934

Year	Percentage			Year	Percentage		
	Nickel	Copper	Total		Nickel	Copper	Total
1925.....	52.1	27.9	80.0	1930.....	36.6	42.5	79.1
1926.....	49.6	30.6	80.2	1931.....	40.5	38.7	79.2
1927.....	48.4	31.7	80.1	1932.....	40.7	38.4	79.1
1928.....	47.6	32.6	80.2	1933.....	44.7	31.6	76.3
1929.....	44.0	35.1	79.1	1934.....	44.4	32.9	77.3

NOTE.—For years 1912 to 1934 see previous reports.

Table 106.—Employees, Salaries and Wages, in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1933 and 1934

—	1933				1934			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
Salaried employees—				\$				\$
Mine and mill.....	56	3	59	166,531	52	1	53	167,030
Smelters and refinery.....	119	13	132	451,068	134	36	170	573,161
<b>Total.....</b>	<b>175</b>	<b>16</b>	<b>191</b>	<b>617,599</b>	<b>186</b>	<b>37</b>	<b>223</b>	<b>740,191</b>
Wage-earners—								
Mine and mill.....	1,540		1,540	2,351,650	2,624		2,624	4,208,672
Smelters and refinery.....	1,867		1,867	2,619,361	2,770		2,770	3,915,909
<b>Total.....</b>	<b>3,407</b>		<b>3,407</b>	<b>4,971,011</b>	<b>5,394</b>		<b>5,394</b>	<b>8,124,581</b>
<b>Grand total.....</b>	<b>3,582</b>	<b>16</b>	<b>3,598</b>	<b>5,588,610</b>	<b>5,580</b>	<b>37</b>	<b>5,617</b>	<b>8,864,772</b>

Table 107.—Wage-Earners Employed by Months, in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1931 to 1934

—	1931	1932	1933	1934
January.....	4,726	3,014	1,822	4,811
February.....	4,656	3,019	1,957	4,876
March.....	4,641	3,039	2,036	5,048
April.....	4,620	2,577	1,976	5,189
May.....	4,597	2,379	2,034	5,409
June.....	4,422	2,434	3,001	5,622
July.....	4,324	2,235	3,957	6,658
August.....	4,262	1,672	4,523	5,566
September.....	3,657	1,628	4,775	5,500
October.....	3,068	1,580	5,050	5,722
November.....	3,195	1,490	4,968	5,707
December.....	3,094	1,551	4,762	5,609

## NICKEL

Production figures include nickel in matte or speiss exported from the Canadian smelters valued at 18 cents per pound; refined and electrolytic nickel produced in Canada, valued at the average price received for sales of nickel metal from the refinery during the year, and the nickel equivalent in oxides or salts sold, valued in the aggregate at the sum obtained from the sales of oxides or salts.

Table 108.—Production of Nickel from Canadian Ores, 1923-1934

(For years 1889 to 1922 see report on the Mineral Production of Canada, 1928)

Year	Pounds of nickel	Value	Year	Pounds of nickel	Value
		\$			\$
1923.....	62,453,843	18,332,077	1929.....	110,275,912	27,115,461
1924.....	69,536,350	19,470,178	1930.....	103,768,857	24,455,133
1925.....	73,857,114	15,946,672	1931.....	65,666,320	15,267,453
1926.....	65,714,294	14,374,163	1932.....	30,327,968	7,179,862
1927.....	66,798,717	15,262,171	1933.....	83,264,658	20,130,480
1928.....	96,755,578	22,318,907	1934.....	128,687,340	32,139,425

Table 109.—Production in Canada, Imports and Exports of Nickel, 1932-1934

	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds	\$	Pounds	\$	Pounds	\$
<b>PRODUCTION—</b>						
Nickel in matte and speiss exported, refined and electrolytic nickel produced, and nickel in oxides and salts sold.....	30,327,968	7,179,862	83,264,658	20,130,480	128,687,340	32,139,425
<b>IMPORTS—</b>						
Nickel, nickel silver and German silver, in ingots or blocks, n.o.p.....	7,364	2,179	686,777	193,229	2,646	771
†Nickel in bars and rods, strips, sheets and plates.....	452,781	172,446	203,217	95,189	591,466	197,230
Nickel silver and German silver, in bars, rods, strips, sheets, plates or anodes....	37,218	12,585	51,742	17,012	48,359	14,187
Nickel chromium, in bars and rods.....	41,434	46,443	50,841	46,210	48,413	45,114
German, Nevada and nickel silver, manufactures of, not plated.....		160,798		127,076		140,682
Nickel-plated household hollow-ware.....		12,915		1,900		9,075
Nickel kitchenware.....		825		1,365		872
Nickel-plated ware, n.o.p.....		845,734		569,862		753,421
<b>Total nickel and its products.....</b>		<b>1,253,925</b>		<b>1,051,843</b>		<b>1,161,352</b>
<b>EXPORTS—</b>						
Nickel, fine.....	15,165,500	4,022,748	42,092,200	13,173,273	54,723,800	16,357,933
Nickel contained in matte.....	15,169,200	2,757,713	38,325,300	6,882,502	58,343,800	10,540,870
Nickel in oxide.....	1,737,200	503,503	7,664,600	2,760,193	5,084,500	2,014,427
<b>Total.....</b>	<b>32,071,900</b>	<b>7,283,964</b>	<b>88,082,100</b>	<b>22,795,968</b>	<b>118,152,100</b>	<b>28,913,230</b>

†Not including bars or rods depolarised or otherwise processed for use as anodes.

Table 110.—World Production of Nickel Ore, 1932-1934

(In terms of metal)  
(Supplied by the Imperial Institute)  
(Long tons)

Country	1932	1933	1934
<b>British Empire—</b>			
Canada.....	13,539	37,172	57,450
India (b).....	930	973	1,200
Australia.....	(11 cwt.)	9	
<b>Total.....</b>	<b>14,500</b>	<b>38,200</b>	<b>58,700</b>
<b>Foreign Countries—</b>			
U.S.S.R. (Russia).....			849
Brazil (ore).....		310	(a)
Greece.....	940	1,355	(a)
Norway.....	930	979	1,312
United States (d).....	174	113	(a)
New Caledonia (c).....	4,958	4,860	8,500
<b>Total.....</b>	<b>7,000</b>	<b>7,300</b>	<b>12,100</b>
<b>World's total.....</b>	<b>21,500</b>	<b>45,500</b>	<b>70,800</b>

(a) Information not available.

(b) Nickel content of speiss obtained as a by-product in smelting operations.

(c) Estimated content of matte and ferro-nickel obtained at smelters was as follows:—

1932..... 2,200 long tons

1933..... 4,000 "

(d) Nickel content of salts and nickel produced as a by-product in the electrolytic refining of copper (partly from imported blister copper).

Secondary metal was recovered in the United States as follows:—

1932.....	1,295 long tons
1933.....	1,473 "
1934.....	1,652 "

## INDUSTRIAL NICKEL ALLOYS

(Supplied by International Nickel Co. of Canada, Ltd.)

Nickel is extensively used in combination with other metals in steels, irons and a large number of non-ferrous alloys, many of which are "key" materials of industry.

- Nickel steels ( $\frac{1}{2}\%$  to 7% nickel)
- Nickel steel castings (1% to 4% nickel)
- Corrosion resistant steels (7% to 35% nickel)
- Heat resistant steels (7% to 35% nickel)
- Heat resistant alloys (35% to 85% nickel)
- Electric resistance alloys (up to 85% nickel)
- Iron nickel alloys—
  - Non-magnetic (10% to 25% nickel)
  - Low expansion (32% to 45% nickel)
  - Highly magnetic (45% to 80% nickel)
- Nickel cast irons—
  - High quality cast iron ( $\frac{1}{2}\%$  to 5% nickel)
  - High strength cast iron (1% to 2 $\frac{1}{2}\%$  nickel)
  - Chilled cast iron (4% to 6% nickel)
  - Corrosion resistant cast irons (14% to 30% nickel)
- Nickel wrought iron (3% nickel)
- Nickel-silvers (5% to 30% nickel, plus copper and zinc)
- Nickel bronzes ( $\frac{1}{2}\%$  to 8% nickel)
- Copper-nickel alloys (15% to 50% nickel)

The International Nickel Co. of Canada, Ltd., states that the year 1934 witnessed a further increase in world nickel consumption, the deliveries in all forms being about 122,000,000 pounds compared with 96,000,000 pounds in 1933. As heretofore, the use of nickel was well distributed among different nickel-consuming countries as well as within various nickel-consuming industries. Although the increased pace of Nickel consumption everywhere was well maintained, those industrial centres whose economic recovery has been most rapid have naturally registered the most prominent gains. The demand for nickel in the United Kingdom reached an all time peak in 1934; nickel deliveries were about equally divided between America (the United States and Canada) and the rest of the world. The automobile industry continued to be the largest single consumer of nickel, using about thirty per cent of the total in the United States and Canada; paralleling the general increase in steel and in foundry iron production, the use of nickel cast iron and of nickel steel increased substantially, one of the outstanding developments in the field of nickel alloy steel was the adoption of welded nickel steel for the pressure vessels and equipment used in the de-waxing processes for oil refining. Pure nickel as well as nickel-clad steel continued to be favoured for the construction of equipment for the manufacture of caustic soda. Ethiopia issued ten million coins of pure nickel, becoming the twenty-eighth nation to use pure nickel coinage. The amount of nickel going into light aluminium alloys registered an increase and the use of the metal in stainless steel continued to advance.

"Die Metallbörse" reported in 1934 that Russia was about to greatly extend its nickel production. The Orsk Works in the Urals are to be increased to produce 500 tons yearly—at present the Russian production amounts to about 1.4 per cent of the world production, but the programme laid down contemplates a yearly production of 5,000 tons. The U.S.S.R. Chamber of Commerce, Moscow, announced in July 1935, that a large nickel plant will commence production in the Orsk region in 1937.

## COPPER

## CANADA

Copper production includes copper contained in ores and concentrates exported, copper contained in blister copper made, and copper in matte exported.

Production of new copper in Canada during 1934 totalled 364,761,062 pounds valued at \$26,671,438 as compared with 299,982,448 pounds at \$21,634,853 in 1933. The quantity produced in 1934 constitutes an all time high record for the industry, the previous high output being 303,478,356 pounds recorded for 1930. The decrease in the average price of the metal from



12.982 cents per pound on the New York market in 1930 to 7.419 cents in 1934, as computed from London quotations, is strongly reflected in the value of the 1934 copper output as compared with that of 1930.

The United Kingdom is now Canada's principal market for copper and it is encouraging to note a distinct improvement in 1935 in the price of copper in London where the price per pound, expressed in Canadian funds, increased from an average of 6.820 cents in January to 8.802 cents for the month of October. The pronounced change in the international flow of Canadian copper is emphasized in the fact that 95.7 per cent of the total value of Canadian copper exports in 1930 went to the United States and only 1.9 per cent to the United Kingdom, whereas in 1934 the percentage to the United States had fallen to 13.1 while the value of consignments to the United Kingdom had increased to 64.2 per cent.

In 1934 copper was produced in Quebec, Ontario, Manitoba, Saskatchewan and British Columbia; the first two provinces were the Dominion's greatest producers contributing 20.3 per cent and 56.2 per cent respectively of the total output of 364,761,062 pounds. The recorded output for the year included 334,703,227 pounds contained in blister and anode copper, 16,674,356 pounds in ores, concentrates and copper matte exported, and 13,383,479 pounds in exports of nickel-copper matte.

The uptrend in Canadian copper output experienced in 1934 continued through into 1935 when an output of 312,520,346 pounds of copper produced during the first nine months compared with 266,302,345 pounds in the corresponding months of 1934 would indicate an all time high production record for the Canadian copper mining industry in 1935.

More complete particulars relating to the mining and smelting of Canadian copper-bearing ores are contained in chapters 2 and 6 of this report.

Table 111.—Production of Copper from Canadian Ores, 1925-1934

Year	Pounds	Value	Cents per pound	Year	Pounds	Value	Cents per pound
		\$				\$	
1925.....	111,450,518	15,649,882	14.042	1930.....	303,478,356	37,948,359	•
1926.....	133,094,942	17,490,300	•	1931.....	292,304,390	24,114,065	•
1927.....	140,147,440	17,195,487	•	1932.....	247,679,070	15,294,058	•
1928.....	202,696,046	28,598,249	•	1933.....	299,982,448	21,634,853	•
1929.....	248,120,760	43,415,251	•	1934.....	364,761,062	26,671,438	•

\*Since 1926 the value of Canada's copper production was computed according to the note in Appendix.

NOTE.—For years 1896 to 1924 see previous reports.

Table 112.—Production of Primary Copper in Canada, by Provinces and by Sources, 1933 and 1934

	1933		1934	
	Pounds	\$	Pounds	\$
By PROVINCES—				
Quebec.....	69,943,882	5,214,177	73,968,545	5,487,948
Ontario.....	145,504,720	10,118,847	205,059,539	14,822,704
Manitoba.....	38,163,181	2,844,989	30,867,141	2,290,126
Saskatchewan.....	3,223,941	240,338	6,618,913	491,077
British Columbia.....	43,146,724	3,210,502	48,246,924	3,579,583
<b>Total.....</b>	<b>299,982,448</b>	<b>21,634,853</b>	<b>364,761,062</b>	<b>26,671,438</b>
By SOURCES—				
In blister and anode copper produced.....	260,386,164	19,411,268	334,703,227	24,832,061
In ores, concentrates and copper matte exported.....	14,950,300	1,114,515	16,674,356	1,237,120
In nickel-copper matter exported.....	24,645,984	1,109,070	13,383,479	602,257
<b>Total.....</b>	<b>299,982,448</b>	<b>21,634,853</b>	<b>364,761,062</b>	<b>26,671,438</b>

Table 113.—Production of Refined Copper in Canada, 1925-1934

Year	Tons	Year	Tons
1925.....	170	1930.....	31,377
1926.....	10,581	1931.....	92,183
1927.....	9,191	1932.....	90,077
1928.....	8,806	1933.....	112,245
1929.....	3,518	1934.....	149,261

NOTE.—For years 1916 to 1924 see previous reports.

Table 114.—Production of Copper Sulphate in Canada, 1925-1934

Year	Pounds	Year	Pounds
1925.....	121,748	1930.....	734,300
1926.....	404,862	1931.....	62,140
1927.....	566,825	1932.....	*900,220
1928.....	771,400	1933.....	*629,100
1929.....	617,430	1934.....	*733,720

\*Used by producer.

Table 115.—Quantity and Value of Copper Produced in Canada, by Provinces, 1925-1934

(For production in previous years see Mineral Production of Canada, 1928)

Year	Quebec		Ontario	
	lb.	\$	lb.	\$
1925.....	2,510,141	352,474	39,718,777	5,577,311
1926.....	2,674,058	368,886	41,312,867	4,828,964
1927.....	3,119,848	403,084	45,341,295	4,946,533
1928.....	33,697,949	4,909,791	66,607,510	8,770,149
1929.....	55,337,169	10,019,901	88,879,853	14,622,572
1930.....	80,310,363	10,425,891	127,718,871	15,187,259
1931.....	68,376,985	5,723,154	112,882,625	9,096,463
1932.....	67,336,692	4,296,216	77,055,413	4,407,828
†1933.....	69,943,882	5,214,177	145,504,720	10,118,847
1934.....	73,968,545	5,487,948	205,059,539	14,822,704

Year	Manitoba		Saskatchewan†	
	lb.	\$	lb.	\$
1925.....	.....	.....	.....	.....
1926.....	.....	.....	.....	.....
1927.....	.....	.....	.....	.....
1928.....	.....	.....	.....	.....
1929.....	.....	.....	.....	.....
1930.....	2,087,609	215,018	.....	.....
1931.....	45,821,432	3,835,254	.....	.....
1932.....	52,706,861	3,362,803	.....	.....
1933.....	38,163,181	2,844,989	3,223,941	240,338
1934.....	30,867,141	2,290,126	6,618,913	491,077

Year	British Columbia		Yukon	
	lb.	\$	lb.	\$
1925.....	69,221,600	9,720,097	.....	.....
1926.....	89,108,017	12,292,450	.....	.....
1927.....	91,056,297	11,845,870	.....	.....
1928.....	102,283,210	14,902,664	*107,377	15,645
1929.....	103,903,738	18,772,778	.....	.....
1930.....	93,318,885	12,114,657	42,628	5,534
1931.....	65,223,348	5,459,194	.....	.....
1932.....	50,580,104	3,227,111	.....	.....
1933.....	43,146,724	3,216,502	.....	.....
1934.....	48,246,924	3,579,583	.....	.....

\*Includes small quantities produced in 1925, 1926 and 1927, but not reported until 1928.

†The metal is recovered from that part of the Flin Flon mine situated on the Saskatchewan side of the Manitoba-Saskatchewan border.

Table 116.—Available Statistics on the Consumption of Copper in Specified Canadian Industries, 1933 and 1934

Industries	Item (Used)	1933	1934
Brass and copper products (a)	(Ingots, billets, slabs, etc. .... lb.	52,020,637	64,445,050
	Castings..... lb.	285,892	39,517
	Pipe and tubing..... lb.	51,426	172,488
	Bars and rods..... lb.	12,768,699	32,580,001
	Plates and sheets..... lb.	334,103	447,476
	Wire..... lb.	1,072,134	312,668
	Scrap..... lb.	1,382,467	1,318,264
	Other..... lb.	16,694	39,372
White metal alloys	(Scrap..... lb.	1,607,143	1,898,265
	Copper bars, sheets, etc..... lb.	42,821	38,764
Electrical apparatus and supplies	(Pig and bars..... lb.	90,742	36,503
	Rods..... lb.	14,793,411	21,369,673
	Tubing and pipe..... lb.	120,108	294,685
	Sheets and plates..... lb.	136,413	193,502
	Wire, bare..... lb.	1,823,238	2,527,365
	Wire, other insulated..... \$	121,749	363,857
	Wire, enamelled..... \$	155,467	262,687
Iron and steel and their products	..... lb.	1932	1933
	Copper sheets, bars, etc..... lb.	3,321,788	3,230,569

(a) A relatively large part of the copper included under this industry is rolled into wire rods, which are sold to manufacturers of electrical cable and duplication to this extent results from the inclusion of these rods in the electrical apparatus industry.

Table 117.—Imports into Canada and Exports of Copper, 1933 and 1934

	1933		1934	
	Pounds	Value	Pounds	Value
		\$		\$
<b>IMPORTS—</b>				
Copper in bars or rods, when imported by manufacturers of trolley, telegraph and telephone wires and electric cables for use only in the manufacture of such articles in their own factories.....	97,400	12,084	410,300	49,228
Copper bars for use only in the manufacture of rods to be used exclusively in the manufacture of electrical conductors, and copper rods for such manufacture, individual units of conductors not to exceed area of No. 7-0 gauge conductor.....	4,000	300	64,800	5,624
Copper in bars or rods, in lengths of not less than 6 feet, unmanufactured, n.o.p.....	305,900	38,736	242,200	31,097
Copper in blocks, pigs or ingots.....	17,200	1,603	34,700	3,693
Copper, scrap, cathode plates.....	4,000	247	26,700	1,256
Copper in strips, sheets or plates not polished or coated.....	144,100	25,142	223,700	37,707
Copper tubing in lengths of not less than 6 feet, and not polished, bent, or otherwise manufactured.....	256,491	53,464	329,275	74,887
Copper wire.....	22,355	3,997	72,515	18,011
Copper wire cloth, or woven wire of copper.....		4,304		1,803
Copper, manufactures of, n.o.p.....		249,680		287,429
Copper, precipitate of, crude.....	20	4	704	113
Anodes of nickel, zinc, copper, silver or gold.....		2,649		1,067
Copper, sub-acetate of, or verdigris, dry.....	210	43	2,844	554
Copper, sulphate of (blue vitriol).....	2,389,595	78,448	5,277,499	170,303
Copper rollers and stones adapted for use in textile and paper printing.....		51,115		53,222
Copper, sulphate of, dehydrated, for agricultural or spraying purposes.....	2,195,858	68,887	42,050	3,295
<b>Total</b> .....		<b>591,003</b>		<b>739,289</b>
<b>EXPORTS—</b>				
Copper, fine, contained in ore, matte, regulus, etc.....	35,436,100	1,723,705	35,145,200	1,655,936
Copper blister.....	15,136,000	1,250,750	26,962,200	2,113,200
Copper, old and scrap.....	4,866,800	264,882	3,888,200	222,909
Copper in ingots, bars, cakes, slabs and billets.....	153,348,300	10,346,590	187,554,000	13,943,724
Copper in rods, strips, sheets, plates and tubing.....	38,700,600	3,061,014	57,903,100	4,801,979
Copper wire and cable.....		122,260		323,683
Copper manufactures, n.o.p.....		148,475		252,331
<b>Total</b> .....		<b>16,917,946</b>		<b>23,313,762</b>
Copper coin, foreign.....		22,866		1,932
Copper coin, Canadian.....		340		43

Table 118.—Copper Prices, by Months, 1933, 1934 and 1935

Month	Copper (Electrolytic)							
	New York			London				
	1933	1934	1935	1933	1934	1935		
	(cents per pound)			(£ sterling per long ton)				
January.....	4.775	7.890	8.775	33.244	35.614	31.261	(a) 6.820	
February.....	4.775	7.777	8.775	32.556	35.969	30.244	6.593	
March.....	5.011	7.775	8.775	32.370	35.512	31.607	6.808	
April.....	5.395	8.173	8.775	33.681	36.038	34.703	7.546	
May.....	6.698	8.275	8.775	38.163	35.756	36.733	8.028	
June.....	7.773	8.594	8.634	41.090	35.339	34.039	7.511	
July.....	8.635	8.775	7.775	41.524	32.778	34.261	7.598	
August.....	8.768	8.775	7.979	40.227	31.483	35.976	8.006	
September.....	8.753	8.775	8.504	38.339	30.556	37.952	8.421	
October.....	7.950	8.775	8.967	36.977	29.478	39.609	8.802	
November.....	7.881	8.775	9.025	33.898	30.222	39.396	8.754	
December.....	7.885	8.775	9.025	34.329	31.086	39.313	8.732	
Average.....	7.025	8.428	8.649	36.359	33.319	35.430	7.795	

(a) Equivalent in cents per pound expressed in Canadian funds.

Transposed into Canadian funds the average price of copper based on the London market was 7.4548 cents per pound in 1933; 7.4193 cents in 1934 and 7.2177 cents for the first six months of 1935.

Table 119.—Canadian Copper Ore Reserves (†) as Officially Reported  
(American Bureau of Metal Statistics)

	Year	Province	Short tons ore	Average grade	Short tons copper
				%	
Falconbridge.....	1934	Ontario.....	2,960,238	0.90	26,600
Granby Consolidated (a).....	1933	British Columbia.....	13,449,900	1.81	243,400
Hudson Bay.....	1930	Manitoba.....	18,000,000	1.71	307,800
International Nickel.....	1934	Ontario.....	204,399,463	(x) 2.00	4,088,000
Noranda.....	1934	Quebec.....	28,305,000	2.51	709,500
Nornimet.....	1933	Quebec.....	625,000	3.00	18,800
Sherritt Gordon.....	1932	Manitoba.....	4,799,175	2.41	115,900
Waite Amulet.....	1933	Quebec.....	1,067,350	6.00	64,000
Britannia.....		British Columbia.....			
Consolidated Copper and Sulphur.....		Quebec.....			
Aldermac Mines Ltd.....		Quebec.....			

(x) Approximate.

† Producing or developed for production.

(a) Anyox properties now closed.

Table 120.—Copper Available for Consumption in Countries Other Than United States and Canada, 1933, 1934 and 1935

(Compiled by the American Bureau of Metal Statistics)

Country	Average per month			Number of months reported in 1935
	1933	1934	1935	
Great Britain.....	12.092	18.425	20.123	9*
France.....	9.025	7.558	8.378	7
Germany.....	14.158	18.450	17.759	8
Italy.....	4.992	5.242	6.971	8
Japan.....	6.875	9.375	11.544	7
Austria.....	592	808	1,057	8
Czechoslovakia.....	1,083	1,482	1,640	8
Hungary.....	475	717	774	6
Netherlands.....	358	442	310	9
Poland.....	592	900	866	8
Sweden.....	2,458	3,025	3,781	8
Switzerland.....	1,233	1,208	1,170	9
Other Europe.....	6,550	7,875	10,800	
India.....	445	600	765	7
Elsewhere.....	1,472	1,650	1,700	
Total—metric tons.....	62,490	77,767	87,738	
Total—short tons.....	68,784	85,723	98,714	



Table 121.—World Production of Copper Ore, 1932-1934

(In terms of metal)  
(Supplied by Imperial Institute)  
(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES</b> —concluded			
United Kingdom.....	61	40	14	Portugal (estimated)	2,000	2,000	2,000
N. Rhodesia.....	87,239	129,423	157,599	Roumania.....	12	23	17
S. Rhodesia (smelter).....	6			U.S.S.R. (Russia)....	31,500	32,200	43,400
South West Africa (c).....	2,400			Spain.....	32,000	29,000	30,000
Union of South Africa.....	9,254	8,250	7,745	Sweden.....	4,241	6,762	4,982
Canada.....	110,571	133,921	162,840	Algeria.....	18	17	138
Cyprus (estimated).....	3,200	4,230	4,986	Belgian Congo			
India (estimated).....	11,200	10,700	11,500	(smelter).....	53,000	65,544	108,346
Australia.....	14,658	14,413	12,012	French Equatorial			
Newfoundland.....	2,091	3,167	4,229	Africa.....	150	1,500	(a)
<b>Total.....</b>	<b>241,000</b>	<b>304,000</b>	<b>361,000</b>	Cuba.....	5,833	8,815	6,094
<b>FOREIGN COUNTRIES</b>				Mexico (c).....	34,698	39,196	43,569
Austria.....	168	131	82	United States (c)....	212,599	170,217	211,563
Bulgaria (ore).....	40		55	Bolivia (exports)....	1,985	1,819	1,596
Czechoslovakia.....	66		160	Chile.....	101,600	160,000	260,000
Finland.....	5,262	5,582	8,666	Peru.....	24,691	30,773	27,297
France.....	428	222	325	Formosa.....	3,400	3,900	(a)
Germany.....	30,255	30,998	25,560	China (smelter).....	433	497	(a)
Hungary (smelter)....	274	310	224	Japan (smelter).....	70,741	67,942	65,944
Italy.....	375	324	320	Korea.....	800	900	1,500
Yugoslavia.....	17,900	33,500	42,300	Greece.....		2	(a)
Norway.....	16,501	19,500	20,840	<b>Total.....</b>	<b>650,000</b>	<b>710,000</b>	<b>920,000</b>
				<b>World's Total....</b>	<b>896,000</b>	<b>1,010,000</b>	<b>1,280,000</b>

(a) Information not available.

(b) Years ended March 31, of the year following that stated.

(c) Amount estimated as recoverable.

Table 122.—World Metal Production of Copper, 1932-1934

(Supplied by Imperial Institute)  
(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES</b> —concluded			
United Kingdom.....	13,000	11,100	11,200	Norway.....	5,230	6,588	7,863
Northern Rhodesia.....	67,887	104,205	137,897	Roumania.....	108	446	(a)
Southern Rhodesia.....	6			U.S.S.R. (Russia)			
Union of South Africa.....	9,239	8,236	8,196	(estimated).....	45,900	44,600	52,800
Canada (d).....	94,199	116,244	149,423	Spain.....	15,310	16,995	13,559
India.....	4,443	4,800	6,309	Sweden.....	3,237	8,660	7,980
Australia.....	13,307	11,238	7,970	Belgian Congo.....	53,000	65,544	108,346
<b>Total.....</b>	<b>202,000</b>	<b>256,000</b>	<b>321,000</b>	Mexico.....	43,047	39,300	42,410
<b>FOREIGN COUNTRIES</b>				United States.....	274,591	223,634	247,257
Austria.....	1,956	995	587	Chile.....	95,976	154,021	252,655
Belgium.....	26,524	34,802	60,135	Peru.....	20,568	24,775	27,589
Czechoslovakia.....	921	767	623	China.....	433	497	(a)
France.....	303	(a)	(a)	Japan.....	70,741	67,942	65,944
Germany (b).....	50,100	49,000	52,200	Korea.....	883	772	1,412
Italy.....	420	118	446	Formosa.....	1,600	1,400	(a)
Yugoslavia.....	29,683	39,721	43,659	<b>Total.....</b>	<b>740,000</b>	<b>780,000</b>	<b>990,000</b>
				<b>World's Total....</b>	<b>940,000</b>	<b>1,040,000</b>	<b>1,310,000</b>

(a) Information not available.

(b) Metallgesellschaft figures.

(d) Copper content of blister copper.

## METALS OF THE PLATINUM GROUP

The output of platinum metals in Canada comes almost entirely from the copper-nickel ores of the Sudbury district in Ontario and the refining of these metals is accomplished in European metallurgical plants. Relatively small amounts of platinum are also recovered annually from stream gravels in British Columbia; 200,162 fine ounces of new platinum, palladium and other platinum group metals valued at \$6,190,045 were recovered from Canadian mineral deposits in 1934 as compared with 55,795 fine ounces worth \$1,502,633 in 1933; the 1934 figures represent an increase over the preceding year of 258.7 per cent in quantity and 312 per cent in value and constitute an all time high record for the production of these metals in Canada.

Imports of platinum, including manufactures thereof, and palladium, iridium, ruthenium and rhodium were valued at \$64,023 in 1934 as compared with a value of \$72,380 in 1933. Exports in 1934 of platinum contained in concentrates or other crude forms totalled 133,072 fine ounces valued at \$5,186,489 as compared with 29,228 fine ounces at \$1,168,565 in 1933. Exports of platinum, old and scrap, amounted to 410 fine ounces worth \$12,202 during 1934; the corresponding figures for 1933 were 189 ounces and \$5,439.

In British Columbia, International Placers Ltd., have been operating the old Swan and other leases between Granite Creek and the Tulameen river near Coalmont. On the Swan, between February and the end of May, 264 feet of drifts were driven, exposing 2,107 square feet of bed rock, from which 172 oz. 14 dwt. gold and 17 oz. 14 dwt. platinum, including iridium, was recovered. The Tulameen river crosses the peridotite and pyroxenite rocks that form part of Olivine and Grasshopper mountains and the British Columbia Department of Mines states that platinum in place associated with chromite has been found in small quantities in the former rock in this locality. Bands of platinum in a peridotite matrix have been also found in the sluice boxes.

The 1934 annual report of the International Nickel Company of Canada, Ltd., states: "The quoted prices per ounce for platinum were fairly level, declining toward the year-end to \$34.00 from about \$38.00 at the beginning of 1934. The price of palladium increased from \$23.00 at the end of 1933 to \$24.00 at the close of 1934.

"The world consumption of new platinum in 1934 is estimated at 200,000 ounces as compared with 175,000 ounces in 1933. The demand continued to be stronger in the industrial and chemical fields as well as in the jewellery field.

"The International Nickel Company is now the world's largest producer of platinum metals and is currently supplying the major portion of the world's requirements of palladium, this metal being in stronger demand particularly in chemical and industrial fields. The demand for palladium for dental and electrical applications increased substantially during the year. Platinum and palladium-bearing alloys are now standard in dental laboratories and in dental use."

The nickel-copper ores mined in the Sudbury area by the Falconbridge Nickel Company, Ltd., also contain platinum metals and this company announced that its Norwegian plant for the separation of precious metals was finished during 1934 and was gradually coming into routine operation.

Mr. Charles Engelhard, President of Messrs. Baker and Co. Inc., New York, comments on the platinum metals as follows: "The consumption of palladium, although less than that of platinum, definitely increased. This metal has been known to science since its discovery by Wollaston in 1803, but it has only been in the last few years of expanding Canadian output that palladium has been available in sufficient volume to make it an important and permanent factor in industry and the arts, and the prospects for a further steady increase in consumption seem most favourable. . . . The larger production of platinum metals from copper-nickel ores, due to the expanding demand for nickel, resulted in Canada maintaining its position as the world's largest producer of palladium, and it is probable that for the first time Canada also became leader in the production of platinum itself. The ability of world markets to absorb the larger production of these precious metals is evidence of their wider recognition in industry and the arts. Although the market for fine diamond jewellery continued below normal, thus restricting the largest traditional outlet for platinum and iridio-platinum, platinum has been used for many rings and other objects normally made in yellow or white gold. There has also been some activity in the resetting in platinum of jewels from outmoded pieces of gold jewellery. . . . In the chemical field a platinum-rhodium alloy has been extensively accepted all over the world as the outstanding

catalyst in the production of nitric acid, and research continues in perfecting the use of platinum as catalyst in the manufacture of sulphuric acid. Cigarette lighters, using platinum salts as catalysts, have become increasingly popular. . . . The development of palladium leaf, first introduced in 1933, continued during the past year. A lady's vanity case has been created in palladium kid, and two of the smartest American shoe designers are experimenting with the same material for evening slippers; in the bookbinding field palladium leaf as a decorative material has received recognition. Palladium is improving its position in the jewellery field as a natural white gold, and a palladium-silver alloy has been developed for optical frames. It is in dentistry, however, that palladium—most frequently as palladium-gold-copper and palladium-gold-silver-copper alloys—is finding the most important market, owing to its resistance to corrosion, lightness of weight and white colour, together with the fact that the metal costs less than gold. As for rhodium plating, its progress, accomplished after a long period of research, has been most remarkable, and there can be no question that its use is only in the initial stages."

An article "Platinum and its Associated Metals" appearing recently in the "Mining Journal," London, is especially interesting in that it refers to Abyssinia as follows: "Abyssinia whose potentialities in respect of a noticeable production of platinum do not appear to be adequately appreciated. If and when modern appliances and methods can be brought into use, to replace the present primitive and wasteful methods, this output will be a factor to be seriously reckoned with in the platinum world. Quiet but persistent endeavours are being made in that direction. . . ."

Other than Canada, the important platinum producing countries of the world, in the order of the magnitude of recent output, include Russia, Colombia, the Union of South Africa and Abyssinia.

**Table 123.—Production of Platinum Group Metals in Canada, 1932, 1933 and 1934**

	Platinum		Palladium, Rhodium, Iridium, etc.	
	Fine ounces	\$	Fine ounces	\$
<b>1932</b>				
Ontario .....	27,284	1,097,021	37,613	901,890
British Columbia .....	59	2,372		
<b>Total .....</b>	<b>27,343</b>	<b>1,099,393</b>	<b>37,613</b>	<b>901,890</b>
<b>1933</b>				
Ontario .....	24,746	856,190	31,009	645,043
British Columbia .....	40	1,400		
<b>Total .....</b>	<b>24,786</b>	<b>857,590</b>	<b>31,009</b>	<b>645,043</b>
<b>1934</b>				
Ontario .....	116,177	4,488,712	83,932	1,699,282
British Columbia .....	53	2,051		
<b>Total .....</b>	<b>116,230</b>	<b>4,490,763</b>	<b>83,932</b>	<b>1,699,282</b>

**Table 124.—Production of Metals of the Platinum Group, 1925-1934**

(From 1887 to 1924 see Mineral Production of Canada, 1928)

Year	Platinum				Palladium	
	Lode		Placer			
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1925 .....	8,692	1,027,477	6	715	7,856	608,727
1926 .....	9,471	919,349	50	4,258	9,790	626,166
1927 .....	11,217	716,653	11	960	11,247	541,319
1928 .....	10,483	706,090	49	2,819	11,909	511,998
1929 .....	12,491	845,057	28	1,699	12,408	471,614
1930 .....	34,007	1,542,490	17	771	29,959	689,217
1931 .....	44,725	1,595,117	50	1,783	39,313	780,260
1932 .....	27,284	1,097,021	59	2,372	29,727	548,582
1933 .....	24,746	856,190	40	1,400	*31,009	645,043
1934 .....	116,177	4,488,712	53	2,051	*83,932	1,699,282

\*Includes other platinum metals except platinum.



Table 125.—Production of Certain Metals of the Platinum Group, 1925-1934

Year	Rhodium		Ruthenium		Osmium		Iridium	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1925.....					432	40,242		
1926.....	204	9,969	16	791			14	3,252
1927.....	222	6,853	31	1,073			45	4,945
1928.....	895	20,951	561	16,331			242	78,553
1929.....	3,037	151,850	1,376	66,048			497	119,777
1930.....	(a) 4,133	206,650						
1931.....	(a) 7,605	431,457						
1932.....	(a) 7,886	353,308						
1933 (b).....								
1934 (b).....								

(a) Includes rhodium, iridium and ruthenium as other platinum metals.

(b) Included with palladium as shown in preceding table.

Table 126.—Imports into Canada and Exports of Platinum, 1932, 1933 and 1934

	1932		1933		1934	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
IMPORTS—						
Platinum retorts, pans, etc.....		30		11,809		1,029
Platinum wire, and in bars, strips, etc. (x).....		29,740		49,136		51,530
Platinum crucibles.....		8,638		11,435		11,464
<b>Total.....</b>		<b>38,408</b>		<b>72,380</b>		<b>64,023</b>
EXPORTS—						
Contained in concentrates, etc.....	14,570	1,155,705	29,228	1,168,565	133,072	5,186,489
Platinum, old and scrap.....	50	2,374	189	5,439	410	12,202
<b>Total.....</b>	<b>14,620</b>	<b>1,158,079</b>	<b>29,417</b>	<b>1,174,004</b>	<b>133,482</b>	<b>5,198,691</b>

(x) Includes any other of the platinum metals.

Table 127.—Platinum Consumed in Canadian Jewellery and Silverware Industry, 1931-1934

Year	Value	Year	Value
	\$		\$
1931.....	32,140	1933.....	35,714
1932.....	26,928	1934.....	38,307

Table 128.—Platinum Metals Sold in the United States, as Reported by Refiners and Shown by Consuming Industries, 1933 and 1934

(From *Minerals Year Book*, U.S. Bureau of Mines.)

(In Troy ounces)

Industry	Platinum	Palladium	Iridium	Others	Total	Percentage of total
1933						
Chemical.....	14,085	338	82	173	14,678	14
Electrical.....	3,422	5,367	526	30	9,345	9
Dental.....	11,149	15,946	116	19	27,230	25
Jewellery.....	41,263	4,413	3,608	508	49,792	46
Miscellaneous.....	6,274	100	144	258	6,776	6
<b>Total.....</b>	<b>76,193</b>	<b>26,164</b>	<b>4,476</b>	<b>988</b>	<b>107,821</b>	<b>100</b>
1934						
Chemical.....	14,699	285	53	89	15,126	16
Electrical.....	3,587	4,468	544	59	8,658	9
Dental.....	6,776	19,555	69	11	26,411	28
Jewellery.....	32,959	6,015	2,246	380	41,600	43
Miscellaneous.....	3,113	506	164	326	4,109	4
<b>Total.....</b>	<b>61,134</b>	<b>30,829</b>	<b>3,076</b>	<b>865</b>	<b>95,904</b>	<b>100</b>



Table-129.—World Production of Platinum Metals, 1932-1934

(Supplied by Imperial Institute)

(Fine ounces)

Country and product	1932	1933	1934	Country and product	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES</b>			
<i>Sierra Leone</i> —				<i>Papua</i> (years ended June 30)—			
Crude platinum.....	531	431	474	Osmiridium (crude).....	1	29	4
				Platinum (crude).....	2	.....	89
<i>Union of South Africa</i> —				<i>U. S. S. R. (Russia)</i> —			
Crude (pt. metals content).....	7,766	.....	26,370	Crude platinum (estimated).....	100,000	100,000	100,000
Concentrates (content)....	1,480	2,386	11,372				
Osmiridium (crude).....	6,523	6,712	5,088	<i>Abyssinia</i> —(b)			
<i>Canada</i> —				Platinum (crude).....	8,217	6,650	5,612
Platinum from placers.....	59	40	53				
Recovered from Ontario nickel-copper matte—				<i>United States</i> —(b)			
Platinum.....	27,284	24,746	110,177	Platinum (crude).....	1,074	1,266	3,720
Palladium.....	29,727	31,009	83,932	New platinum metals recovered by refineries from domestic gold and copper ores—			
Other metals.....	7,886			Platinum.....	1,694	1,050	1,062
<i>New South Wales</i> —				Palladium.....	1,147	698	1,271
Crude platinum.....	336	113	180	Iridium.....			
				Osmiridium.....	3	9	2
<i>Tasmania</i> —				Others.....			
Osmiridium (crude).....	785	548	488	<i>Colombia</i> —			
				Platinum (crude).....	40,478	45,971	54,768
<i>New Zealand</i> —				<i>Japan</i> —			
Crude platinum.....		4	.....	Platinum (crude).....	266	206	118
				<i>Belgian Congo</i> —			
				Palladium.....	2,025	559	3,588
				Platinum.....			1,260

(b) Amount registered, which is probably not total production.

(c) Secondary metals were recovered as follows (Troy ounces):—

	1932	1933	1934
Platinum.....	21,635	35,073	35,494
Palladium.....	5,783	4,814	5,606
Iridium.....	3,726	692	1,328
Others.....	1,444	783	1,328

NOTE.—It is estimated by the Department of Mines, Union of South Africa, that the osmiridium produced in these years contained the amounts of the metals mentioned below (fine ounces):—

	1932	1933	1934
Osmium.....	1,603	2,602	1,858
Iridium.....	1,365	2,082	1,706
Ruthenium.....	655	1,071	713
Platinum.....	616	876	670
Rhodium.....	25	30	30

## CHAPTER FIVE

## MISCELLANEOUS METAL MINING INDUSTRIES IN CANADA

Including General Statistics Relating to the Industries in this Group and Commodity Statistics, Showing Production by Provinces, Imports, Exports, Prices and World Output Tables on Aluminium, Antimony, Beryllium, Cadmium, Chromite, Iron Ore, Pig Iron and Ferro-Alloys, Steel and Rolled Products, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Radium, Selenium, Tantalum, Tellurium, Tin, Titanium, Tungsten, Vanadium and Zirconium

## 1. General Review

Metal-bearing minerals, mined or treated usually by a very few operators, have been grouped in this chapter for consideration as a single industry. The iron and steel industry is one of the larger and better organized in Canada; ores utilized in Canadian iron furnaces are imported either from the Mesabi range in Minnesota, U.S.A., or from the Wabana deposits on Bell Island, Newfoundland. Iron ores consisting of hematite, siderite and magnetite occur in rather extensive deposits in Canada. These ores are usually of lower grade than those imported and their utilization in the Canadian steel industry would necessitate the employment of beneficiation methods. The Canadian aluminium industry is also very important; the production of this metal in the Dominion comes entirely from the province of Quebec. Bauxite, the crude aluminium ore employed in the manufacture of Canadian made aluminium, is mined in foreign countries.

This chapter also includes a summary review of the occurrence and production of antimony, beryllium, cadmium, chromium, lithium, magnesium, manganese, mercury, molybdenum, radium, selenium, tellurium, tin, tungsten and vanadium ores in Canada.

For historical purposes and to provide the interested reader with available data, tables have been prepared for this chapter that set out the known facts regarding domestic and world production of these metals or ores, some of which represent by-products in the major metal mining industries.

Table 130.—Employees, Salaries and Wages in the Miscellaneous Metal Mining Industries in Canada, 1933 and 1934

	1933			1934		
	Number of employees		Salaries and wages	Number of employees		Salaries and wages
	Male	Female	\$	Male	Female	\$
Salaried Employees—						
Total.....	5		3,312	4	1	6,345
Wage-earners—						
Surface.....	13		10,963	29		25,928
Underground.....	6			8		
Mill.....				2		
Total.....	19		10,963	39		25,928
Grand Total.....	24		14,275	43	1	32,273

Table 131.—Average Number of Wage-Earners Employed, by Months, 1933 and 1934

Month	Number 1933	Number 1934
January.....	16	15
February.....	16	26
March.....	13	34
April.....	12	17
May.....	12	25
June.....	19	41
July.....	10	42
August.....	13	44
September.....	13	62
October.....	26	60
November.....	34	45
December.....	31	37

**2. Commodity Statistics on Aluminium, Antimony, Beryllium, Bismuth, Cadmium, Calcium, Chromite, Iron Ore, Pig Iron, Ferro-Alloys, Steel and Rolled Products, Lithium, Manganese, Mercury, Molybdenum, Radium-uranium, Selenium, Tellurium, Tin, Tantalum, Titanium, Tungsten Vanadium, Zirconium**

**ALUMINIUM**

Aluminium is a product of the electric furnace; alumina, which has been recovered by chemical means from bauxite, is dissolved in molten cryolite in the electric furnace; a low voltage current decomposes the oxide into metallic aluminium and oxygen, the metal sinking to the bottom of the crucible. All cryolite ore is obtained from Greenland. Aluminium, in addition to its use in the pure state, is alloyed with other metals, including copper, nickel, cobalt, iron, antimony, tin, zinc, beryllium and magnesium. Pure aluminium powder is used in the thermit process to reduce the oxides of certain metals to the metallic state.

It is interesting to note that the Nippon-Manchukuo Aluminium Co. is to utilize Manchurian clay in the manufacture of aluminium, this will be treated by the Suzuki dry process. The capacity of the works, states "Mineral Industry," will at first be 5,000 tons, and at least part of the plant was expected to be operating at the end of 1934. The aluminium works of the South Manchuria Railway Co. will also use Manchurian clay and will employ the same process.

Aluminium ores (bauxite) are not mined in Canada. In 1934 new aluminium was produced in Canada only at the Arvida reduction plant of the Aluminum Company of Canada, Limited, and was reduced from alumina obtained from foreign ores. The company's slag ore plant at Arvida, Quebec, and its reduction works at Shawinigan Falls in the same province were both inactive throughout the year. Production of the company in 1934 comprised aluminium fabricated products made at Shawinigan Falls, Quebec, and aluminium ingot produced at Arvida. Both the Shawinigan fabricating plant and the Arvida reduction works were in continuous operation during the entire year. Owing to the fact that only one Canadian company produces primary aluminium, the statistics relating to smelting operations in this industry have been included with data supplied by smelters producing other non-ferrous metals.

"To-day the capacity of the various aluminium reduction works of the United States, Canada, Scotland, Norway, France, Switzerland, Italy, Austria, Germany, Russia and Spain could supply nearly 400,000 tons of virgin aluminium a year and yet half a century ago barely 50 tons of this metal had been produced at a cost of roughly 30s. a pound. . . . the light alloy has become an essential material for many purposes and cannot be replaced for aeronautical uses. The subject of aluminium alloys deserves separate treatment as the whole future of the aluminium industry is dependent on these light alloys. They are already to aluminium what steel is to iron and some of them hold positions to others as special steels hold to normal steel. It is tolerably well known that almost every ounce of virgin aluminium is produced from bauxite. In fact the bauxite industry was established as a result of the demands of the aluminium industry, just as was the Greenland cryolite industry, which still remains almost entirely dependent on the aluminium industry. However, new supplies of bauxite, or its equivalent—aluminous laterite—are being discovered almost every year in various parts of the world. The best known occurrences are those of the United States and France, but in Europe valuable deposits occur in Hungary, Italy and in Yugoslavia. The aluminous laterites of Dutch and British Guiana are also now well known and those of India, West Africa and East Africa await development. Although the greater part of the world's production of bauxite is used in the aluminium industry, after refining to alumina, for reduction to aluminium, increasingly large quantities of bauxite are used for the preparation of aluminium sulphate and alums; in the manufacture of high grade refractories and abrasives of the emery type; in the manufacture of aluminous cements; and for the decolourisation and deodorisation of kerosene, etc. Roughly 4 tons of bauxite are required for the recovery of one ton of aluminium. . . . actually continues the "Deutsche Bergwerks Zeit" a substitute material has been developed for tin plate, tin ware, and many other uses of tin, which technically and economically is superior. This material is made by a process in which steel or iron plate is given an aluminium coating in a molten bath of aluminium. This aluminium coating is very thin, but is highly resistant against acid attack, and, therefore, particularly suitable for making containers for preserved goods. . . . In another direction, the development of substitute material

for tin is being carried out by a manufacturer or aluminium foil. This development is a method by which both sides of paper can be given a coating of aluminium foil, rendering it perfectly impervious to air and moisture and very suitable for enclosing preserved foods. The advantage of the material is a great saving in weight compared to the use of tinned containers."<sup>1</sup>

The United States Bureau of Mines reports that in the automobile industry aluminium is finding increased use in the construction of trailers and chiefly as a result of recent disasters at sea, the use of various metals, including aluminium, is receiving serious consideration for bulk-heads and cabin construction. Cabin walls constructed of layers of aluminium sheet with cellular asbestos are claimed to be not only fireproof but to reduce materially the weight of walls.

"A huge aluminium works has started working in Dnepropetrovsk. This is the biggest enterprise of the aluminium industry. . . . it has an output capacity of 40,000 tons of aluminium per annum. The Dnepropetrovsk works was begun in 1931 and cost about 200 million rubles. It is now the largest aluminium producing works in the Union. Enormous reserves of the necessary raw material (bauxite) have been discovered on U.S.S.R. territory and as there was no known source of natural cryolite in the Union, a works was built for the production of synthetic cryolite."<sup>2</sup>

**Table 132.—Imports into Canada and Exports of Aluminium, Alumina, Bauxite, and Cryolite, 1933 and 1934**

	1933		1934	
	Cwt.	\$	Cwt.	\$
<b>IMPORTS—</b>				
Alumina.....	753	8,461	1,052	12,235
Bauxite.....	1,050,641	1,750,230	1,639,070	2,170,878
Cryolite.....	47,327	204,357	3,345	27,718
Aluminium in pigs, ingots, blocks, notch bars, slabs, billets and blooms.....	1,091	26,882	796	18,907
Aluminium scrap.....	1,394	21,794	3,520	45,174
Aluminium in bars, rods and wire.....	452	14,570	2,480	78,155
Aluminium in plates, sheets and strips, including circles.....	7,993	239,395	12,198	336,469
Aluminium pipes and tubes.....	463	21,439	805	38,694
Aluminium leaf, less than .005 mm. thick*.....				2,023
Aluminium kitchen or household hollow-ware, n.o.p.....		61,428		92,411
Aluminium, manufactures of, n.o.p.....		405,103		433,797
Aluminium leaf, n.o.p., or foil less than .005 inch thick, plain or embossed.....		40,579		53,470
Aluminium powder..... lb.	30,073	14,382	109,673	48,137
Other.....		4,768		4,360
<b>Total Aluminium and Its Products.....</b>		<b>2,813,358</b>		<b>3,362,428</b>
<b>EXPORTS—</b>				
Aluminium scrap.....	14,988	176,269	27,969	354,617
Aluminium in bars, blocks, etc.—				
To United Kingdom.....	228,607	4,035,786	264,946	4,566,765
United States.....	17,464	284,265	30,499	502,995
Argentina.....	3,031	60,251	284	6,517
Brazil.....	1,562	34,292	344	7,294
China.....	5,709	103,359	72	2,611
Australia.....	232	4,686	3,055	72,991
Japan.....	77,728	1,358,987	74,940	1,233,867
Netherlands.....			22,669	375,383
British India.....		22,719	17,808	375,356
Belgium.....	1,222	22,637	632	13,594
Mexico.....	987	21,195	474	10,711
Other countries.....	1,639	31,811	1,747	38,457
<b>Total in bars, blocks, etc.....</b>	<b>339,135</b>	<b>5,979,988</b>	<b>417,470</b>	<b>7,206,541</b>
Aluminium kitchen utensils and hollow-ware.....		8,634		11,920
Aluminium, manufacture of, n.o.p.....		137,083		434,564
<b>Total Aluminium and Its Products.....</b>		<b>6,361,974</b>		<b>8,007,642</b>

\* From April 15, 1934.

(1) The Mining Journal—London.

(2) U.S.S.R. Chamber of Commerce—Moscow.



Table 133.—Estimated World Production of Aluminium, 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934
<b>BRITISH EMPIRE</b>			
United Kingdom.....	10,000	10,800	12,700
Canada.....	17,500	15,900	15,500
<b>Total.....</b>	<b>27,500</b>	<b>26,700</b>	<b>28,200</b>
<b>FOREIGN COUNTRIES</b>			
Austria.....	2,000	2,100	2,000
France.....	14,133	14,300	14,835
Germany.....	18,700	18,650	(c) 36,696
Italy (c).....	13,201	11,880	12,643
Norway (c).....	17,506	15,141	15,104
U.S.S.R. (Russian).....	1,000	3,000	13,000
Spain.....	(c) 1,136	(c) 1,136	1,211
Switzerland.....	8,000	7,400	8,000
United States (b) (c).....	46,824	38,003	33,115
Sweden (c).....		9	292
<b>Total.....</b>	<b>123,000</b>	<b>111,000</b>	<b>136,000</b>
<b>World's Total.....</b>	<b>150,000</b>	<b>138,000</b>	<b>164,000</b>

(a) Information not available.

(c) Official figures.

(b) Secondary metal was recovered as follows:—

1932.....	21,400 long tons
1933.....	29,900 "
1934.....	41,400 "

Table 134.—World Production of Bauxite, 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE—</b>				<b>FOREIGN COUNTRIES—Con.</b>			
Northern Ireland.....	1,473	698	57	Greece.....	581		(a)
British Guiana (c)—				Hungary.....	109,796	71,281	182,069
60% or over alumina....	65,107	32,441	50,998	Italy.....	85,186	93,320	129,193
50-60% alumina.....		716	2,225	Yugoslavia.....	66,024	85,274	83,488
30 to 50% alumina (b)..	18,396	8,172	11,666	Roumania.....	602	1,138	1,435
India.....	4,467	1,075	18	Spain.....	1,300	2,500	(a)
Australia.....	1,129	670	158	U.S.S.R. (Russia).....	36,800	49,800	60,000
<b>Total.....</b>	<b>91,000</b>	<b>44,000</b>	<b>65,000</b>	United States.....	96,349	154,176	157,838
<b>FOREIGN COUNTRIES—</b>				Dutch Guiana (d).....	124,522	104,697	99,412
France.....	395,100	470,243	530,618	<b>Total*.....</b>	<b>920,000</b>	<b>1,040,000</b>	<b>1,180,000</b>
Germany.....	1,612	(e) 5,000	6,458	<b>World's Total*.....</b>	<b>1,010,000</b>	<b>1,080,000</b>	<b>1,250,000</b>

\* Excluding the production in Austria, statistics of which are not available.

(a) Information not available.

(b) Ore remains at the mines.

(c) The shipments from mines of dried and washed ore were as follows:—

	1932	1933	1934
Metallurgical.....	40,276	10,273	20,406
Chemical.....	22,129	25,095	28,181
Refractory.....	102	716	1,775

(d) Exports.

(e) Estimated.

Table 135.—Production (Exports) of Cryolite from Greenland, 1930-1934

	Long tons
1930.....	35,671
1931.....	17,427
1932.....	17,592
1933.....	10,187
1934.....	14,999

NOTE.—It was reported in 1935 that the manufacture of synthetic cryolite was well advanced in Germany.

## ANTIMONY

Minerals containing antimony occur in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba and British Columbia, also in the Yukon. No sales or shipments of antimony ores have been reported in Canada since 1917 and no by-product production of the metal since 1926 in which year it was recorded as a metal content of silver-lead-bismuth bullion obtained in the treatment of ores from the Cobalt district. The greater part of the Canadian output of refined antimony was produced at Trail, British Columbia, in the years 1907, 1909, 1915 and 1916 by the Consolidated Mining and Smelting Company of Canada, Limited; the metal was recovered as a by-product in the treatment of silver-lead ores.

World production of antimony increased considerably during 1934 together with higher prices and an increased demand for the metal. In China, the world's principal antimony producer, the state monopoly of antimony production was reinstated and prices increased.

It was recently announced that the large deposits of 40 per cent antimony ore developed at Turgai, Kazakstan, have been selected as a principal source of the metal in Russia.

Antimony is employed largely as an alloying element in bearing metals and in the manufacture of storage batteries and paints. Its power in reducing the shrinkage of crystallization in lead has favoured its utilization in type metal alloys; the metal in the liquid state also possesses practically the same volume as when solid.

The average price for antimony on the New York market in 1934 was 8.901 cents per pound as compared with a price of 6.528 cents in 1933 and 5.592 cents in 1932.

Table 135(a).—Production of Antimony in Canada, 1911-1934

Year	Antimony ore		Refined regulus		Antimony in silver-lead-bismuth bullion exported	
	Tons	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
1911-1914.....						
1915.....	1,341	81,283	59,440	11,888		
1916.....	885	94,537	107,185	41,823		
1917.....	361	22,000				
1918-1924.....						
1925.....					1,751	206
1926.....					1,596	281
1927-1934.....						

NOTE.—For years 1886 to 1910 see previous reports.

Table 136.—Imports of Antimony and Antimony Products into Canada, 1933 and 1934

	1933		1934	
	Pounds	\$	Pounds	\$
Antimony or regulus of, not ground, pulverized or otherwise treated..	626,854	32,796	625,432	45,124
Antimony oxide and titanium oxide*			983,539	131,005
Antimony salts—tartar emetic, etc.....	28,861	4,371	41,926	5,297
Antimony salts for dyeing.....	57,138	2,288	112	43

\* From April 1, 1934.

Table 137.—World Production of Antimony Ore, 1932-1934

(In terms of metal)  
(Supplied by Imperial Institute)  
(Long tons)

Producing country	1932	1933	1934	Producing country	1932	1933	1934
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
Australia.....	60	47	9	Algeria.....	261	100	650
FOREIGN COUNTRIES				Morocco (Spanish).....	100	40	(a)
United States (c).....	374	524	361	Mexico.....	1,317	1,919	2,626
Czechoslovakia.....	588	1,341	1,142	Bolivia (exports).....	1,446	1,866	1,182
France.....	627	300	261	Peru.....	14	18	73
Greece.....	325	168	(a)	China.....	12,191	12,600	(b) 16,466
Italy.....	372	358	346	Turkey.....		44	(a)
Argentina.....		12	(a)	Japan (ore).....	66	133	106
				Korea (ore).....	7	21	

(a) Information not available.

(b) Interport exports.

(c) Secondary metal was recovered as follows:—

1932.....	5,800 long tons
1933.....	6,600
1934.....	6,700

## BERYLLIUM

The principal ore of beryllium is the mineral beryl— $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$ . There are several known occurrences of this mineral in Canada and shipments of beryl have been made for experimental purposes from deposits in Renfrew county, Ontario, and the Oiseau river area in Manitoba. No beryl mining operations in Canada were reported in 1934.

"The use of beryllium increased approximately fourfold during 1933. Beryllium-copper alloys continued to provide the principal commercial outlet for the metal, and approximately 90 per cent of the domestic consumption was used for this purpose. Another growing application is the utilization of beryllium oxide as a refractory. A considerable part of the beryl supply in the United States was drawn from the Black Hills of South Dakota, but additional quantities were obtained from scattered pegmatites in other states. Arrangements were perfected for obtaining additional quantities of beryl from British India, and deposits in other foreign countries were investigated as potential sources. The raw material situation does not indicate that beryllium is likely to become a cheap metal soon, but possibilities are that its use will continue to grow at an accelerated pace, and resulting savings in cost will be shared by consumers. . . . The discovery of large deposits of beryl in the Ghedem Mountains in Eritrea was reported; reports from Germany indicate that investigations in the laboratories of Heraeus-Vacuum Smelte A.G., of Hanau have resulted in the successful reduction of beryllium directly from its oxide to copper or nickel alloys. . . . A tract on the west side of the Cordon de la Bolsain the Sierra de la Madera Montezuma municipality in the State of Sonora, Mexico, was declared by the ministry to be part of the national mineral reserves for the exploitation of beryllium. The consumption of beryl in the United States increased to approximately 35 tons monthly at the end of 1933."<sup>1</sup>

The tensile strength of annealed copper is about 33,000 pounds per square inch and it is stated that by adding 1.5 to 2.5 per cent beryllium and by heat treatment the tensile strength can be raised to 200,000 pounds per square inch.

"To a notable extent beryllium possesses the capacity for hardening most of the common metals even when present in small proportions and although its present cost is somewhat prohibitive (at a figure approximating to 30s. per pound) that is a factor of development which will change favourably as time and use bring it into greater demand following upon a widening recognition of its valuable properties. As has been the case with other metals in the "rare" list, those who have had its development in hand have hedged themselves around with protective patents or other devices, whilst the process of production has been and is specialized and difficult owing to its affinity for oxygen. Whilst this feature has made it an effective deoxidizer of other metals, it has created many difficulties in the attempt to reduce it to metallic form. Beryllium bronzes would appear to have a bright future. Much more will be heard both of beryl and beryllium."<sup>2</sup>

It is interesting to note that the value of beryl crystals produced in the Union of South Africa during 1934 totalled £10,608 as compared with a value of £4,220 in 1933.

Metal and Mineral Markets, New York, September, 1935, quotations for beryllium ore were—per ton carload lots, minimum 10 per cent  $\text{BeO}$  \$30; minimum 12 per cent, \$35, f.o.b. mines. Beryllium copper-master alloy, 3.5 per cent beryllium, remainder copper, in lots of 250 lb. or more beryllium \$25 per pound of contained beryllium.

## BISMUTH

Bismuth occurs in small quantities with ores of the Cobalt district in Ontario and in ores treated at the Trail smelter in British Columbia.

Production of new bismuth in Canada in 1934 totalled 253,644 pounds valued at \$301,215 as compared with 78,303 pounds worth \$81,526 in 1933 and 16,855 pounds at \$7,340 in 1932. The production in each of the three years consisted of the metal contained in silver-lead-bismuth bullion exported by the Deloro Smelting and Refining Company, Limited, Deloro, Ontario, and metallic bismuth produced at Trail, British Columbia, by the Consolidated Mining and Smelting Company of Canada, Limited. Output of the metal during the first six months of 1935 amounted to only 4,244 pounds valued at \$3,109 as against 79,525 pounds worth \$110,541 during the corresponding period of 1934.

<sup>1</sup> Excerpts from United States Bureau of Mines 1934 Minerals Year Book.

<sup>2</sup> Excerpts from "The Mining Journal", London.

Bismuth is utilized in the manufacture of various low melting alloys, including some solders, and in the production of astringents and various chemical products. It was reported in 1934 that possible bismuth supplies were considerably in excess of present requirements for the metal. Peru, Spain, Canada, Germany, Japan and Mexico are the principal bismuth producing countries.

Imports into Canada in 1934 of bismuth metal totalled 4,046 pounds valued at \$4,864 as compared with 180 pounds worth \$198 in 1933. Bismuth salts imported during 1934 were valued at \$22,010 as against a value of \$25,255 in 1933.

"Metal and Mineral Markets" quoted metallic bismuth, September, 1935, New York, at 90 cents per pound ton lots. London, 3s. 6d.

**Table 138.—World Production\* of Bismuth, 1932-1934**

(Supplied by Imperial Institute)

(Cwt.=112 pounds)

Producing country and description	1932	1933	1934
<b>BRITISH EMPIRE</b>			
Canada—metal and content of bullion.....	150	699	2,265
India—(ore).....	27 lb.	80 lb.	.....
Australia—(ore, etc.).....	405	53	300
<b>FOREIGN COUNTRIES</b>			
Germany (Saxony)—(Bismuth, cobalt-nickel ore).....	2,154	.....	(a)
Spain—(ore).....	650	1,516	3,543
Mexico—(metal).....	689	512	905
Mexico—ore (bi-content).....	343	923	2,033
Bolivia (exports)—(Content of ore and concentrates).....	46	37	993
Peru—			
Lead, Silver bullion etc. (Bi content).....	1,192	1,607	2,358
Metal.....	376	4,149	3,010
China—(ore (bi-content).....	400	400	400
Japan—(metal).....	938	1,124	991

\* Bismuth is also recovered as a by-product in the United States, United Kingdom, France, Sweden and U.S.S.R. (Russia).

(a) Information not available.

## CADMIUM

Cadmium was produced in Canada for the first time in 1928 at the Trail refinery of the Consolidated Mining and Smelting Company, Limited, as a by-product on the refining of zinc.

Cadmium production in Canada during 1934 was valued at \$95,665 as compared with \$78,733 in 1933 and \$26,824 in 1932. The entire Canadian output of this metal is obtained at Trail, British Columbia, in the treatment of zinc bearing ores by the Consolidated Mining and Smelting Company of Canada, Ltd. Both the cadmium and bismuth plants of this company are by-product works and are only operated as occasion demands. Cadmium precipitate is obtained in the electrolytic zinc refining operations of the Hudson Bay Mining and Smelting Company, Limited, at Flin Flon, Manitoba; the amount of this precipitate on hand at the end of 1934 totalled 5,495 tons containing 3.63 per cent cadmium, 6.76 per cent copper, and 55.0 per cent zinc.

One of the principal industrial uses at present for cadmium is as a plating metal in automobile and aeroplane manufacture; it is also utilized in the preparation of pigments. Excellent results have been claimed for cadmium base alloys; new cadmium alloys reported in the United States include a cadmium-silver-copper bearing, for which greater efficiency is claimed compared with babbitt metal and a cadmium-nickel bearing which utilizes cadmium for a base and contains about 1.3 per cent of nickel; this latter alloy is now being tested in the automobile industry. The metal is also used in low melting alloys.

The United States Bureau of Mines reports the production of metallic cadmium in the United States during 1934 at 2,777,384 pounds, an increase of 22 per cent over 1933. In addition to metallic cadmium, United States manufacturers reported production of the following cadmium compounds: cadmium sulphide, cadmium oxide, cadmium lithopone, cadmium selenide (cad-



mium red), cadmium hydrate, cadmium sulphate, and cadmium carbonate—the cadmium content of which was 566,700 pounds in 1934 compared with 401,400 pounds of cadmium in compounds in 1933, an increase of 41 per cent. Imports for consumption of cadmium metal into the United States in 1934 amounted to 125,955 pounds, of which 76,889 pounds were from Norway, 29,153 pounds from Germany, 11,094 pounds from Belgium and 8,819 pounds from Netherlands.

It was announced in February, 1935, by the U.S.S.R. Chamber of Commerce, Moscow, that the experimental electrolytic works of the Ridder combine had developed a process of producing cadmium by electrolysis.

"Metal and Mineral Markets"—New York, reported cadmium—New York—at 85 cents per pound, September 20th, 1935. London, 4s. nominal.

**Table 139.—Cadmium Production\* in Canada, 1928-1934**

Year	Pounds	\$
1928.....	491,894	341,374
1929.....	773,976	675,294
1930.....	456,582	337,871
1931.....	323,139	180,958
1932.....	65,425	26,824
1933.....	246,041	78,733
1934.....	293,611	95,665

\* Produced in British Columbia. In addition cadmium precipitate was produced and stored by the Hudson Bay Mining and Smelting Co., Ltd., at Flin Flon, Manitoba.

**Table 140.—World Production of Cadmium, 1932-1934**

(Supplied by *Imperial Institute*)  
(Lb. avdp.)

Country	1932	1933	1934
<b>BRITISH EMPIRE</b>			
Canada.....	122,822	(a) 246,041	(c) 294,000
Australia.....	354,620	357,313	380,493
South West Africa (d).....			140,000
<b>FOREIGN COUNTRIES</b>			
Belgium.....	274,451	355,000	498,245
France.....	108,000	88,000	
Italy.....	13,752	15,287	17,600
United States—			
Metal.....	799,501	2,276,933	2,777,384
Compounds (metal content).....	259,800	401,400	566,700
Mexico (b).....	189,981	2,848,079	848,149
U.S.S.R. (Russia).....	(a)	(a)	5,700

Cadmium is also produced in Germany, Norway, Poland, Sweden and Japan.

(a) Information not available.

(b) Including cadmium content of flue dust, etc., exported for treatment.

(c) Excluding cadmium sponge produced at Flin Flon, Manitoba.

(d) Cadmium content of shipments of dust from the smelters to Germany.

## CALCIUM

Metallic calcium, produced by the electrolysis of the fused chloride, is gradually acquiring new commercial applications. Among the more important of these are the debismuthizing of lead (the Betterton process); the hardening of lead for various purposes, particularly bearing metals and cable coverings; as a deoxidizer for copper and its alloys, and for cast iron and steel; as a constituent of aluminium alloys for forging and casting; as a reducing agent for oxides of beryllium, chromium, thorium and uranium; as a desulphurizing agent in petroleum refining; and as an absorbent of residual gases in vacuum tubes.<sup>1</sup> The metal has not yet been produced in Canada.

<sup>1</sup> The Mineral Industry.

## CHROMITE

The output of chromite in Canada in 1934 amounted to 111 tons valued at \$1,578 as compared with 30 tons worth \$343 in 1933. The production in 1934 came entirely from the Eastern Townships of Quebec and from the Obonga Lake area, Thunder Bay district, Ontario.

In 1932 chromite deposits, located a few miles north of Clinton, British Columbia, were under development and considerable work of an exploratory nature was recently conducted on chromite occurrences in the Obonga Lake area, situated some miles north of the city of Port Arthur, Ontario.

The Ontario Department of Mines reported development, to the end of 1934, on the Obonga Lake property of Chromium Mining and Smelting Corporation, Ltd., included one two-compartment shaft, 350 feet deep, and about 600 feet of lateral work on the 100 foot level; a second shaft, 25 feet deep; about 3,000 feet of surface trenching; and 33 diamond drill holes, with a total footage of 6,150 feet. Shipments of ore were made in 1934 and the first half of 1935 to a smelter located at Niagara Falls, New York, and in August, 1935, it was announced that the Chromium Mining and Smelting Corporation, Ltd., had commenced smelting operations at Sault Ste. Marie, Ontario, where ferro-chromium will be produced.

The three principal uses for chromite are: (1) for the production of ferro-chromium; (2) for the production of bichromates and other chemical compounds of chromium, and recently the chemicals used in electroplating with chromium; and (3) as a refractory.

Chromium is a very important constituent of the so-called stainless steel alloys and the familiar heating element "nichrome" is an alloy containing approximately 20 per cent chromium. There is also a demand for chromium bronzes and chromium aluminium, both of which are characterized by high tensile strength. Chromite is utilized in the manufacture of emerald green glass and chrome oxide is extensively employed in the ceramic industry for black, green and brown glazes. Bichromate of soda is used in the tanning of light leathers and, as an oxidizing agent, is utilized in the manufacture of dyes and other synthetic chemicals.

"Metal and Mineral Markets," New York, September quotations, 1935, were as follows:—Chromium, per pound, 97 per cent grade, spot, 88 cents; contract, 83 cents per pound contained chromium, maximum 1 or 2 per cent iron (usually sold as ferro-chrome).

Chrome Ore—per long ton, c.i.f. Atlantic ports, \$15.50 to \$16.50 for 45 to 47 per cent  $\text{Cr}_2\text{O}_3$  ore, and \$18.50 to \$19.50 for 48 to 50 per cent ore. Ferro-chrome, per pound of contained chromium, 4 to 6 per cent carbon, 66 to 70 per cent chromium, 10 cents, delivered on contracts.

Table 141.—Production of Chromite in Canada, 1924-1934

Year	Short tons	Value
		\$
1924-1928.....		
1929.....	126	900
1930.....		
1931.....		
1932.....	78	1,113
1933.....	30	343
1934.....	111	1,578

NOTE.—For years 1886 to 1923 see previous reports.

Table 142.—Imports of Chromium and Chromium Products into Canada, 1933 and 1934

	1933		1934	
	Quantity	\$	Quantity	\$
Chromium metal and tungsten metal, in lumps, etc., when imported by manufacturers for alloying purposes..... lb.	17,755	8,801	26,222	16,461
Nickel chromium in bars or rods not more than 0.75 inch diam., containing 60% nickel and 10% chromium for use as electric resistance wire, etc..... lb.	50,841	46,210	48,413	45,114
Chrome fire brick..... lb.		38,431		39,184
Bichromate of potash—crude..... lb.	113,807	9,013	139,865	11,684
Bichromate of soda..... lb.	1,858,424	87,558	2,374,311	138,313

Table 143.—World Production of Chrome Ore, 1932-1934

(Supplied by *Imperial Institute*)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES—CON.</b>			
Southern Rhodesia.....	15,445	34,493	70,961	Cuba.....	500	21,837	(d) 49,370
Union of South Africa.....	19,065	33,541	44,560	United States.....	200	966	341
Cyprus.....	(c) 1,000		968	Roumania.....		29	
Canada.....	70	27	99	Japan.....	12,295	19,681	26,792
India.....	17,865	15,526	21,578	Turkey.....	54,344	74,188	143,800
Australia.....	97	891	1,716	New Caledonia.....	68,332	49,100	54,300
				Guatemala (d).....		2,061	792
<b>Total.....</b>	<b>54,000</b>	<b>84,000</b>	<b>140,000</b>	<b>Total.....</b>	<b>240,000</b>	<b>319,000</b>	<b>(a)</b>
<b>FOREIGN COUNTRIES</b>				<b>World's Total.....</b>			
Greece.....	1,530	14,550	(a)		<b>291,000</b>	<b>493,000</b>	<b>(a)</b>
Yugoslavia.....	38,524	25,062	46,540				
Norway.....	403	321	41				
U.S.S.R. (Russia).....	64,200	110,900	(a)				

(a) Information not available.

(c) Estimated.

(d) Imports into the United States from the country indicated.

## IRON ORE

Iron ore was first discovered in Canada in the St. Maurice valley, Quebec, as early as 1667, or perhaps earlier. Count Frontenac mined ore there five years later and the samples, tested in France, were found to be of workable quality.

In 1730 M. Francheville was granted a licence by Louis XIV of France together with a subsidy of 10,000 "livres" to work the St. Maurice iron mines. The project contemplated the construction of a blast furnace which apparently was not successful for, in 1735, he surrendered his rights to the government. Some years later another licence and a subsidy were given La Compagnie des Forges which made not only the iron kettles that were needed by the pioneers for making sugar and soap but furnished the French government with cannon for military enterprises. In 1743 the plant again reverted to the crown and was operated by the government until the country passed into the hands of the British.

Nova Scotia, with its large iron and steel industry, is not at present a producer of iron ore. The large deposits of high-grade ore in Newfoundland owned and operated by the Dominion Steel and Coal Corporation, are much more readily accessible and of a higher and more constant grade than the iron ore deposits in Nova Scotia and for that reason the local deposits are not mined.

Iron ore mining and smelting were carried on to a small extent in New Brunswick but the ore was low-grade and the operations did not prosper.

Iron ore was first mined and smelted in the province of Quebec early in the eighteenth century, and from that time until 1883 the industry was carried on almost continuously at Three Rivers in the St. Maurice district. Other furnaces using local ore were operated at Radnor Forges and at Drummondville, the last to shut down being the Drummondville furnace in 1911. The ores used were bog ores, with charcoal for fuel. The output of all the furnaces was small and the industry owed its success to the superior quality of the pig iron produced.

Furnaces have also been built at various times and places in attempts to smelt some of the other classes of ore found in the province; these were all short lived, and none achieved commercial success.

In Ontario the first iron furnace was erected in Leeds county in 1800 and in 1822 iron smelting operations were commenced at Normandale, Norfolk county; these ceased in 1847.

In northwestern Ontario about 1899, a deposit of hematite, that later developed into the Helen mine, was found, this mine proved the main source of Ontario's iron output for a number of years. The high grade ore was exhausted and the mine is now closed down. Ontario has a large supply of low-grade iron ore, but beneficiation processes must be applied to make these ores suitable for commercial use.

Production of iron ore in British Columbia had been almost negligible up to the present time, however, the small production has not been caused so much by the lack of ore as by the scarcity of a market for the ore.

There are no known large bodies of high-grade iron ore in Canada that could be made tributary to present Canadian furnaces. There are, however, two very large partly developed, but unequipped deposits of low-grade ore in Ontario. The Algoma Steel Corporation's New Helen mine in the Michipicoten district has proved reserves variously estimated at 60,000,000 to 80,000,000 tons of low-grade rather sulphury iron carbonate that requires roasting to fit it for use in the blast furnace. A similar ore was formerly worked by the same company at their Magpie mine, also in the Michipicoten district, but this is not at present profitable. In the Sudbury district, Moose Mountain, Ltd., have developed some 33,000,000 tons of proved and probable ore, consisting of low-grade siliceous magnetite carrying in its natural state about 35 per cent of iron. For a number of years it was attempted to work the Moose Mountain ore by a process of magnetic separation and sintering, but in spite of the exceptionally high-grade of the finished product it was found impossible to bring costs down to the point where a profit could be made in competition with available natural ores of foreign origin.

**Table 144.—Shipments of Iron and Titanium Ores from Canadian Mines, by Provinces, 1924-1934**

(For years 1886 to 1923 see Mineral Production of Canada, 1928)

(Short tons)

Year	Quebec	Ontario	British Columbia	Canada
1924	1,408	44	28	1,480
1925	3,978			3,978
1926	200			200
1927	2,029			2,029
1928	2,244			2,244
1929	2,748			2,748
1930	412			412
1931	1,509			1,509
1932				
1933				
1934	2,023			2,023

\* 1925-1934—shipments consist of titaniferous ore.

**Table 145.—Shipments of Iron Ore from Wabana Mines, Newfoundland, 1925-1934**

(For years 1895 to 1924 see Mineral Production of Canada, 1928)

Year	To Nova Scotia	To United States	To Europe	Total shipments
	Short tons	Short tons	Short tons	Short tons
1925	384,795		883,056	1,267,851
1926	465,961		503,640	969,601
1927	480,757	68,354	946,569	1,195,680
1928	690,316	41,493	1,001,833	1,733,642
1929	763,168	85,501	850,370	1,699,039
1930*	523,918	54,623	740,774	1,319,315
1931	234,148	25,670	530,079	789,897
1932*			166,303	166,303
1933			254,383	254,383
1934*	346,178		344,769	690,947

\* European shipments in 1930, 1932 and 1934 were to Germany only.

**Table 146.—Imports into Canada, and Exports of Iron Ore, 1933-1934**

	1933		1934	
	Quantity	Value	Quantity	Value
	Short tons	\$	Short tons	\$
<b>IMPORTS—</b>				
Iron ore from United States	176,261	343,395	684,581	1,257,745
Iron ore from French Africa	21,627	42,706		
Iron ore from other countries*	7,815	14,646	292,760	569,563
<b>Total</b>	<b>205,703</b>	<b>400,747</b>	<b>977,341</b>	<b>1,827,308</b>
<b>EXPORTS—Total</b>	<b>1,771</b>	<b>1,563</b>	<b>3,311</b>	<b>12,383</b>

\* In 1934, 205,661 tons at \$473,101 were imported from Newfoundland.



Table 147.—World Production of Iron Ore

(Supplied by Imperial Institute, London)  
(Including Manganiferous Iron ore)  
(Long tons)

Producing Country	Ore			Estimated Iron Content		
	1932	1933	1934	1932	1933	1934
<b>BRITISH EMPIRE</b>						
United Kingdom (c).....	7,328,190	7,461,720	10,586,846	2,198,500	2,238,516	3,176,054
Northern Rhodesia.....	711			464		
Sierra Leone (exports).....		24,550	210,645		16,000	120,100
Union of South Africa.....	31,196	67,496	229,494	11,140	24,609	141,391
Newfoundland.....	317,858	320,891	506,616		167,000	263,000
India.....	1,760,501	1,228,625	1,916,918	1,130,000	790,000	1,230,000
Unfederated Malay States.....	688,179	766,472	1,135,649	440,000	490,000	730,000
Australia.....	546,160	736,604	1,247,465	360,000	482,000	823,000
New Zealand.....		6,572	2,806		3,600	1,300
<b>Total.....</b>	<b>10,700,000</b>	<b>10,600,000</b>	<b>15,800,000</b>			
<b>FOREIGN COUNTRIES</b>						
Austria.....	301,951	262,814	459,462	105,419	92,554	160,687
Belgium.....	91,344	104,523	114,090	41,000	47,000	(a)
Czechoslovakia.....	592,704	422,000	530,233	192,798	136,965	174,265
France.....	27,163,427	29,728,996	31,695,690	9,000,000	10,000,000	11,000,000
Germany.....	1,318,600	2,550,513	4,274,092	435,736	815,316	1,350,639
Greece.....	45,295	83,875	(a)	20,600	38,063	(a)
Hungary.....	52,029	49,231	67,775	18,054	17,942	24,496
Italy.....	417,368	517,294	494,153	209,546	259,355	247,000
Luxemburg.....	3,161,879	3,309,312	3,771,328	983,050	1,019,480	1,155,197
Norway.....	368,002	460,379	558,452	241,044	304,476	382,562
Poland.....	75,901	270,161	243,458	20,000	84,000	77,000
Portugal.....		4,400	2,849		2,100	1,300
Roumania.....	7,924	13,613	82,270	3,600	6,058	40,000
Spain.....	1,732,667	1,786,811	2,060,929	790,000	830,000	870,000
Sweden.....	3,246,886	2,658,127	5,170,093	2,000,000	1,659,000	3,200,000
Switzerland (exports).....	11,675	6,977	18,661	(a)	(a)	(a)
U.S.S.R. (Russia).....	12,000,000	14,000,000	21,000,000	(a)	(a)	(a)
Yugoslavia.....	26,214	50,925	176,971	13,737	26,685	86,200
Algeria.....	459,560	749,426	1,305,488	230,000	375,000	691,909
Belgian Congo.....		69	(a)		(a)	(a)
Egypt.....	25		200	(a)	(a)	(a)
Morocco (Spanish).....	168,479	507,692	811,785	93,000	279,000	(a)
Tunis.....	206,000	286,000	537,900	106,000	148,000	277,000
Cuba.....	185,248	275,197	(a)	85,200	126,000	(a)
Mexico.....	26,694	76,486	104,128	17,000	48,950	66,648
United States (b).....	9,872,350	17,744,819	24,809,438	4,900,000	8,800,000	12,400,000
Brazil (estimated).....	30,000	30,000	30,000	20,000	20,000	20,000
Chile.....	168,420	556,246	957,800	111,000	344,316	622,000
China.....	1,232,816	1,260,000	(a)	490,000	500,000	(a)
French Indo-China.....		405	1,512		222	692
Japan.....	223,141	315,605	424,863	(a)	(a)	(a)
Korea.....	149,022	254,188	173,228	82,000	148,000	117,000
"Manchoukuo".....	1,025,163	1,158,060	(a)	510,000	580,000	(a)
<b>Total.....</b>	<b>64,000,000</b>	<b>79,000,000</b>	<b>101,000,000</b>			
<b>World's Total.....</b>	<b>75,000,000</b>	<b>90,000,000</b>	<b>117,000,000</b>			

(a) Information not available.

(b) Including shipments of manganiferous iron ore up to 35 p.c. Ma.

(c) In addition, bog ore and iron ore (not used for smelting) were produced as follows:—

1932.....	9,533 long tons
1933.....	8,256 "
1934.....	9,709 "

## IRON AND STEEL AND THEIR PRODUCTS

## The Primary Iron and Steel Industry

Statistics for the primary iron and steel industry cover the operations of plants engaged chiefly in the manufacture of (a) pig iron, (b) ferro-alloys, (c) steel ingots and direct steel castings, (d) rolled and drawn iron and steel products such as bars, plates, sheets, strips, rails, wire rods, structural shapes, etc. Thirty-seven firms were included in this industry in 1934 and reports were received for 51 different plants or departments, including 4 blast furnace departments, 3 ferro-alloy plants, 27 steel furnace divisions and 17 rolling or drawing mills. Two steel furnace departments and 2 rolling mills were idle during 1934.

Factory sales of pig iron, steel, ferro-alloys and rolled products were 57 per cent higher in 1934 than in 1933, the values being \$29,101,463 and \$18,492,549 respectively. The 22 works in Ontario reported sales at \$18,037,559 or 62 per cent of the total for Canada; 6 works in Nova Scotia accounted for \$6,701,638 or 23 per cent, and 14 plants in Quebec had total sales worth \$3,343,686 or 12 per cent of the total. There were also 4 operating plants in Manitoba, 2 in Alberta and 4 in British Columbia.

Capital employed in 1934 was reported at \$90,079,004, of which \$68,005,714 represented the value of land, buildings and plant equipment, \$5,650,877 was the value placed on materials on hand and in process, \$8,361,807 was the inventory value of finished products on hand, and \$8,060,606 was the total of operating capital such as cash, bills receivable, etc., as at the end of the year. The total for Ontario was \$57,803,304; for Nova Scotia, \$18,973,518; for Quebec, \$10,986,806, for Manitoba, \$1,676,263; and for Alberta and British Columbia, \$639,113.

The average number of employees in the primary iron and steel plants was 7,400 in 1934 compared with 5,200 in 1933. About 552 workers were employed in blast furnace departments, 245 in ferro-alloy plants, 2,069 on steel furnaces and 4,534 in rolling mills. About 58 per cent, or 4,306, of these workers were employed in Ontario, 1,456 in Quebec, 1,297 in Nova Scotia, 283 in Manitoba and 58 in Alberta and British Columbia.

Payments in salaries and wages amounted to \$9,009,512 in 1934, an increase of 49 per cent over the total of \$6,049,189 for 1933. The average wage per wage-earner was \$1,136 in 1934 compared with \$1,050 in 1933, indicating some increase in actual working time as well as in working staff.

Expenditures for fuel and electricity totalled \$3,969,136 in 1934 compared with \$2,699,837 in the previous year. Electricity alone cost \$1,148,554 in 1934 and \$872,857 in 1933.

(a) **Pig Iron.**—Production of pig iron increased by 78 per cent in 1934 to 404,995 long tons as compared with 227,317 tons in 1933 and 144,130 tons in 1932. Output of basic iron was given at 310,631 tons or 77 per cent of the total; malleable iron amounted to 43,441 tons and the foundry grade to 50,923 tons.

Sales of pig iron by the producers totalled 97,440 tons at \$1,856,284 in 1934 as against 76,507 tons at \$1,402,903 in the previous year. Transfers (including some from stock) of pig iron to the other departments of the producing companies amounted to 350,906 tons or 127 per cent more than in 1933.

Imports of pig iron during 1934 advanced to 6,419 long tons from 2,459 tons in 1933 and exports declined to 9,221 tons from 11,903 tons. Stocks held by the producers declined to 65,637 tons at the end of 1934 from 109,507 tons at the close of 1933. The apparent consumption of pig iron during the year, as computed from production, imports, exports and changes in stocks, amounted to 446,063 tons compared with 213,641 tons during 1933.

Charges to furnaces in 1934 included 718,237 long tons of iron ore, 37,043 long tons of mill cinder, etc., 12,461 long tons of scrap, 415,462 short tons of coke, and 209,104 short tons of limestone.

The four producers of pig iron in Canada have 11 blast furnaces available for use which, if operated at capacity, could produce 1.5 million tons of pig iron per year. Actual production in 1934 at 404,995 tons was at the rate of about 27 per cent of the rated capacity.

Iron furnaces in blast in January represented 17 per cent of the capacity; this percentage dropped to 11 in February and March and then increased to 24 in April and to 37 in May. A decline in June brought the figure to 26 per cent but in July there was a gain to 34 per cent. In October the year's high of 45 per cent was reached and in the remaining months only 34 per cent of capacity was in blast. Only 5 of the 11 furnaces were used during the year.

(b) **Ferro-Alloys.**—Production of ferro-alloys during 1934 amounted to 29,940 long tons compared with 30,133 tons in 1933 and 16,161 tons in 1932.

In 1934, ferro-silicon was produced by 5 different plants. Three concerns recovered small tonnages of ferro-silicon as a by-product from the manufacture of fused alumina, another company made 50%, 75%, and 90% grades, and another concern made 15%, 50%, 75%, 85%, and 90% grades; the latter company also made large tonnages of ferromanganese and spiegeleisen. One of the pig iron producers made occasional runs of spiegeleisen in their blast furnace, and a chemical manufacturer made some ferrophosphorus.

Imports of ferro-alloys totalled 1,226 long tons at \$247,783 in 1934 as against 467 tons at \$168,394 in 1933.

(c) **Steel Ingots and Castings.**—Steel production advanced 85 per cent in 1934 to 757,782 long tons from 409,979 tons in 1933. The 1934 output included 737,118 tons of ingots and 20,664 tons of castings. Practically all of the ingots were transferred to the producers' own rolling mills, while nearly all of the castings were made for sale. The sales of ingots and castings amounted to 20,139 tons at \$3,228,451 compared with 14,934 tons at \$2,365,171 in the previous year. Transfers to the producers' own works were reported at 737,477 tons as against 394,236 tons in 1933.

Inventories of steel on December 31, 1934, were reported at 20,184 tons of ingots and 1,735 tons of castings, a total of 21,919 tons.

Twenty-seven steel plants were in operation during 1934. Four of these concerns operated basic open hearth furnaces only, 19 used electric furnaces only, 2 used both basic open hearth and electric furnaces and 2 used converters. Five concerns made basic open hearth steel ingots, 4 made electric ingots, 19 made electric steel castings, 3 made basic open hearth castings and 2 made converter castings. These plants reported steel furnace equipment as follows: 42 basic open hearth furnaces with a total daily capacity of 5,186 long tons; 4 converters with total capacity of 932 tons, and 30 electric furnaces with a total capacity of 594 tons. Two plants were idle during the year, 1 electric furnace in Ontario and 1 basic open hearth furnace in Alberta, with a combined capacity of about 87 tons of steel per day.

(d) **Rolled and Drawn Steel.**—In 1934 there were 14 hot rolling mills in operation, 1 cold rolling plant and 2 works for making cold drawn shapes. Nine of these mills were in Ontario, 3 in Quebec, 3 in Nova Scotia, 1 in Manitoba and 1 in Alberta. One plant in Quebec and 1 in Ontario were idle throughout 1934.

The value of sales from these rolling mills was reported at \$23,035,746, an increase of 66 per cent over the corresponding total of \$13,876,661 for 1933. Merchant bars were worth \$5,364,110; rails, \$3,660,274; blooms, billets and slabs, \$1,440,318; cold rolled and cold drawn shapes, \$1,152,885; bars for reinforcing concrete, \$1,138,554; structural shapes, \$1,104,324; wire rods, \$2,705,167; and railway tie plates, \$834,258. Plates, sheets, horseshoes, railway spikes, forgings and miscellaneous rolled products made up the remainder of the output.

About 831,000 long tons of iron and steel passed through the mills in 1934 and 775,000 tons of this came from the producers own works.

Imports of rolling mill products were valued at \$20,801,030 in 1934 compared with \$14,986,693 in 1933. Shipments from the United States were worth \$11,027,769 and the purchases from the United Kingdom were appraised at \$9,187,786.

**Table 148.—Principal Statistics of the Primary Iron and Steel Industry, 1929-1934**

Years	No. of plants	Capital employed	Average number of employees	Salaries and wages	(*) Cost of materials at works	(*) Selling value of products at works	Value added by manufacturing
		\$		\$	\$	\$	\$
1929.....	45	109,446,529	11,218	18,534,081	32,514,596	72,231,995	39,717,399
1930.....	49	112,079,926	9,723	14,934,325	22,765,648	52,588,935	29,823,287
1931.....	53	104,512,104	8,026	11,072,054	15,291,414	36,911,245	21,619,831
1932.....	52	96,323,629	4,847	6,131,057	6,289,483	16,197,526	9,908,043
1933.....	50	96,444,846	5,200	6,049,189	7,598,931	18,492,549	10,891,618
1934—							
Nova Scotia.....	6	18,973,518	1,297	1,609,354	3,179,177	6,701,638	3,522,461
Quebec.....	13	10,980,806	1,456	1,223,441	1,188,618	3,343,686	2,155,068
Ontario.....	22	57,803,304	4,306	5,832,583	8,087,469	18,037,559	9,950,090
Manitoba.....	4	1,676,263	283	286,361	179,048	708,900	529,852
Alberta and British Columbia.....	4	639,113	58	57,773	39,086	309,680	270,594
<b>Canada.....</b>	<b>51</b>	<b>90,973,004</b>	<b>7,409</b>	<b>9,099,512</b>	<b>12,673,398</b>	<b>29,101,463</b>	<b>16,428,065</b>

(\*) Figures of materials used are of purchased materials only, and production figures cover sales only.

**Table 149.—Production of Pig Iron and Sales by the Producers, 1933 and 1934**

Grades	Total tonnage made	Tonnage shipped to producers' own plants	Sales	
			Quantity	Selling value at works
	Long tons	Long tons	Long tons	\$
<b>1933</b>				
Basic.....	189,428	151,976	15,648	272,600
Foundry.....	22,333	234	39,361	732,357
Malleable.....	15,556	2,029	21,498	397,966
<b>Total.....</b>	<b>227,317</b>	<b>154,239</b>	<b>76,507</b>	<b>1,402,963</b>
<b>1934</b>				
Basic.....	310,631	347,109	8,898	176,271
Foundry.....	50,923	1,596	54,422	1,023,474
Malleable.....	43,441	2,201	34,120	656,539
<b>Total.....</b>	<b>404,995</b>	<b>350,905</b>	<b>97,440</b>	<b>1,856,284</b>



Table 150.—Consumption of Pig Iron in Canada, by Industries and by Provinces. 1929-1933

	1929	1930	1931	1932	1933
	Long tons	Long tons	Long tons	Long tons	Long tons
(a) BY INDUSTRIES					
Steel ingots and castings.....	761,878	520,562	328,033	106,951	156,962
Castings and forgings.....	200,323	149,012	114,670	55,429	37,300
Boilers, tanks and engines.....	1,492	1,404	657	744	3,156
Agricultural implements.....	48,821	26,589	11,704	4,427	4,974
Machinery.....	32,483	24,836	8,837	4,913	4,091
Automobiles.....					
Automobile parts.....	3,823	2,718	35	1,823	2,000
Railway rolling stock.....	32,932	23,601	14,433	6,855	7,653
Wire and wire goods.....					
Sheet metal products.....	11,480	272	6		
Hardware and tools.....	2,504	1,713	1,130	908	872
Miscellaneous iron and steel.....	1,013	737	168	272	220
Electrical apparatus and supplies.....	4,982	2,862	1,585	546	427
<b>Total.....</b>	<b>1,101,731</b>	<b>754,306</b>	<b>481,288</b>	<b>182,868</b>	<b>217,655</b>
(b) BY PROVINCES					
Prince Edward Island.....	56	60	50	42	30
Nova Scotia.....	297,508	213,011	122,152	28,569	85,854
New Brunswick.....	2,258	1,677	1,287	689	971
Quebec.....	72,293	56,291	39,661	19,336	11,356
Ontario.....	712,242	478,284	315,221	132,181	117,934
Manitoba.....	11,549	2,761	1,415	1,274	822
Saskatchewan.....	2,000				
Alberta.....	1,094	187	120	108	73
British Columbia.....	2,731	2,035	1,382	669	615
<b>Canada.....</b>	<b>1,101,731</b>	<b>754,306</b>	<b>481,288</b>	<b>182,868</b>	<b>217,655</b>

Table 151.—Materials Charged to Iron Blast Furnaces, 1933 and 1934

Materials	1933		1934	
	Quantity	Cost at furnace	Quantity	Cost at furnace
Foreign iron ore..... long tons	400,290	\$ 1,378,198	718,237	\$ 2,513,465
Mill cinder, scale, etc..... long tons	17,992	57,343	37,043	78,139
Scrap (net charge)..... long tons	10,879	92,421	12,461	108,966
Limestone—				
From Canadian quarries..... short tons	21,888	28,477	69,318	84,675
From foreign sources..... short tons	110,347	140,501	139,786	155,587
Coke made in Canada—				
From Canadian coal..... short tons	135,323	803,659	155,085	879,223
From imported coal..... short tons	80,500	388,211	215,462	1,005,930
Imported coke..... short tons	32,151	164,378	44,915	285,941
Other materials..... short tons		63,052		48,233
<b>Total.....</b>		<b>3,116,240</b>		<b>5,160,159</b>

Table 152.—Blast Furnaces in Canada, 1934

Names of companies	Location of plants	Number of stacks	Total daily capacity (24 hours)	Number of days in blast	
				1933	1934
Dominion Steel and Coal Corporation Ltd.	Sydney, N.S.....	1	300		
		1	300		
		1	300		
		1	550	202	262
<b>Total.....</b>		<b>4</b>	<b>1,450</b>		
Canadian Furnace Co. Ltd.....	Port Colborne, Ont.....	1	350	181	205
The Steel Co. of Canada, Ltd.....	Hamilton, Ont.....	1	275	183	44
		1	550		278
<b>Total.....</b>		<b>2</b>	<b>825</b>		
Algoma Steel Corporation Ltd.....	Sault Ste. Marie, Ont...	1	300		
		1	300		
		1	450	84	203
		1	550		
<b>Total.....</b>		<b>4</b>	<b>1,600</b>		
<b>Total for Canada.....</b>		<b>11</b>	<b>4,225</b>		



Table 153.—Production of Ferro-Alloys, 1927-1934

Years	Long tons	Years	Long tons
1927.....	56,230	1931.....	46,764
1928.....	44,842	1932.....	16,161
1929.....	89,116	1933.....	30,133
1930.....	65,223	1934.....	29,940

Table 154.—Production of Steel Ingots and Direct Steel Castings, by Grades, 1927-1934

Years	Steel ingots		Direct steel castings			Total steel ingots and castings
	Open hearth	Electric	Open hearth	Converter	Electric	
1927.....	868,440	134	17,569	2,191	19,611	907,945
1928.....	1,189,399	602	20,109	2,019	22,590	1,234,719
1929.....	1,295,162	14,444	35,806	2,590	30,022	1,378,024
1930.....	925,427	30,051	24,772	2,314	27,014	1,009,578
1931.....	612,437	25,017	14,760	590	19,305	672,109
1932.....	308,700	19,670	2,616	846	7,514	339,346
1933.....	378,666	15,393	5,017	288	10,615	409,979
1934.....	713,227	23,891	6,457	507	13,700	757,782

Table 155.—Materials Used in Steel Furnaces, 1933 and 1934

Materials	1933		1934	
	Quantity	Cost of purchased materials	Quantity	Cost of purchased materials
	Long tons	\$	Long tons	\$
(a) Metals:—				
Pig iron—Own make.....	154,827		349,137	
Purchased.....	2,135	46,450	3,209	65,216
Spiegeleisen and ferromanganese.....	4,157	208,046	6,771	345,683
Ferrosilicon.....	2,748	115,319	2,954	137,743
Other ferro-alloys.....	434	90,969	1,087	252,633
Scrap iron and steel—Own make.....	94,930		193,370	
Purchased.....	213,396	1,418,420	287,309	3,029,549
Metals for making alloy steel (nickel, etc.).....		95,604		71,141
Total metals.....		1,974,808		3,901,965
(b) Ores:—				
Crude iron ore—				
Foreign.....	17,740	121,010	33,739	197,087
Calcined, roasted, or treated ore—				
Foreign.....	80	928	220	3,644
Manganiferous ore—				
Foreign.....	198	3,203	751	12,235
Chrome, etc.—				
Foreign.....	133	2,564	134	3,892
Total ores.....	18,151	127,705	34,844	216,858
(c) General materials:—				
Limestone—				
Canadian.....	14,418	88,291	31,103	96,454
Foreign.....	20,114	27,567	46,712	51,026
Fluorspar.....	2,949	31,657	4,555	55,643
Dolomite.....	6,874	30,557	14,748	69,104
Magnesite.....	399	14,798	2,733	105,072
Coke made from Canadian coal.....	368	3,928	472	4,683
Coke made in Canada from imported coal.....	2,894	19,059	404	1,150
Imported coke.....	291	4,143	1,321	17,541
Anthracite coal.....	759	7,063	547	4,801
Bituminous coal.....	30	240	100	802
Charcoal.....	70	1,810	80	2,156
Electrodes.....		75,698		94,125
Moulding sands.....	8,960	56,607	14,199	73,424
Firebrick.....		34,694		49,386
Fireclay.....	2,904	25,365	3,005	26,393
Other materials.....		208,675		319,296
Total general materials.....		630,752		971,056
Total Value of Metals, Ores and General Materials used.....		2,733,265		5,089,879

Table 156.—Summary of Steel Furnace Capacity in Canada, 1934

Type of furnace	Number of furnaces (*)	Total daily capacity (24 hours)
Basic open hearth.....	42	(Long tons) 5,180
Electric.....	30	594
Converter.....	4	932
<b>Total.....</b>	<b>76</b>	<b>6,712</b>

(\*) Including 2 furnaces (1 electric and 1 B.O.H.) which were idle in 1934.

Table 157.—Products Made in the Iron and Steel Rolling and Drawing Mills, and Sales by the Producers, 1933 and 1934

Products	Total tonnage made	Tonnage shipped to producers' own plants	Sales	
			Quantity	Value
	Long tons	Long tons	Long tons	\$
<b>1933</b>				
Blooms, billets and slabs (except for forging).....	187,372	177,998	8,691	259,334
Rails.....	67,835	120	69,052	2,899,750
Structural shapes.....	16,153	66	15,974	740,200
Merchant bars, including spring steel, alloy steel, tool steel, rounds, squares, flats (6 in. and under) except flats for cold rolling and bars for reinforcing concrete.....	56,474	6,949	56,667	3,241,735
Bars for reinforcing concrete.....	16,400	686	16,019	767,373
Wire rods, including chain rods.....	88,692	61,422	29,111	1,104,532
Nail, washer, spike and hinge plate.....	313	165		
Long angle splice bars, long fish plate bars, long tie plate bars and all other long rail joint shape bars.....	4,095	4,095		
Rolled blooms, billets and axle blanks for forging purposes only, excluding all intended for further rolling.....	1,497	354	1,159	69,457
Spike rods, bolt and nut rods, horseshoe bars, and all other miscellaneous rolled (not forged) forms, not elsewhere specified.....	7,038	5,173	1,834	111,325
Cold rolled and cold drawn steel shapes.....	8,049		8,028	729,324
Rail fastenings, finished—				
Tie plates.....	4,071	1	4,074	229,942
Angle splice bars and fish plates.....	808	1	1,075	76,667
Forgings of iron or steel.....	3,279		3,151	221,661
Railway spikes, pressed spikes.....	2,918	104	2,857	200,992
Washers.....	179	62	199	27,592
Scrap iron and steel.....	1,205	334	925	4,515
Other products, including plain sheets, plates, galvanized sheets, horseshoes, etc., which were made by only 1 or 2 concerns in this industry and for which figures cannot be shown separately.....				3,192,262
<b>Total.....</b>				<b>13,876,661</b>
<b>1934</b>				
Blooms, billets and slabs (except for forging).....	450,075	378,348	54,771	1,440,318
Rails.....	96,689	216	88,023	3,660,274
Structural shapes.....	23,070	560	23,258	1,104,324
Merchant bars, including spring steel, alloy steel, tool steel, rounds, squares, flats (6 in. and under) except flats for cold rolling and bars for reinforcing concrete.....	108,980	14,358	92,289	5,364,110
Bars for reinforcing concrete.....	24,279	1,776	24,083	1,138,554
Wire rods, including chain rods.....	175,585	99,089	76,992	2,705,167
Nail, washer, spike and hinge plate.....	630	602	1	91
Long angle splice bars, long fish plate bars, long tie plate bars and all other long rail joint shape bars.....	21,440	21,394		
Rolled blooms, billets, and axle blanks for forging purposes only, excluding all intended for further rolling.....	3,133	1,084	2,027	110,118
Spike rods, bolt and nut rods, horseshoe bars, and all other miscellaneous rolled (not forged) forms, not elsewhere specified.....	10,669	8,168	2,439	139,677
Cold rolled and cold drawn steel shapes.....	12,733		12,678	1,152,885
Rail fastenings, finished—				
Tie plates.....	16,003	3	16,482	834,258
Angle splice bars and fish plates.....	3,190	4	3,499	224,457
Forgings of iron or steel.....	4,178		3,848	300,383
Railway spikes, ship and drift spikes and pit spikes.....	5,283	221	5,197	365,915
Washers.....	450	105	392	53,835
Scrap iron and steel.....	1,571	561	1,218	9,708
Other products including plain sheets, plates, galvanized sheets, horseshoes, etc., which were made by only 1 or 2 concerns in this industry and for which figures cannot be shown separately.....				4,431,672
<b>Total.....</b>				<b>23,035,746</b>

Table 158.—World Production of Pig Iron and Ferro-Alloys, 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES—Con.</b>			
United Kingdom.....	3,574,000	4,136,000	5,969,100	Hungary.....	65,234	91,602	138,005
Union of S. Africa.....	14,272	26,000	(a)	Manchoukuo.....	362,366	426,676	458,311
Canada.....	160,291	257,450	434,935	Italy.....	487,192	557,966	571,571
India.....	913,314	1,057,837	1,320,210	Yugoslavia.....	9,815	29,238	32,097
Australia (b).....	190,132	336,246	487,259	Luxembourg.....	1,929,232	1,857,727	1,968,603
New Zealand.....		3,286	1,337	Netherlands.....	232,692	248,655	253,769
Total.....	4,900,000	5,800,000	8,300,000	Norway.....	101,464	110,873	124,927
<b>FOREIGN COUNTRIES</b>				Poland.....	195,536	300,959	375,940
Austria.....	92,974	86,560	131,384	Roumania.....	8,614	1,981	60,435
Belgium.....	2,705,327	2,667,623	2,905,889	U. S. S. R. (Russia).....	6,075,000	7,015,000	10,236,000
China.....	145,941	164,704	(a)	Spain.....	295,870	333,501	366,485
Czechoslovakia.....	442,997	491,099	590,843	Sweden.....	277,707	340,069	548,422
Finland.....	13,455	11,814	(a)	Mexico.....	20,059	26,100	(a)
France—				United States.....	8,781,453	13,345,602	16,138,573
Saar.....	1,328,180	1,566,586	1,796,831	Brazil.....	32,825	50,000	56,000
Other districts.....	5,450,004	6,224,340	6,053,761	Japan.....	1,020,304	1,433,866	1,744,383
Germany.....	3,870,258	5,163,645	8,579,070	Korea.....	161,068	161,348	207,478
				Philippine Islands.....	165	98	(a)
				Total.....	34,100,000	42,700,000	53,400,000
				<b>World's Total.....</b>	<b>39,000,000</b>	<b>48,500,000</b>	<b>61,700,000</b>

(a) Information not available.

(b) Years ended June 30.

Table 159.—World Production of Steel Ingots and Castings, 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES—Con.</b>			
United Kingdom.....	5,281,400	7,024,000	8,849,700	Italy.....	1,374,129	1,743,163	1,803,406
Union of South Africa (b)...	42,542	9,000	(a)	Latvia.....	336	1,336	2,076
Canada.....	339,346	409,979	757,782	Korea.....	(a)	(a)	58,755
India.....	569,810	694,073	797,569	Luxembourg.....	1,924,688	1,815,694	1,901,868
Australia (c).....	221,488	392,666	(a)	Poland.....	542,056	820,006	831,177
Total.....	6,400,000	8,500,000	11,000,000	U. S. S. R. (Russia).....	5,828,400	6,727,000	9,500,000
<b>FOREIGN COUNTRIES</b>				Spain.....	523,995	498,651	636,641
Austria.....	201,284	222,230	304,324	Sweden.....	519,935	619,913	848,176
Belgium.....	2,745,719	2,688,251	2,897,248	Mexico.....	57,215	75,000	(a)
Czechoslovakia.....	660,846	722,898	925,594	United States.....	13,681,162	23,232,347	(d)
France—							26,055,289
Saar.....	1,440,316	1,049,798	1,919,614	Japan.....	2,360,404	3,145,660	3,682,861
Other districts.....	5,550,957	6,427,754	6,076,662	China (estimated).....	30,000	30,000	30,000
Germany.....	5,535,254	7,335,832	11,510,831	Brazil.....	47,492	52,000	61,000
Hungary.....	177,000	224,067	310,000	Roumania.....	101,000	142,479	172,567
				Total.....	43,300,000	58,300,000	69,600,000
				<b>World's Total.....</b>	<b>49,700,000</b>	<b>64,800,000</b>	<b>80,000,000</b>

(a) Information not available.

(b) Including rails, fishplates, etc.

(c) Years ended June 30.

(d) Excluding steel castings which were produced by companies not manufacturing steel ingots.

## LITHIUM

Lithium-bearing minerals occurring in the Pointe du Bois region of southeastern Manitoba have been investigated as to their economic value. A few years ago trial shipments of lepidolite and spodumene were made from the Silver Leaf mine located on the south side of Winnipeg river and considerable development work was conducted on the Buck property, Bernic lake. Some activity was reported at Bernic lake during July and August of 1934 by the Lithium Corporation of Canada, Ltd., however, no later developments were reported by this company up to the end of June, 1935. It was stated that the company plans the erection of a plant in Manitoba for the production of lithium salts and metal from ores of the Bernic lake deposits.



One of the chief consumers of lepidolite is the glass industry which employs the mineral in the production of heat-resistant products. Referring to lithium, "The Mining Journal," London, comments as follows:—"The therapeutic uses of certain lithium salts are very old, but the production to-day of other salts of this metal is already large, with promise of further expansion. Research work of an international character has resulted in a steady output of the metal (lightest of all metals) itself which is finding extensive employment, yet in quite minute proportions (a mere fraction of a per cent of the whole) in a bearing alloy, whilst a similar alloy has possibilities for employment as sheathing for cables. In short, the use of lithium is being steadily expanded in many directions, particularly in alloy form (calcium-lithium for instance) and the ground gained is not likely to be lost again. There would appear to be a wonderful future for this metal."

"Metallic lithium is now produced very efficiently by the electrolysis of fused lithium chloride, the product being 99.5 per cent pure. Lithium alloys are also capable of being deposited, lithium-calcium alloys being commercial materials. These lithium-calcium alloys find industrial application in giving graphite refinement and increased strength for cast iron, whilst lithium itself improves the machinability of stainless steel, and is usefully employed as a de-oxidizer for producing oxygen-free copper and as a hardener for lead alloys and aluminium-zinc alloys. . . . lithium hydride (LiH) is a product for which there is commercial possibilities. It reacts with water, evolving hydrogen, and as the gross weight of the hydride is much less than that of a steel cylinder housing an equal volume of gas, this particular product should become of importance as a portable source of hydrogen." (The Chemical Age, London).

By far the most important development of the year (1935) in connection with lithium, however, is the employment of lithium chloride solutions for air-conditioning. The highly concentrated lithium-solutions, after extracting moisture from the air, are evaporated and used over and over again.<sup>1</sup>

No imports into Canada of lithium, lithium alloys or compounds, described as such, were recorded in 1934.

The annual world production of lithium metal is reported to amount to several thousand kilograms, valued at 165-175 marks per kilogram and "Mineral Industries" states that a monograph by H. Osborg (electrochemical society, New York, 1935) gives a detailed discussion of the metal, its properties, occurrence in nature, recovery and uses.

"Metal and Mineral Markets—New York" quotations, September, 1935, for metallic lithium per pound, 98 to 99 per cent, 100 pound lots, \$15. Lepidolite—per ton, \$20 to \$25 for ordinary grades. Amblygonite—per ton, f.o.b. mines, 8 to 9 per cent  $\text{Li}_2\text{O}$ , \$34 to \$35.

## MAGNESIUM

Metallic magnesium is not produced in Canada. "Magnesium has only a short history as an industrial metal. Its present production is estimated at 30,000 to 35,000 tons yearly, but is expected to increase. Possible raw material for its production is exceedingly abundant; it includes magnesium chloride (natural brines) and the natural carbonates, magnesite and dolomite. Magnesium is obtained by several processes, but in all these on the principle of reducing the chloride or oxide electrolytically from a bath containing these materials in a suitable molten flux, which is generally a fusible halogen salt. Unalloyed magnesium metal, as such, has little industrial importance, but in the form of its alloys in which it is the basic metal, it is an exceedingly useful material combining reasonable strength and good working properties with small weight. The best known alloys are the series under the general name "Elektron" which have numerous uses, including the manufacture of pistons for internal combustion motors and motor bodies. If its price can be lowered this will be a serious competitor with aluminium in different employment spheres; although somewhat inferior in strength, its considerable smaller weight favours its use in aircraft construction. Besides alloys in which magnesium is the basic metal, there are others in which it is used in small percentage to great advantage. These alloys include some of aluminium in which the magnesium plays an important part, although present in small quantities. The best known examples of these are duralumin and magnalium." (The Mining Journal, London).

(1) Paul M. Tyler, A.I.M.E.



The United States Bureau of Mines reports that in 1934 the quantity of magnesium ingot sold or used in the United States was 4,249,838 pounds, an increase of 196 per cent over 1933 and the entire domestic output of primary magnesium was obtained from magnesium chloride recovered as a joint product of the salt wells of the Dow Chemical Company near Midland, Michigan. The metal magnesium is not yet produced in Canada.

The same prices were quoted by trade journals on ingot (4 x 16 inches) throughout 1934 as in 1933 and 1932—30 cents a pound in carloads, and 32 cents a pound in 100 pound lots or more, L.C.L.

### MANGANESE

No Canadian manganese ores have been commercially shipped or sold in Canada since 1931. The Department of Mines, Ottawa, reports that the manganese ores mined in Eastern Canada are pyrolusite, manganite, psilomelane and bog manganese. These, with the exception of the bog manganese, were mostly ores with a high manganese content and fairly free from deleterious constituents. They were obtained mainly from New Ross in Lunenburg county, Loch Lomond, Cape Breton, and Aylesford, Kings County, all in Nova Scotia; in New Brunswick, at Dawson Settlement and Turtle Creek, Albert county, and from Markhamville, King's county. Manganiferous ores have also been mined in British Columbia.

In 1934 some development work was reported on a bog manganese deposit located at North Renous, New Brunswick, and a trial shipment of the material may be made in 1935. Considerable work was also done on manganese bearing veins occurring near the village of Elgin, Albert county.

Manganese is utilized largely in the manufacture of various steels and the consumption fluctuates with the world's steel output; minor quantities are used in the non-ferrous alloys, chemical and electrical products industries.

Imports of manganese oxide into Canada during 1934 totalled 619,069 cwt. valued at \$234,236 as compared with 686,842 cwt. worth \$293,910 in 1933; the greater part of the imports in both years came from the Gold Coast while lesser quantities were obtained from the United States, British South Africa, and the United Kingdom. Imports of ferro-manganese and silico-manganese, containing more than 30 per cent by weight of manganese totalled 6,903 cwt. valued at \$61,017 in 1934 as compared with 4,835 cwt. worth \$31,611 in 1933. (To April 18th, 1934).

"Metal and Mineral Markets" quotations, September, 1935, were: manganese ore, per long ton unit of Mn., c.i.f. North Atlantic ports, cargo lots, exclusive of duty; Brazilian, 46 to 48 per cent Mn. 24 cents; Chilean, 47 per cent minimum, 25 cents; Indian, 48 to 50 per cent, 25 cents; Caucasian, 52 to 55 per cent, 26 cents; South African, 49 to 51 per cent, 26 cents.

Table 160.—Production of Manganese Ore in Canada, 1923-1934

Year	Tons	Value
		\$
1923.....	200	1,400
1924.....	584	4,088
1925-29.....		
1930.....	273	1,356
1931.....	117	2,893
1932-34.....		

NOTE.—For years 1886 to 1922 see previous reports.

Table 161.—World Production of Manganese Ore, 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES—Con.</b>			
Gold Coast.....	(b) 50,689	(b) 265,140	305,178	U.S.S.R. (Russia).....	813,000	982,000	1,792,000
Northern Rhodesia.....		5,367	2,041	Spain.....	2,550	2,789	3,736
Union of South Africa.....		20,894	50,229	Sweden.....	4,653	6,124	6,212
India.....	212,604	218,307	406,306	Egypt.....	322	184	944
Unfederated Malay States..	9,278	13,194	18,649	Morocco (French zone).....	4,000	4,752	7,161
Australia.....	106	149	105	Portuguese India.....	3,517	1,600	(a)
				Cuba.....	2,113	89,224	(a)
<b>Total.....</b>	<b>270,000</b>	<b>520,000</b>	<b>840,000</b>	Puerto Rico (exports).....	2,302	1,638	1,711
<b>FOREIGN COUNTRIES</b>				Mexico.....	301	564	654
Austria (b).....	(a)	(a)	(a)	United States (c).....	17,777	19,146	26,514
Czechoslovakia.....	32,951	16,799	58,433	Argentina.....	248	404	(a)
Germany.....	12	554	507	Brazil.....	36,152	24,500	2,300
Greece.....	733	1,578	(a)	Chile.....	441	450	(a)
Hungary.....	1,473	6,134	10	China.....	21,200	9,300	(a)
Italy.....	387	4,453	6,831	Japan.....	25,828	42,847	56,262
Yugoslavia.....	157	521	1,086	Netherlands, East Indies..	8,156	10,238	11,451
Roumania.....	4,971	2,730	11,198	Turkey.....	2,800	7,600	2,645
Manchoukuo.....	59	740	(a)	<b>Total.....</b>	<b>980,000</b>	<b>1,240,000</b>	<b>2,080,000</b>
Portugal.....		25	290	<b>World's Total.....</b>	<b>1,250,000</b>	<b>1,760,000</b>	<b>2,920,000</b>

(a) Information not available.

(b) Exports.

(c) Shipments, excluding ore containing 10 to under 35 per cent mn, which is included with iron ore as follows:—

1932.....	15,635 long tons.
1933.....	12,779 "
1934.....	23,231 "

## MERCURY

There has been no Canadian production of new mercury reported since 1897. Previous to this a small output of quicksilver was recorded as having been produced in British Columbia from a property situated on the north shore of Kamloops lake. The principal mercury producing countries are Italy, Spain, United States, Mexico, and Czechoslovakia.

The 1934 Minerals Year Book of the United States Bureau of Mines refers to the following new uses for mercury: A new type of mercury lamp using a small quantity of rubidium, and closely approximating sunlight has been developed; Dupont Lignason is an organic mercurial used to prevent fungus growth on freshly cut lumber in storage.

In the United States, during 1928, drugs and chemicals accounted for about 39 per cent of the mercury consumed and fulminate used in detonators and ammunition for 19 per cent. Next in importance was the use of mercury for scientific instruments and electrical apparatus followed in turn by vermilion, felt, and caustic soda and glacial acetic acid. This order of importance has probably remained substantially the same since that year, if the large amount of mercury used in 1932 for mercury-boiler plants is not considered, although the proportionate use for electrical apparatus may have increased somewhat. In Canada a considerable amount of mercury is utilized in the amalgamating of gold in ores.

It was reported in the Japanese Press early in 1935 that an extensive deposit of mercury ore had been discovered in Hokkaido, on the Teshio river. The deposits are estimated to contain about three million tons of mercury metal.

Imports of mercury into Canada in 1934 totalled 246,892 pounds valued at \$183,366 as compared with 49,066 pounds worth \$35,057 in 1933. Of the 1934 imports 146,879 pounds came from Italy and 83,809 pounds from the United States. Imports of mercury salts in 1934 were appraised at \$3,010 as against \$1,676 in 1933.

Quicksilver was quoted, September, 1935, New York, \$69.50 to \$71.50 per flask of 76 pounds; London, £11 6s. to £11 7s. 6d. for spot.

Table 162.—Imports into Canada of Mercury, 1926-1934

Year	Pounds	Value
		\$
1926.....	100,492	84,910
1927.....	124,069	160,330
1928.....	199,603	269,746
1929.....	346,701	478,048
1930.....	105,755	153,837
1931.....	21,159	25,454
1932.....	43,230	37,068
1933.....	49,068	35,057
1934.....	246,892	183,366

Table 163.—World Production of Mercury, 1932-1934

(Supplied by Imperial Institute)

(Pounds)

Country	1932	1933	1934
<b>BRITISH EMPIRE</b>			
Australia (concentrates).....	1,989	47	167
New Zealand.....	1,500	7,500	3,852
<b>FOREIGN COUNTRIES</b>			
Austria.....	2,200	440	.....
Czechoslovakia.....	99,329	14,872	58,052
Italy.....	2,240,518	1,338,058	972,238
Spain.....	1,797,978	1,491,601	2,416,729
Algeria.....	90,041	.....	.....
Mexico.....	557,176	340,372	348,161
United States.....	959,272	734,844	1,173,820
Turkey.....	.....	1,748	3,192
Japan.....	5,256	17,807	14,930
China.....	44,000	33,000	(a)
Korea.....	2,050	(a)	(a)
Roumania.....	168	600	(a)
Bolivia (exports).....	38,383	.....	50,384
<b>World's Total (b).....</b>	<b>5,800,000</b>	<b>4,000,000</b>	<b>(a)</b>

(a) Information not available.

(b) Excluding U.S.S.R. (Russia).

## MOLYBDENITE

No commercial mine shipments of molybdenite ore or concentrates have been made in Canada since 1931 in which year 1,222 pounds of molybdenite concentrates were shipped from a property in Ontario. The mineral occurs in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba and British Columbia, and deposits in Ontario and Quebec have yielded a considerable output during past years. The mine of the Phoenix Molybdenite Corporation, Ltd., located in Bagot township, Renfrew county, Ontario, was operated from April to October, 1934; the mill of the company went into operation on August 15 and treated about 200 tons of surface ore, with a recovery of 3,300 pounds of concentrates.

It was reported in 1934 that an adit had been commenced on the Stella molybdenite property located some 5 miles southwest of Endako in the Omineca division, British Columbia. Molybdenite occurs here in fine scales, remarkably free from other sulphides, in quartz veins up to 2 feet wide in granodiorite and also as disseminations in the rock adjacent to the veins. No report of ore shipments from this property was received in 1934.

In 1933, 700 pounds of hand picked molybdenum ore were shipped from a molybdenite prospect at Pigeon Lake, Gloucester county, New Brunswick. This was for experimental purposes.

In Preissac township, Abitibi county, Quebec, the Height of Land Company during 1934 dewatered two old shafts and the underground workings of its molybdenite property; the company also conducted some prospecting and completed a small amount of diamond drilling. No shipments of ore were made.

The United States is by far the world's greatest producer of molybdenite ores and in 1934, as in other recent years, the Climax Molybdenum Company at Climax, Lake County, Colorado, and the Molybdenum Corporation of America near Ouesta, Taos county, New Mexico, were the principal producers and shippers.

The world production of molybdenum in 1934 was estimated by the Mining Journal, London, at 10,175,000 pounds, of which 700,000 pounds came from Green Cananea (Mexico), 300,000 pounds from Norway (Knaben mine), 150,000 pounds from Morocco and the balance from the United States. The Journal states that "there has been a very large development in Germany in the use of molybdenum salts for catalysers for hydrogenation work. There are other uses in connection with the oil industry now being developed which may also largely increase the demand for molybdenum. Experience in the United States indicates that molybdenum is substantially replacing tungsten in modern alloy steel. One of the advantages of molybdenite alloys is that molybdenum steel can be made much thinner for equal strength with consequent marked saving in weight; this is particularly important in the case of aeroplanes and the new streamline trains. Large quantities of bearing metal are now being made containing percentages of molybdenum. Molybdenum has a wide range of use in connection with various types of stainless steel, and in the development of cast iron alloys." In the incandescent lamp and radio tube industries the metal is used in the form of wire and sheet; it is also employed in the manufacture of high temperature electric furnaces.

Imports of calcium molybdate into Canada, when imported by manufacturers of steel for use exclusively in the manufacture of steel, in their own factories, totalled 35,187 pounds valued at \$15,586 in 1934 as compared with 7,082 pounds worth \$3,414 in 1933.

"Metal and Mineral Markets," New York, September, 1935, quotations were: Molybdenum, per pound, in 10 to 49 pound lots, C.P. powder, \$9.50; 97 per cent, \$4.10. Molybdenum ore, per pound of contained  $\text{MoS}_2$ , nominally 42 cents for 75 to 85 per cent concentrate. London, per long ton unit, nominal at 33s. for 80 to 85 per cent concentrate.

**Table 164.—Production of Molybdenite in Canada, 1924-1934**

Year	Ores mined	Ores treated	Ores and concentrates shipped		$\text{MoS}_2$ content of shipments	$\text{MoS}_2$ production (probable recovery)	
	Tons	Tons	Tons	Value (a) \$	Pounds	Pounds	Value (b) \$
1924.....	700	663	10.0	9,370	18,739	18,739	9,307
1925.....	3,000	2,779	15.3	11,176	22,350	22,350	11,176
1926.....	4,186	4,490	12.6	10,472	20,943	20,943	10,472
1927.....							
1928.....							
1929.....	9,100	2,900	9.5	8,400	16,150	16,150	6,400
1930.....							
1931.....	12	12	0.61	280	1,222	1,222	280
1932-1934*							

(a) Value as given by the operators. (b) Estimated at the average market value of molybdenite.

Note.—For years 1902 to 1923 see previous reports.

\*It was reported that 200 tons of surface ore was milled during 1934 at a molybdenite property in Renfrew County, Ontario; no shipments were reported.

**Table 165.—World Production of Molybdenum Ore, 1932-1934**

(Supplied by Imperial Institute)

(In cwt.—112 pounds of concentrates)

Country	1932	1933	1934
<b>BRITISH EMPIRE</b>			
Australia.....	102	130	89
<b>FOREIGN COUNTRIES</b>			
Norway ( $\text{MoS}_2$ content).....	5,181	8,149	4,793
French Morocco ( $\text{MoS}_2$ content).....		3,700	2,700
United States ( $\text{MoS}_2$ content).....	30,176	84,554	139,315
Korea.....	879	2,070	2,037
Peru ( $\text{MoS}_2$ content).....	150	198	176
Mexico.....	103	1,303	15,315
Japan.....			99



## RADIUM-URANIUM (Pitchblende-Silver)

The commercial production of primary radium and uranium products in Canada comes entirely from the refinery of Eldorado Gold Mines, Ltd.; this plant, located at Port Hope, Ontario, was in continuous operation throughout 1934. Ores and concentrates treated at Port Hope are shipped from the company's pitchblende-silver mine situated at Echo Bay, Great Bear Lake, Northwest Territories. In summer months, roughly from July to October, transportation is by water route from the railhead at Waterways, Northern Alberta, via Athabaska river, Lake Athabaska, Great Slave River, Great Slave Lake, Mackenzie River, and Great Bear River to Great Bear Lake, a total distance of 1,400 miles. In both summer and winter regular airplane service is maintained between Edmonton and Waterways, Alberta, and Great Bear Lake.

During 1934 the Port Hope plant received from the mine 77 tons of pitchblende and silver ore and seven tons of silver concentrates. Twenty-six tons of ore were treated with the recovery of radium, uranium, silver and lead; the value of these products was reported, by the press, at \$210,000.

The eighth annual report of the Company gives, for the first time, an estimate of ore reserves. It is stated that, assuming the ore is continuous from the surface to the 125 foot level, the two ore bodies indicated in drifting contain ore to the value of \$2,400,000. This estimate was based on the prevailing market prices for radium, uranium products and silver. No allowance is made for ore below the 125 foot level.

The Consolidated Mining and Smelting Company of Canada, Ltd., reports that underground development was continued on its Echo Bay property, with somewhat favourable results. Altogether 524 feet of drifting and crosscutting was accomplished. The main crosscut intersected a vein not previously located on the surface but parallel in strike to number two vein, which carried fair values in silver for 85 feet, with some sections of high grade composed of leaves, wires and plates of silver. No pitchblende ore was encountered and no shipments of silver ore made.

Both surface and underground operations were carried on during 1934 by Bear Exploration and Radium Ltd.; the property of this company is located at Cameron Bay, Great Bear Lake, and a test shipment of three tons of silver ore was made in 1934 to the Trail smelter, British Columbia. Other operations in the area included those of Great Bear Lake Mines Ltd.; this company conducted shaft sinking, crosscutting and drifting, but reported no shipments of ore.

In Ontario the Canada Radium Mines, Ltd., maintained steady surface and underground development work at its radium bearing deposit located at Cheddar, Haliburton county. The shaft has been sunk to a depth of 375 feet with levels at 125, 250 and 365 feet. Approximately 700 feet of lateral work has been completed. No ore shipments were reported by this company.

In order to permit sale the National Research Council, Ottawa, recently conducted tests for the standardization and certification of the radium products of the Eldorado Gold Mines, Ltd. Tests demonstrated the value of the material, no significant impurities were discovered and needles of radium were tested and certified. Work is also being conducted by the Council to determine the life of radium luminous compounds as used in watches, clocks and aircraft instruments.

The U.S.S.R. Chamber of Commerce, Moscow, reports that an expedition party of the Moscow Institute of Rare Metals, which has been working at Cheleken Island, has worked out a process for obtaining radium salts from bore hole waters. Work has been started in connection with the construction of a test plant for obtaining radium concentrate from water. The discovery has been reported by Soviet geologists of a large deposit of uranium in the Caucasus which is said to carry 3 per cent  $U_3O_8$  and to be larger than Tyuya Muyun and Taboshar. The ores are believed to resemble the carnotite ores of the United States.

The last annual report of the Union Minière du Haut-Katanga states that the radium market was improved and the quantity of its sales was very satisfactory in 1934.

It was also reported in 1934 that "very extensive deposits" of autunite (calcium uranium phosphate) were discovered near the village of Streltscha, Bulgaria, and that efforts were being made in Australia to develop the uranium deposits on Mt. Paintee located in the desert north of the railroad to Broken Hill.

The greater part of the world's radium supply is utilized for therapeutic purposes whereas uranium, in the form of salts, is used largely for colouring glazes in the ceramic industry.

Imports of radium into Canada in 1934 were valued at \$211,140 as compared with \$8,374 in 1933.

"Metal and Mineral Markets" quotations, September, 1935, for radium was \$50 per Mg. radium content. New York quotation, September for uranium oxide, kegs, was \$1.50 per pound up.

**Table 166.—World Production of Uranium Minerals, 1932-1934**

(Supplied by Imperial Institute)

(Cwt. 112 pounds)

Country	1932	1933	1934
<b>BRITISH EMPIRE</b>			
Canada.....	(b)	(b)	(b)
<b>FOREIGN COUNTRIES</b>			
Czechoslovakia (U <sub>3</sub> O <sub>8</sub> ).....	376	236	236
Portugal.....	645	1,233	791
United States (U <sub>3</sub> O <sub>8</sub> ).....	34	18	70
Belgian Congo.....	(c)	(c)	(c)

Uranium minerals are also produced in Russia. The production recorded in 1927 was about 50 tons; later information is not available.

(a) Information not available.

(b) During 1933 and 1934, 3,021 mgrms. and 3,000 mgrms. of radium of 98 per cent average concentration and 34,940 lb. and 27,000 lb. of uranium salts were produced respectively.

(c) The output of uranium minerals is not available for these years but it is reported that the radium produced from these ores amounted to 6 and 6.7 grams 1932 and 1933 respectively. This production of radium represents the greater part of the world's supplies.

## SELENIUM

Production of selenium in Canada in 1934 totalled 104,924 pounds valued at \$171,311 as compared with 48,221 pounds worth \$70,345 in 1933. The production of the metal in Canada represents a by-product in the refining of blister or anode copper in electrolytic copper refineries located at Montreal East, Quebec, and Copper Cliff, Ontario. Selenium was produced commercially for the first time in Canada in 1931, the metal being recovered at Copper Cliff by the Ontario Refining Company, Ltd. Selenium produced in Canada is credited to the provinces from whose ores the blister copper, electrolytically refined, was obtained.

Selenium has found its best use as a decolorizer and as a base for various colours in the manufacture of glass. It is used in the rubber industry for compounding to increase tensile strength, resistance to abrasion and to shorten the cure. The metal is also employed in the manufacture of photo-electric cells and stainless steels. It has also been used effectively as an insecticide for the elimination of the red spider in fruit orchards. Selenium-cadmium yellow glasses are being employed now for marine and aviation beacons and for automobile headlights.

"Metal and Mineral Markets," September, 1935, quotation for selenium was—per pound, \$2 for black powdered, 99.5 per cent pure.

**Table 167.—Production of Selenium in Canada, 1931-1934**

Year	Pounds	\$
1931.....	21,500	40,850
1932.....		
1933.....	48,221	70,345
1934.....	104,924	171,311

## SODIUM

Large quantities of sodium are used in oil refining and in various chemical industries involving organic syntheses. Its employment has reached a point where it is shipped in 40 ton tank cars. These cars, recently described, are equipped with steel coils welded on the outside in which cold oil is circulated while the molten metal is run in, and hot oil when remelting for unloading. For deoxidizing brasses and other non-ferrous alloys in which a content of 2 per cent or more metallic zinc may be tolerated, a sodium-zinc alloy, containing 2 per cent sodium, has been developed. Addition of this new alloy to brasses generally tends to improve the physical properties.<sup>1</sup>

(<sup>1</sup>) Paul M. Tyler, A.I.M.E.

## TANTALUM AND COLUMBIUM

Tantalite, the principal ore of tantalum, has been produced chiefly in the Pilbarra field of Western Australia, occasional small shipments of the mineral have also been made from the United States, Africa and British India. It is stated that the mineral tantalite and columbite have been identified in deposits occurring in Renfrew county, Ontario. The United States Bureau of Mines reports that Fansteel Products Co. Inc., North Chicago, Ill., is the leading producer of tantalum metal and since 1922 has been supplying not only the United States but most of the tantalum used in Europe, although the Siemens concern in Germany has refined a portion of its requirements, and Blackwell's Ltd., in Liverpool, has been producing ferrotantalum containing columbium for fifteen years and more. Fansteel is also the only commercial supplier of columbium in the world, but the Electro Metallurgical Company of Niagara Falls, N.Y., recently engaged in commercial production of ferrocolumbium.

Tantalum is reported as being sold extensively for rayon spinnerets and various kinds of chemical plant vessels and equipment. Seamless tantalum tubes are made in several sizes down to small-bore tubing for hypodermic needles. Columbium has a low work-function and consequently is being used as an emitter in extra-high-power electronic tubes now being produced more or less experimentally by several European companies. The use of ferrocolumbium in stainless as well as plain chrome steels is fast becoming an established fact, and a certain amount of ferrotantalum seems to be used in steels in Europe. The melting point of tantalum carbide is given as  $3,875^{\circ}\text{C}.$ , which is above the temperature of the carbon arc  $3,500^{\circ}\text{C}.$  and higher than that of any other known compound except, perhaps, hafnium carbide. High resistance to corrosion attack is also cited as contributing to the ability of tantalum carbide tool mixtures to cut steel of previous unmachinable hardness. Nominal quotations for tantalum metal, rod or sheet, after remaining at a base sheet price of \$130 a kilogram gross since the end of 1930, were advanced to \$143 in March, 1934. Tantalum ores, of 60 per cent  $\text{Ta}_2\text{O}_5$  grade, were quoted variously at 75 cents to \$2.50 per pound of  $\text{Ta}_2\text{O}_5$  contained, according to source. Ferrocolumbium, after selling for some time at \$2 was later advanced to \$3 a pound.<sup>1</sup>

## TELLURIUM

The first commercial production of tellurium in Canada occurred in 1934, the metal being recovered at the electrolytic copper refinery of the Ontario Copper Refining Company, Ltd. The output totalled 5,130 pounds valued at \$25,599.

Tellurium is used as a hardening and strengthening agent in lead and its alloys. Tellurium lead, with 0.02 to 0.1 per cent tellurium is reported to be remarkably strong and corrosion resisting as compared with pure lead. The metal is also employed in the manufacture of rubber products, its function being to increase tensile strength and resistance to abrasion.

It was recently reported that a successful method of plating rhenium had been evolved; the coating is very hard and possesses a high resistance to hydrochloric acid. The metal occurs in certain copper refinery slimes.

In May, 1935, it was reported that tellurium was being produced in Russia as a by-product in the treatment of the copper ores from Kyschtym. The world's largest tellurium producer is probably the United States, however European metallurgical plants are showing an increased interest in tellurium recovery.

New York quotation for tellurium, September, 1935, was \$2 per pound.

## TIN

Tin ores are not mined in Canada. The metal is known to occur in the Snowflake and Sullivan mines in British Columbia and in certain pegmatites in Southeastern Manitoba. It has also been reported at New Ross, Nova Scotia.

The Mining Journal, London, states that most of the tin available for smelting at the present time is alluvial, comprising nearly all the production of Malaya, Netherlands Indies, Nigeria.

(1) United States Bureau of Mines.



Siam, the Congo, and considerable proportions of the output from Burma, Indo China, and some of that from South and East Africa and Australia. The rapid development of the tin deposits of the Congo is bringing tin smelting in Belgium and the Congo into prominence.

E. Baliol Scott, in the "Mineral Industry," says: "The longer the international policy of compulsory restriction continues, the larger part it plays in the fortunes of the industry. Such is the experience of all experiments in international cartelisation, and to-day the International Tin Committee with its Siamese twin, the Buffer Stock Committee, is about the only matter of real interest. The price structure at the high levels now ruling depends upon the amount of tin which the committee permits to be produced and marketed, and on the outlook for price largely depends what fresh development and equipment of known deposits is put in hand—the international agreement was for three years from January 1, 1934, to be extended for a further period or periods, if the four signatory governments and Siam so decide.

**Table 168.—Available Statistics on the Consumption of Tin in Specified Canadian Manufacturing Industries, 1933-1934**

Industries	Items (used)	1933	1934
		Pounds	Pounds
Brass and copper products.....	Ingots.....	125,526	261,354
	Scraps.....	3,568	91,939
	Other.....	19,339	5,038
White metal alloys.....	Pig.....	2,086,320	2,455,847
Iron and steel.....	Tin.....	631,136	1,214,493
<b>Grand Total.....</b>		<b>2,865,989</b>	<b>4,024,671</b>

**Table 169.—Imports into Canada of Tin, 1932-1934**

	1932		1933		1934	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Tin in blocks, pigs and bars.....	3,148,400	809,437	2,834,100	1,149,378	3,999,900	2,053,773
Tin foil.....	6,749	3,293	8,271	4,076	35,158	18,990
Strip waste.....	1,884,000	6,850	3,416,000	11,310	1,426,000	6,999
Collapsible tubes.....		67,810		81,258		38,597
Tin plated kitchen and dairy hollow-ware not painted or decorated.....		72,445		39,355		41,463
Manufactures of tin plate, painted, japanned, decorated or not, and manufactures of tin, n.o.p.*.....		723,511		437,982		386,232
Tin cans and containers for food.....		126,418		138,297		186,175
Containers manufactured from tin plate, n.o.p.*.....				165,509		239,497
Bichloride of tin or tin crystals.....	1,185,483	189,128	826,632	149,880	333,311	88,327
Phosphor tin and phosphor bronze in blocks, etc.....	319,064	78,749	506,464	135,997	826,611	232,483
Oxide of tin and copper.....	147,459	12,532	144,657	50,743	207,769	86,376
Sheets, plates, hoop, band or strip, coated with tin, n.o.p.....	79,967,400	3,146,162	149,713,800	6,549,512	159,429,000	7,319,878
<b>Total.....</b>		<b>5,236,335</b>		<b>8,913,297</b>		<b>10,693,799</b>

\*From April 1, 1933. †From October 12, 1932.



Table 170.—World Production of Tin Ore

(Supplied by Imperial Institute—London)

(In terms of metal)

(Long tons)

Producing country	1932	1933	1934
<b>BRITISH EMPIRE</b>			
United Kingdom.....	1,337	1,542	1,999
Nigeria.....	4,320	3,755	5,000
Southern Rhodesia.....	4	11	11
South West Africa.....	65	144	136
Swaziland.....	59	71	114
Tanganyika Territory.....	50	59	103
Uganda.....	261	272	334
Union of South Africa.....	540	539	570
India.....	3,168	3,472	4,061
Federated Malay States (shipments).....	28,363	23,922	36,385
Unfederated Malay States.....	1,341	923	1,348
Straits Settlements.....	38	57	49
Australia.....	2,138	2,810	2,986
<b>Total.....</b>	<b>41,700</b>	<b>37,600</b>	<b>53,100</b>
<b>FOREIGN COUNTRIES</b>			
Argentina.....		45	254
Portugal (estimated).....	400	500	530
Spain.....	78	70	102
Belgian Congo.....	689	1,950	4,356
Cameroon (French).....		60	150
Morocco (French).....		40	40
Mexico.....	740	123	16
United States.....	(8 cwt.)	3	8
Bolivia.....	21,100	17,000 (h)	22,638
China.....	7,572	7,961	8,000
French Indo-China.....	1,000	1,038	1,134
Japan.....	1,557	1,538	1,821
Netherlands East Indies.....	16,789	12,699	19,433
Siam.....	9,276	10,300	10,157
<b>Total.....</b>	<b>59,000</b>	<b>53,000</b>	<b>68,000</b>
<b>World's Total.....</b>	<b>101,000</b>	<b>91,000</b>	<b>121,000</b>

NOTE.—The metal content of the ores has been calculated on the following percentages—South West Africa 70, Swaziland 70, Uganda 70, India 70, Belgian Congo 70, Japan 70, Siam 72.

(a) Information not available.

(b) Exports.

### TITANIUM ORE

Important deposits of ilmenite, some of which contain rutile, occur near Baie St. Paul, Quebec, and titaniferous ores have been exported from this area for some years. Shipments of these ores in Canada during 1934 totalled 2,023 tons valued at \$14,161, the entire output coming from properties in the province of Quebec. Shipments during the first six months of 1935 amounted to 2,419 tons worth \$16,933.

"Like molybdenum, titanium has also found its way into cast iron and stainless alloys, although on a much more modest scale. It is added to cast iron to make strong alloy compositions more easily to machine, to close the pores and reduce the size of the graphite flakes. Added to stainless steel in a ratio of 5 to 7 times the carbon content, it serves to inhibit inter granular corrosion. It also prevents air-hardening and imparts ductility and softness to the steel. Otherwise, the most important metallurgical use of titanium is as a scavenger to remove oxygen and nitrogen from iron and steel. Alloyed with copper, titanium imparts age-hardening properties; the carbide is also being used in cutting steels. The output of titanium oxide, an excellent white pigment (possessing high hiding powers) is, however, much more important than that of the metal." (Engineering and Mining Journal).

The United States Bureau of Mines defines the standard titanium-calcium pigment as containing 30 per cent titanium dioxide precipitated upon and coalesced with calcium sulphate, and the titanium-barium pigment as containing 25 per cent titanium dioxide precipitated upon a blanc fixé base. A leading brand of titanated lithopone contains 15 per cent titanium dioxide. The Titanium Pigment Co. (subsidiary of the National Lead Co.) made several improvements in

its St. Louis factory and was constructing a large new plant at eastern seaboard, the site finally selected being at Sayreville, N.J. This new plant is reputed to cost \$4,300,000. Titanium dioxide has other uses than in paints and paper fillers. Recently, it has been advocated for use in vanishing creams and allied toilet preparations and for reducing the luster of rayon (Dreyfus process), as well as more extensively in enamels and sundry other ceramic products.

Imports into Canada of antimony oxide and titanium white from April 1st to December 31st, 1934, totalled 983,539 pounds valued at \$131,005.

September, 1935, quotations—New York—titanium metal, 96 to 98 per cent, \$6 to \$7 per pound; titanium ore—per gross ton, ilmenite, 45 to 52 per cent  $\text{TiO}_2$ , f.o.b. Atlantic seaboard, \$10 to \$12, according to grade and impurities. Rutile, per pound, guaranteed minimum 94 per cent concentrate, 10 cents.

**Table 171.—Consumption of Titanium White in Canadian Paint Industry, 1931-1934**

	Pounds	Cost at Works
1931.....	745,207	\$ 89,781
1932.....	691,304	96,759
1933.....	1,061,249	128,969
1934.....	1,710,188	186,678

**Table 172.—World Production of Titanium Minerals**

(Supplied by *Imperial Institute*, London)  
(Long tons)

Producing country and description	1932	1933	1934
<b>BRITISH EMPIRE</b>			
Canada (shipments)—Titaniferous iron ore.....			1,806
India—Ilmenite.....	50,053	43,384	75,644
Australia—Ilmenite.....		550	51
<b>FOREIGN COUNTRIES</b>			
Norway—Ilmenite.....	13,268	22,846	25,891
Rutile.....	30	55	243
Portugal—Ilmenite.....			434
Egypt.....	479		181
Senegal (exports)—Ilmenite.....		300	500
Argentina—Titaniferous iron ore.....		2,559	(a)
Brazil (exports)—Ilmenite.....	34	95	114

NOTE.—Titanium minerals are also produced in the United States, but figures are not available for publication. In recent years, however, the production of ilmenite has been in the order of 1,000 to 5,000 tons, and that of rutile has been several hundred tons.

(a) Information not available.

## TUNGSTEN

Tungsten minerals have been found in widely separated districts in Canada. Deposits in Nova Scotia and New Brunswick appear to possess the greatest economic possibilities. Comparatively small shipments of tungsten ores were made in Canada in 1912 and 1917; no commercial production has been reported since the latter year.

At Indian Path, Lunenburg county, Nova Scotia, the Indian Path Mines, Ltd., carried on work during the winter months of 1934. Number 2 shaft was deepened 80 feet and at 70 a feet level was driven east a distance of 40 feet along No. 1 vein which consists of quartz containing small segregations of scheelite, also crystals of galena, arsenopyrite and pyrites. At the east end of the level a crosscut was driven to connect with No. 3 shaft. This crosscut intersected two scheelite bearing quartz veins. No ore shipments were reported from the property.

The British Columbia Department of Mines reported that for the first time in many years, interest was evinced in tungsten properties, at one of which, the Hardscrabble mine near Barker-ville, preliminary investigation was commenced.

Tungsten has a number of industrial uses, being employed in the manufacture of high temperature electric furnaces, vacuum tube filaments, incandescent lamp filaments, electric contact surfaces and laboratory equipment. It is an important alloying element in such high speed tool alloys as stellite and is a constituent in certain resistance welding electrodes and hard cemented carbides.

"Broadly speaking, it may be taken that for normal consumption with trade in a reasonable state of activity, the world's requirements must be some 12,000 to 14,000 tons of mineral concentrates, equivalent to half this quantity of metal. The chief producers in 1913 were India and Burma, United States and Portugal. To-day the chief output available is from China which has shipped, and probably under normal conditions, can produce comfortably 6,000 tons a year. Chinese government manipulation of the market, and some improvement in demand, have caused prices to remain high for some time, and, in consequence, numerous sources of supply outside China have been developed on a larger scale. The countries producing the bulk of the world's requirements to-day, are: China, Burma, Malaya, Bolivia, United States and Portugal, while Australia, Argentina, Cornwall and several other countries have contributed substantial quantities." (The Mining Journal, London).

Imports of metallic elements and tungstic acid into Canada, for use only in the manufacture of metal filaments for electric lamps, were valued at \$57,919 in 1934 as compared with \$46,734 in 1933. Imports of chromium metal and tungsten metal, in lumps, etc., and alloy scrap for alloying purposes, totalled 26,222 pounds valued at \$16,461 in 1934 as against 17,755 pounds at \$8,801 in 1933.

September, 1935, New York quotation for tungsten, 98 per cent powdered was \$1.75 to \$1.90 per pound; tungsten ore—per unit  $WO_3$ , N.Y. Chinese wolframite, \$15, duty paid. Bolivian scheelite, nominal. Domestic scheelite, good analysis, carload lots or more, \$15.

Table 173.—World Production of Tungsten Ore and Concentrates

(Supplied by Imperial Institute, London)

(Long tons)

Producing country	1932	1933	1934	Estimated WO <sub>3</sub> Content		
				1932	1933	1934
BRITISH EMPIRE						
United Kingdom—Concentrates.....	2	11	190	1	7	131
Nigeria—Concentrates.....			5			3
South West Africa—Tungsten ore.....			16			10
Southern Rhodesia—Concentrates.....	13	30	106	8	20	69
India—Concentrates.....	2,023	2,147	3,329	1,315	1,396	2,164
Federated Malay States—Wolfram.....		33	29		21	19

(a) Information not available.

## VANADIUM

No vanadium ores are produced in Canada. Relatively small quantities of the metal are known to occur in some of the magnetites of the Rainy River district in Ontario and some research has been conducted as to a method for its commercial recovery.

By far the greater amount of vanadium is consumed as a toughening element in the production of alloy steels and recently the metal is being used in cast irons.

Early production of vanadium came largely from Peru where certain bituminous coal deposits carry a relatively high percentage of vanadium pentoxide. Increased production in recent years has developed in South West Africa and Northern Rhodesia where the metal occurs with lead-zinc-copper ores. In the United States vanadium has been obtained chiefly from the carnotite ores of the Southwestern States. It was reported in the technical press, early in 1935, that vanadium stocks have been excessive and ore production slowed down. It has recently been reported that Russia's rare metals works in Moscow have made vanadium compounds for catalytic use. The vanadium being a by-product of radium isolated from tyuyamunite (a vanadate of lime and uranium) ore mined at Tyuya Muyun, Ferghana, Russian Turkestan. It has also been announced that vanadium was successfully recovered in Norway from pig iron made from vanadium-bearing ores, and similar developments in the U.S.S.R. are expected to result in an increase in world vanadium supply.

Vanadium ore prices—September, 1935—per pound  $V_2O_5$  contained was  $27\frac{1}{2}$  cents, f.o.b. shipping point. Ferrovadium, per pound of vanadium contained, delivered, \$2.70 to \$2.90.

Table 174.—World Production of Vanadium Ores, 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934
<b>BRITISH EMPIRE</b>			
Northern Rhodesia—(V content).....	302	35	3
South West Africa.....	2,973	177	324
<b>FOREIGN COUNTRIES</b>			
United States ( $V_2O_5$ ).....	103	2	(a)

(a) Information not available.

## ZIRCONIUM

"The metallurgical uses of zirconium so far have failed to account for any large consumption but demands from the ceramic industries are increasing by leaps and bounds. Quite a few new zirconium salts, oxides and metallic forms were placed on the market in 1935. A newly created zirconium opacifier replaces tin oxide in vitreous enamels on a pound for pound basis, and although costing scarcely half as much, affords equal or better opacity and gloss.

"Important supplies of zircon are being furnished from Australia where at least three companies are engaged in recovering the mineral from an abundant supply of beach sand along the coast of New South Wales. The final separation is made by froth flotation."<sup>1</sup>

"Zircon is the most common zirconium mineral and it or cyrtolite commonly occurs in greater or less amount in Canadian precambrian pegmatites, also in the pegmatitic-apatite-phlogopite deposits of the Grenville areas in Ontario and Quebec. . . . Brazil is the chief source of commercial zirconium ore, greatly overshadowing all other occurrences in available reserves and cheapness of exploitation."<sup>2</sup>

Imports into Canada of zirconium silicate during 1934 amounted in value to \$2,029; imports of zirconium oxide for the same year were appraised at \$7,827.

<sup>(1)</sup> Paul M. Tyler, A.I.M.E.<sup>(2)</sup> Department of Mines, Ottawa, report 2314.



## CHAPTER SIX

## THE NON-FERROUS SMELTING AND REFINING INDUSTRY IN CANADA

An increase in the development of Canadian deposits containing the non-ferrous metals has stimulated an expansion in the domestic smelting and refining of these metals. Abundant water power, conveniently located in regard to the mining districts, has made possible the generation of electric energy at such low cost that the utilization of electrochemical or electrothermic processes has been adopted for many metallurgical purposes. Some of the more important of these applications include the electrolysis of alumina and the production of aluminium in various forms in Quebec, the production of electrolytic copper at Montreal East; the refining of nickel and copper in central Ontario and the manufacture of refined zinc in Manitoba and British Columbia. Electrolytic lead is produced at Trail, British Columbia, by the Consolidated Mining and Smelting Company. Electric furnaces are also used throughout the world in the production of abrasives, ferro-alloys, titanium products, magnesium, beryllium, iron, ferro-silicon, carbides and cyanamide.

As a source of power, electric energy is being used to an ever increasing extent in mining and milling operations where important economies in operation are being effected.

In the extraction and treatment of ores, the mining and milling are so closely associated that it is impossible to make a separation of the statistics of these two operations. There is less difficulty in drawing a line between mining and milling on the one hand, and smelting and refining on the other, though there are cases where mining, milling and smelting operations are so closely related that it is very difficult to separate the figures on capital employed. This chapter is devoted to a consideration of the smelting and refining industry in Canada as it applies to the ores of the non-ferrous metals.

The estimated cost of ores, concentrates, matte, etc., treated in smelters and refineries in 1934 totalled \$78,325,552 as compared with \$43,242,563 in 1933; value of products in metallurgical plants in 1934 amounted to \$149,936,239 as against \$100,561,297 and the total value added through the treatment of crude or semi-crude mine material in Canadian works totalled \$71,510,687, representing an increase of 24.9 per cent over the corresponding value of \$57,318,734 in 1933.

Employees in the industry totalled 8,298 in 1934 as compared with 6,360 in 1933, an increase of 30.5 per cent. Salaries and wages paid amounted to \$11,059,206 as against \$8,403,181 in the preceding year; the number of employees in 1934 was only surpassed in the history of the industry by those of 1929, a year of extensive mine and plant development.

The results of the survey of the non-ferrous metallurgical industry are particularly interesting in 1934 in that they include particulars relating to the purchase of mine and mill equipment, insurance costs, etc., and are the first of this nature compiled since 1923. The total value of such items as reported by the nickel-copper mines, smelters and refineries; copper-gold mines, smelters and refineries; silver-lead-zinc smelters and refineries, and cobalt-silver smelters totalled \$35,029,644 in 1934. Some of the outstanding values for expenditures during the last calendar year include \$6,272,642 for incoming freight, \$2,082,485 for outgoing freight, \$5,429,202 for fuel, \$1,472,833 for smelter fluxes, \$1,384,388 for lumber, \$958,387 for electrical equipment, and \$573,535 for flotation reagents.

## Review of the Industry by Provinces

**Quebec.**—Aluminium ores are not mined in Canada; however, the production of primary metallic aluminium in Quebec, from imported material, has constituted an important industry for several years. The Aluminium Company of Canada, Limited, the sole producer of new metal in the Dominion, operated its Shawinigan Falls fabricating plant continuously throughout 1934; the company's reduction works at Shawinigan Falls was inactive. The reduction plant of the company located at Arvida maintained steady production of aluminium ingot during the calendar year 1934. This plant employed both imported alumina and aluminium produced at Arvida; the slag ore works was not operated in 1934.

"The Mining Journal," London, reports the present capacity of the various aluminium reduction works of the United States of America, Canada, Scotland, Norway, France, Switzerland, Italy, Austria, Germany, Russia and Spain, could supply nearly 400,000 tons of virgin aluminium a year, and yet half a century ago barely 50 tons of this metal had been produced at a cost of roughly 30s. a pound. The price of the virgin metal is now quoted at about a shilling a pound, and this price has been more or less maintained since the slump period of 1921.

During 1934 the Noranda smelter treated 1,050,684 tons of copper-gold-silver ore, concentrate and refinery slag, and produced 70,607,764 pounds of anodes, the average analysis of which was 99.39% copper, 7.04 oz. gold per ton, and 15.66 oz. silver per ton. The following table shows the amount of material treated in the Noranda smelter and the production each year since commencement of operations:—

Year	Tons of ore, concentrate and refinery slag smelted	Pounds of fine copper produced	Gold produced	Silver produced
			ounces	ounces
1927.....	10,740	552,345	767	2,644
1928.....	271,926	33,065,261	52,949	186,277
1929.....	428,221	51,223,115	68,732	334,279
1930.....	734,072	75,509,373	117,393	691,920
1931.....	765,544	62,859,355	253,363	558,801
1932.....	918,567	83,013,485	341,350	619,597
1933.....	1,010,629	85,008,731	284,675	510,739
1934.....	1,050,684	70,175,512	248,615	552,809

During 1934 the concentrator treated 920,363 tons of ore from the Horne mine, the average assay of which was 2.34% copper, 0.125 oz. gold per ton, and 0.32 oz. silver per ton, from which 181,938 tons of concentrate were produced and sent to the smelter. In April, 1934, the rated daily capacity of the concentrator was increased from 2,000 to 3,000 tons and at the same time additional equipment designed to regrind and retreat the entire mill tailing was placed in operation. This tailing retreatment plant is operating very satisfactorily and is effecting a substantial saving of gold that was formerly lost in the tailing. A hundred ton experimental cyanide unit designed to extract additional gold from the pyrite residue of the retreated mill tailing was constructed and placed in operation in June, 1934. The results obtained from this unit were so satisfactory that a separate 500 ton cyanide mill to treat the entire pyrite portion of the tailing was constructed and placed in operation in 1935. The converter Cottrell plant was increased to twice its former size and capacity and the power house extended to accommodate a 2,600 k.w. steam turbine driven generator to be installed as an auxiliary source of power.

At Montreal East, the electrolytic copper refinery of Canadian Copper Refiners, Ltd., maintained steady production throughout 1934. Blister copper from Flin Flon, Manitoba, and anode copper from Noranda, Quebec, are treated in this plant for the production of refined copper, gold and silver; refined copper is marketed in the form of wire bars, ingot bars, and cathodes. Selenium is now being produced in substantial tonnage at the refinery; production of tellurium has been delayed as, owing to the demand for selenium, efforts were concentrated on the production of the latter metal; it is expected that tellurium will be produced in 1935.

**Ontario.**—The International Nickel Company of Canada, Limited, reported that operations throughout the year, conducted on an increased scale and at a uniform rate, afforded the management opportunity to cut costs of production to the lowest figures obtaining since the plants were reconstructed and the Frood mine fully developed. The expanded operations called for additions to payrolls and decreased unemployment in the various localities in which operations were conducted. The concentrator of the company was operated at a uniform rate during 1934 and treated 1,843,146 tons of ore, the greatest tonnage thus far handled. As the result of certain re-arrangement of equipment and with the completion of some minor installations the available capacity in the grinding and flotation sections is 8,000 tons per day. This capacity can be readily increased to 11,000 tons per day should demand call for increased quantities of nickel. The Copper Cliff smelter produced 92,174 tons of bessemer matte and 97,611 tons of blister copper. Three reverberatory furnaces were in operation throughout the year. The installation of additional converters was completed; this not only adds to plant capacity, but from a metallurgical standpoint balances adequately the copper and nickel smelting operations. For the

Orford separation process one blast furnace was used in 1934 and a second for seven months. At the Coniston smelter three blast furnaces were in operation up to April 1st and four thereafter; during the year 840,980 tons of ore were smelted and 59,732 tons of bessemer matte produced. All of the four hydro-electric plants were in use throughout the year.

At the Port Colborne nickel refinery six electrolytic circuits were in continuous operation during the year and a seventh was in use from April to August inclusive. The total output of nickel, inclusive of nickel in oxide, was 70,974,850 pounds.

The electrolytic copper refinery of the Ontario Refining Company, Limited, (90% owned by the International Nickel Company of Canada, Limited), maintained steady production at Copper Cliff, Ontario, throughout 1934. As a result of increased nickel production there was a corresponding increase in the tonnage of blister copper received from the Copper Cliff smelter, which rose from approximately 6,500 tons per month at the beginning of the year to 9,000 tons per month during the last quarter. Refined copper production amounted to 95,558 tons compared with 58,098 tons in 1933. Shipments from the refinery were 97,292 tons in 1934 compared with 53,678 tons in 1933. Selenium and tellurium are now regularly produced as by-products in addition to by-product gold, silver and platinum metals. A plant for refining tellurium was constructed during the year and was started in October, 1934. Selenium has found its best use as a decolorizer and as a base for various colors in the manufacture of glass. An interesting application is found in the photo-electric cell. Tellurium is used as a hardening and strengthening agent in lead and its alloys.

In the manufacture of rubber products strength and resistance to abrasion are improved by the use of selenium and tellurium.

The mill and smelter of Falconbridge Nickel Mines, Limited, operated throughout 1934 with only the normal interruptions for repairs and the excellent overall metallurgical recovery was reported as slightly improved. No important changes occurred during the year in the milling and smelting plants. It was rather a year of crowding the existing facilities to their utmost with the result that 272,923 tons were treated or 17 per cent more than the previous year. Results of operations are tabulated as follows:—

Total ore treated.....	272,923	short tons
Matte produced.....	9,271.4	short tons
Nickel in matte produced.....	5,202.6	short tons
Copper in matte produced.....	2,450.8	short tons
Metals per ton in ore.....	41.00 lb. nickel and 19.90 lb. copper	
Metallurgical losses per ton of ore.....	2.88 lb. nickel and 1.94 lb. copper	

From 317,646 tons of ore delivered to the crushing plant 44,116 tons or 13.9 per cent of waste was eliminated by sorting and discarded.

The plants of the Deloro Smelting and Refining Company, Limited, located at Deloro, Hastings county, were operated continuously during 1934. Silver-cobalt ores from the Cobalt and Gowganda areas were treated by the company for the production of silver bullion, white arsenic, cobalt metal, cobalt oxides and salts, and nickel oxide. A silver lead-bismuth bullion was also exported by the company.

It is interesting to note, that according to a statement by Sir Edmund Davis, 1,217,925 pounds of by-product cobalt were recovered for the fourteen months to the end of August, 1934, from ore on the Mindola section of Rhokana in Northern Rhodesia and Union Minière du Haut-Katanga have announced that the cobalt market developed substantially in 1934, the tonnage of its sales being heavier than for any previous year.

At Port Hope the radium refinery of Eldorado Gold Mines, Limited, was in continuous operation during 1934. Silver pitchblende ores and concentrates from Great Bear Lake, North West Territories, were treated in this plant and products included radium salts, sodium uranate (orange), sodium uranate (yellow), uranium oxide (black), uranium salts, and by-product silver and lead. During 1934 the plant was reported to have received from the mine 77 tons of pitchblende and silver ore and 7 tons of silver concentrates. Twenty-six tons of ore were treated



during the year with recovery of radium, uranium, silver and lead amounting to \$210,000 leaving 48 tons of roasted ore on hand at December 31, 1934. During the period January 1, 1935, to May 31, 1935, the remaining 48 tons of ore were treated with recovery amounting to \$250,000, in addition to which there remained in the plant in process about \$135,000 in products. Radium has been supplied to the following countries: England, Ireland, Scotland, United States, South Africa, Egypt, Iraq, Cyprus, Esthonia, Australia and Canada.

**Manitoba and Saskatchewan.**—The Flin Flon mine, copper smelter and zinc refinery are situated on the interprovincial boundary of Manitoba and Saskatchewan, and for this reason, the operations of the Hudson Bay Mining and Smelting Company, Limited, are reviewed under the heading of the two provinces.

There was treated by the concentrator during 1934 an average daily tonnage during the days the plant operated of 4,420 or a total for the eleven months operated during the year of 1,463,716 tons of ore. This averaged gold, ounces .095; silver, ounces 1.45; copper, 1.71 per cent, and zinc, 4.4 per cent. The tonnage treated was approximately the same as that treated during the previous year. From the 1934 tonnage there were produced 250,595 tons of copper concentrates, assaying gold, ounces 0.353; silver, ounces 5.16; copper, 8.29 per cent, and 76,149 tons of zinc concentrates assaying gold, .071 ounces; silver, 1.90 ounces; copper, 0.87 per cent, and zinc, 45.5 per cent.

The operation of the cyanide annex continued with minor changes, all of which tended towards improving the operations. A maximum tonnage of 921,388 was put through this plant; this consisted of sulphide ore tailings averaging .0417 oz. gold per ton and .605 ounces of silver per ton.

The copper smelter was operated continuously during the year with the exception of the strike period. There were smelted in the reverberatory in 1934, 245,425 tons of Flin Flon ore and concentrates; from the Flin Flon concentrates and other products there were produced and shipped 19,101 tons of blister copper containing a total of 99,334 ounces gold, 1,348,807 ounces of silver, and 37,677,064 pounds of copper. The average tonnage of new material treated per day by the smelter was 828 tons.

The electrolytic zinc plant operated steadily throughout 1934 with the exception of June, the strike month. There were treated during the year 72,896 tons of zinc concentrates averaging gold, .070 ounces; silver, 1.89 ounces; copper, 0.89 per cent, and zinc, 45.5 per cent, from which were produced 49,427,280 pounds of zinc, the average grade of which was 99.9893 per cent zinc. In 1934 the refinery produced 647 tons of die casting zinc averaging 99.9919 per cent zinc. The amount of cadmium precipitate in stock at the close of 1934 totalled 5,495 tons, the metal content of which is cadmium, 3.63 per cent, copper, 6.76 per cent, and zinc, 55.0 per cent.

**British Columbia.**—The Consolidated Mining and Smelting Company of Canada, Limited, reported that the cost of producing lead and zinc was again the lowest in the history of the company. Cost reductions in 1934 were due largely to the enhancement in the value of silver (silver values being credited against the cost of lead and zinc) and to the increased tonnages handled.

Concentration costs at the Kimberley concentrator were slightly above the record of 1933. Recoveries, while good in comparison with all other years, were a little below those of 1933. The drop in recoveries is ascribed partly to the larger tonnage treated, 25 per cent over 1933, and partly to the oxidation due to sprinkling the ore to control the dust. The small increase in mining and concentrating costs was much more than offset by the increased value of silver, with the result that the cost of both lead and zinc in concentrates constituted on all time low record.

The 1933 record costs of smelting lead were maintained in 1934. Lead losses were a little higher owing to smelting a large tonnage of Rossland ore in the lead plant, the available tonnage of this ore not being sufficient to run a copper furnace.

Record costs and recoveries were made in the zinc plant; the reduction in cost was mainly due to larger tonnage and to the new roasting process. The cadmium and bismuth plants, both by-product works, are only run as occasion demands.



Following is the metal production and tonnage treated at Kimberley and Trail plants together, from 1894 to date, and for 1934:—

—	Tons ore treated	Gold produced	Silver produced
		ounces	ounces
1894 to date.....	24,463,646	2,381,581	113,951,029
1934.....	1,792,298	35,328	7,316,231
—	Lead produced	Copper produced	Zinc produced
	pounds	pounds	pounds
1894 to date.....	3,797,121,176	184,673,769	2,020,575,232
1934.....	315,340,312	1,567,078	221,955,701
—	Cadmium produced	Bismuth produced	Fertiliser
	pounds	pounds	tons
1894 to date.....	2,650,668	576,871	237,706
1934.....	293,611	246,002	82,497

The plants of Granby Consolidated Mining, Smelting and Power Company, Limited, located at Anyox consist of a crushing plant and concentrator of about 5,000 tons capacity, smelter, coke ovens and power plant. During 1934 the continued low copper price adversely affected the Granby operations at Anyox and the bulk of the blister output was necessarily stored. A generally lower tenor of ore was met by a slight increase in tonnage to the mill, which, towards the end of the year, was treating about 5,200 tons of ore per day. No new ore developments of importance materialized in the mine during the year. In the early part of December a blast involving 500,000 or more tons of ore, mainly in pillars and sills of old stopes in No. 1 and No. 5 orebodies between the 385 foot level and surface, was carried out. About 1,100 men were employed at Anyox with a payroll of \$135,000 per month. Mining operations of the company were discontinued in July, 1935. "The Miner," Vancouver, comments on Granby as follows: "The operating efficiency that distinguished the first, or boundary, stage of the Granby undertaking, has been more than duplicated in the lost stage at Anyox, and during the past few years in particular. Indeed, in point of low cost production of copper, we question if any mine in the world, where the conditions are similar, can show comparable results with Granby. This has meant, that although during the depression period, with the world price of copper falling below six cents a pound, the company has continued to operate,—not without loss, it is true,—but nevertheless to operate. Corporations are supposed to be soulless, but it is difficult, as we have previously noted, to discover motives other than primarily benevolent to its employees and their community in the company's policy since 1933 of continuing to produce copper for accumulation when metal could have been purchased in the open market at a price considerably below the cost of production at Anyox.... actually the Anyox orebodies, commercially considered, were depleted three years ago...."

It is noteworthy that the new electrolytic copper refinery erected at the Nkana smelter in Northern Rhodesia put its anode department into operation in September, 1934; the first cathode section was put into circuit on December 4th and the first cathode production was drawn on December 21st. The new refinery consists essentially of an anode department, making anodes of refined blister copper, an electrolytic tank house, which converts the anodes into cathodes by electro-deposition, and a furnace refinery which melts and casts the cathodes into commercial shapes. Necessary installations auxiliary to these are the electric sub-station and slimes treatment plant. The rated capacity of the refinery as built is 36,500 short tons of refined copper output per year, but the site chosen will allow for extension to five times its present capacity when desired. Nkana blister copper is of exceptional purity containing about 99.5 per cent copper.

Table 175.—Capital Employed in the Non-Ferrous Smelting and Refining Industry in Canada, 1933 and 1934

	1933	1934
	\$	\$
<b>CAPITAL EMPLOYED AS REPRESENTED BY:</b>		
(a) Present value of land, buildings, fixtures, machinery, tools and other equipment..... (Estimated value if rented.)	101,508,625	100,334,062
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	12,446,854	14,264,927
(c) Inventory value of finished products on hand.....	16,768,493	16,584,377
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	15,301,312	14,864,056
<b>Total.....</b>	<b>146,085,284</b>	<b>146,047,422</b>

Table 176.—Principal Statistics, Including Ores, Concentrates and Residues Smelted and Value of Smelter and Refinery Products in the Non-Ferrous Smelting and Refining Industry, 1933 and 1934

	1933	1934
Number of companies.....	11	11
Number of plants.....	14	14
Capital employed..... \$	146,085,284	146,047,422
Number of salaried employees.....	679	849
Salaries..... \$	1,461,390	1,842,449
Number of wage-earners.....	5,681	7,449
Wages..... \$	6,941,801	9,218,757
Cost of fuel and electricity..... \$	7,809,936	10,477,582
Estimated cost of ores, matte concentrates, etc., treated..... \$	43,242,563	78,325,552
Value of plant products*..... \$	100,561,297	149,936,239
Value added by smelting..... \$	57,318,734	71,610,687

\*Products include gold, silver, platinum metals, blister and anode copper, refined lead, zinc, copper and nickel, nickel-copper matte, nickel oxide, nickel salts, cobalt, cobalt oxide, aluminium, base bullion, cadmium, bismuth, arsenic, tellurium, selenium, radium and uranium salts and oxides.

Table 177.—Number of Wage-Earners by Months, in the Non-Ferrous Smelting and Refining Industry, 1932, 1933 and 1934

Month	1932	1933	1934
January.....	5,496	5,003	6,870
February.....	5,400	4,831	6,832
March.....	5,355	4,926	7,034
April.....	4,750	4,890	7,264
May.....	4,297	4,910	7,530
June.....	4,475	5,534	7,717
July.....	4,205	6,080	7,734
August.....	4,180	6,322	7,767
September.....	4,198	6,368	7,595
October.....	4,326	6,478	7,816
November.....	4,316	6,396	7,620
December.....	4,274	6,410	7,606
<b>Average.....</b>	<b>4,601</b>	<b>5,681</b>	<b>7,449</b>

Table 178.—Capacities of Canadian Copper Smelting and Refining Works, 1934\*

Company	Blast furnaces		Reverberatories		Converters	
	Number	Annual capacity—tons of ore and concentrates	Number	Annual capacity—tons of ore and concentrates	Number	Annual capacity—tons of ore and concentrates
Consolidated Mining & Smelting Co. (†).....	1	200,000	1	48,000	2	16,000
Falconbridge Nickel Mines.....	1	200,000	2	900,000	2	35,000
Granby Consolidated Mining, Smelting & Power Co.....	2	200,000	1	325,000	3	15,000
Hudson Bay Mining & Smelting Co.....	2	800,000	2	900,000	2	150,000
Noranda Mines.....	4	800,000	5	2,100,000	4	150,000
International Nickel Co.....	4	800,000	5	2,100,000	17	.....

## ELECTROLYTIC COPPER REFINERIES—

Canadian Copper Refiners, Ltd.....	65,000
Ontario Refining Co., Ltd.....	120,000

\*American Bureau of Metal Statistics.

†Idle.

Table 179.—Capacity and Production of Electrolytic Zinc Plants and Lead Smelting Capacity in Canada, 1932-1934

Company	Maximum horse-power used	Estimated annual capacity for cathode zinc (short tons)	Actual production as ingot zinc (short tons)		
			1932	1933	1934
Consolidated Mining & Smelting Co. of Canada, Ltd....	73,000	146,000	65,284	68,810	110,217
Hudson Bay Mining & Smelting Co., Ltd.....	13,500	23,400	20,868	23,153	24,714

## LEAD SMELTING CAPACITY IN CANADA, 1934.

Company	Situation of plant	Number of blast furnaces	Annual capacity (tons of charge)
Consolidated Mining & Smelting Co.....	Trail, B.C.	5	700,000

Supplied by the American Bureau of Metal Statistics.

## CHAPTER SEVEN

**THE COAL MINING, COKE, NATURAL GAS, PEAT AND PETROLEUM INDUSTRIES  
(Fuels) IN CANADA****The Coal Mining Industry in Canada**

1. General Review
2. Commodity Statistics on Coal—including Tables on Output, Disposition, Shipments, Imports into Canada and Exports, Consumption and World Output

**The Coke and Gas Industry in Canada****The Peat Industry in Canada****The Petroleum Industry in Canada**

1. Production of Crude Petroleum
2. Production of Petroleum Products

NOTE.—In order to correlate data, regarding fuels in Canada, this chapter has been prepared to include statistics of the coal, natural gas, peat and petroleum industries. This survey presents information in detail regarding these industries as a whole, dealing principally with the mineral industry, although supplementary data are shown for closely allied manufacturing operations.

**THE COAL MINING INDUSTRY**

Coal production in Canada during 1934 advanced to 13,810,193 tons worth \$42,045,942 from the 1933 total of 11,903,344 tons valued at \$35,923,962. The 1934 output included 10,058,782 tons of bituminous coal, 537,508 tons of sub-bituminous coal and 3,213,903 tons of lignite coal. In 1933, bituminous coal production totalled 7,979,283 tons, sub-bituminous coal, 554,118 tons, and lignite coal, 3,369,943 tons.

Nova Scotia mines produced 6,341,625 tons during 1934; this represented a 39.1 per cent increase over the tonnage mined in 1933. New Brunswick's output advanced slightly to 314,750 tons from the preceding year's total of 312,303 tons. Manitoba produced 4,113 tons as against 3,880 tons in 1933. A 2 per cent decline was recorded in Saskatchewan's production; the 1934 total was 909,288 tons and the 1933 output, 927,649 tons. Reports from Alberta operators show that 4,753,810 tons were mined in 1934 as compared with 4,718,788 tons in 1933. The first upward trend in coal output in British Columbia since 1928 was recorded during the year under review; the 1934 production totalled 1,485,969 tons while in 1933 the output was 1,382,272 tons. The Yukon output declined to 638 tons from the 1933 total of 862 tons.

Exports of Canadian coal declined steadily from 1927 to 1933; in the former year 1,113,330 tons were exported while in the latter year only 259,233 tons were shipped from Canada. During 1934, the Canadian exports totalled 306,335 tons, made up of 212,151 tons cleared through Nova Scotia, New Brunswick, Quebec and Ontario ports, and 94,184 tons shipped through Manitoba, Saskatchewan, Alberta and British Columbia ports.

Imports of coal into Canada in 1934 reached a total of 13,813,657 tons as compared with 11,465,976 tons imported in the preceding year. Anthracite coal importations in 1934 totalled 3,537,309 tons, of which Great Britain supplied 1,643,516 tons, the United States, 1,804,127 tons, Germany, 72,103 tons, Belgium, 17,557 tons, and Newfoundland, 6 tons. These data show that Great Britain supplied 46.5 per cent of Canada's anthracite supply in 1934 as compared with 52.9 per cent in the preceding year and 44.6 per cent in 1932. The United States contributed 51 per cent of the 1934 anthracite importations, 47.1 per cent of the 1933 and 53.7 per cent of the 1932 imports. Bituminous coal receipts in 1934 rose to 10,273,557 tons from the 1933 total



of 8,427,656 tons. The 1934 importations included 96.76 per cent from the United States, 3.22 per cent from Great Britain and the remainder from Japan, Norway, Germany, Newfoundland and Sweden. Imports of lignite coal from the United States amounted to 2,791 tons in 1934 as against 2,707 tons in 1933.

Employment was furnished by the Canadian coal mines to 24,671 men during 1934; in the preceding year an average of 24,812 men were employed. Wage-earners employed in the eastern coal mines numbered 13,086 and in the western mines, 11,585 men. An average of 238 days work was furnished surface employees and 207 days to underground workers in 1934. In addition to these men there were 1,290 salaried employees on the mine payrolls in 1934. All employees working in or about the coal mines received \$25,662,591 in 1934; during the preceding year salaries and wages totalled \$22,378,736. Corresponding with the advance in output in 1934 there was a considerable increase in the number of man-days work furnished to wage-earners. During the year these men received 5,270,076 days work as against 4,511,345 man-days work in 1933.

Coal consumption in Canada in 1934 was computed at 27,317,515 tons; in the preceding year 23,110,087 tons were made available for consumption. In addition to coal, Canada consumes large quantities of coke, natural and artificial gas, fuel oil, wood and electricity for industrial and domestic purposes.

In 1934 the Canadian coke supply was estimated at 3,166,245 tons or 31.3 per cent above the 1933 total. Canadian coke producers sold 1,474,916 tons in 1934; this represented 67.6 per cent of the year's output. Coke importations increased 44.4 per cent in 1934 to 930,221 tons from the 1933 imports of 644,075 tons. The coal equivalent of the imported coke was 1,431,138 tons. Approximately 844,303 tons of Canadian bituminous coal were used by Canadian coke and artificial gas manufacturers in 1934; in addition, 2,271,801 tons of imported coal were used.

Manufactured gas consumption for domestic and industrial purposes in Canada amounted to 15,409,927 thousand cubic feet in 1934 as compared with 15,893,248 thousand cubic feet in the preceding year. Natural gas consumption in 1934 consisted of 15,300,000 thousand cubic feet for domestic purposes and 7,000,000 thousand cubic feet for industrial use. The estimated displacement of coal through the domestic consumption of natural gas in 1934 was 612,000 tons.

The Canadian consumption of fuel oil in 1934 totalled 400.7 million imperial gallons and of gas oils, 102.3 million imperial gallons; in 1933 fuel oil consumption amounted to 389.8 million imperial gallons and gas oils to 91.9 million imperial gallons. According to the Dominion Fuel Board's survey of fuel oil consumption, 97.1 million imperial gallons were consumed for domestic and building heating in 1933; industrial consumption totalled 74.4 million imperial gallons; tractor fuel, 12.6 million imperial gallons; railroads, 49.5 million imperial gallons, and bunkering purposes, 129 million imperial gallons. A possible coal displacement of 693,571 tons was indicated by the quantity of fuel oil used for domestic purposes in 1933.

**Table 180.—Capital Employed in the Coal Mines of Canada, by Provinces, 1933 and 1934**

Province	1933				1934			
	Capital employed as represented by				Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	46,218,286	1,883,877	4,412,256	52,514,419	40,369,939	3,008,993	4,293,277	47,663,209
New Brunswick...	1,541,080	25,335	214,958	1,781,371	1,486,916	28,063	341,413	1,856,392
Manitoba.....	2,010	.....	1,183	3,193	2,304	.....	600	2,904
Saskatchewan....	4,882,884	75,362	252,917	5,211,163	4,818,248	123,981	240,473	5,182,702
Alberta.....	36,577,858	1,207,324	6,070,698	43,855,880	33,845,242	1,230,576	6,356,058	41,431,876
British Columbia.	19,348,706	506,109	2,316,949	22,171,764	18,994,859	529,293	2,409,651	21,933,803
Yukon.....	203,000	.....	.....	203,000	203,000	520	.....	203,520
<b>Canada.....</b>	<b>103,773,824</b>	<b>3,693,007</b>	<b>13,268,939</b>	<b>125,740,790</b>	<b>99,711,505</b>	<b>4,921,426</b>	<b>13,641,472</b>	<b>118,274,403</b>

Table 181.—Employees, Salaries and Wages in the Coal Mines of Canada, by Provinces, 1934

Province	Average number of employees					Salaries and wages		
	Salaried employees		Wage-earners		Total	Salaries	Wages	Total
	Male	Female	Surface	Under-ground				
						\$	\$	\$
Nova Scotia.....	395	55	2,000	10,051	12,501	782,454	12,055,775	12,838,229
New Brunswick.....	28	6	202	533	1,069	66,201	678,844	745,045
Manitoba.....			4	8	12		5,364	5,364
Saskatchewan.....	44	6	263	619	932	93,787	546,177	639,964
Alberta.....	522	32	2,066	5,773	8,393	1,174,269	6,895,136	8,069,405
British Columbia.....	185	17	890	1,959	2,051	462,894	2,900,190	3,363,084
Yukon.....			1	2	3		1,500	1,500
<b>Canada.....</b>	<b>1,174</b>	<b>116</b>	<b>5,426</b>	<b>19,245</b>	<b>25,961</b>	<b>2,579,665</b>	<b>23,082,986</b>	<b>25,662,591</b>

Table 182.—Wage-earners Employed in the Coal Mines of Canada, by Classes and by Provinces, 1934, with Comparative Totals for 1933

Classification	Province							Canada		
	Nova Scotia	New Brunswick	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Surface	Under-ground	Total
Administration.....	58	17		10	62	11		158		158
Officials, foremen and clerks.....	693	34	1	76	613	173	1	531	1,060	1,591
Screenmen and loaders.....	612	46	2	87	633	140	1	1,521		1,521
Stripping shovel operators.....				4				4		4
Hand cutters and helpers.....	838	542	7	412	1,814	741	1		4,355	4,355
Machine cutters and helpers.....	1,004	43		31	378	112			1,568	1,568
Machine loaders and helpers.....	1,943	114		28	1,626	177			3,888	3,888
Horse haulage employees.....	439	3		63	440	167		65	1,047	1,112
Mechanical haulage employees.....	1,448	4		26	366	237		122	1,959	2,081
Ventilation employees.....	229	1		4	67	28		1	328	329
Roadmakers.....	270	14		13	130	38		6	459	465
Timbermen.....	1,038	30	1	9	225	110		15	1,398	1,413
Pumpmen.....	87	6		5	48	17		9	154	163
Loading shovel.....				7				7		7
Cleaning shovel.....				2				2		2
Chute loaders.....	76				139	9			224	224
Enginemen.....	241	17	1	12	154	65		407	83	490
Firemen.....	134	2		14	96	41		287		287
Machinists.....	183	1		5	63	39		279	12	291
Carpenters and masons.....	122	6		4	48	47		226	1	227
Other mechanics.....	302	2		7	95	164		274	296	570
Japanese.....						20		1	19	20
Chinese.....						99		97	2	99
Indians.....										
All other employees.....	2,334	153		63	842	414		1,414	2,392	3,806
<b>Total for 1934.....</b>	<b>12,051</b>	<b>1,035</b>	<b>12</b>	<b>882</b>	<b>7,839</b>	<b>2,849</b>	<b>3</b>	<b>5,426</b>	<b>19,245</b>	<b>24,671</b>
<b>Total for 1933.....</b>	<b>11,861</b>	<b>1,025</b>	<b>10</b>	<b>891</b>	<b>7,971</b>	<b>3,050</b>	<b>4</b>	<b>5,433</b>	<b>19,379</b>	<b>24,812</b>

Table 183.—Output of Coal from Canadian Mines, 1925-1934

Year	Short tons	Value	Average per ton
		\$	\$
1925.....	13,134,968	49,261,951	3.75
1926.....	16,478,131	59,875,094	3.63
1927.....	17,426,861	61,867,463	3.55
1928.....	17,564,293	63,757,833	3.63
1929.....	17,496,557	63,065,170	3.61
1930.....	14,881,324	52,849,748	3.55
1931.....	12,243,211	41,207,682	3.37
1932.....	11,738,913	37,117,695	3.16
1933.....	11,903,344	35,923,962	3.02
1934.....	12,219,697	38,025,912	3.11

Table 184.—Output and Value of Coal in Canada, by Kinds and by Provinces, 1933 and 1934

(Short tons)

Province	1933			1934		
	Number of mines	Quantity	Value	Number of mines	Quantity	Value
			\$			\$
NOVA SCOTIA (Bituminous).....	36	4,557,590	15,969,793	37	6,341,625	21,860,093
NEW BRUNSWICK (Bituminous).....	34	312,303	1,041,744	25	314,750	1,026,343
MANITOBA (Lignite).....	2	3,880	9,214	3	4,113	8,952
SASKATCHEWAN (Lignite).....	*106	927,649	1,285,996	*132	909,288	1,241,130
ALBERTA—						
Bituminous.....	15	1,726,256	5,435,656	16	1,915,800	6,116,513
Sub-bituminous.....	21	554,118	1,274,017	19	537,508	1,256,936
Lignite.....	†296	2,438,414	5,597,585	†280	2,300,502	5,182,650
Total.....	332	4,718,788	12,307,258	315	4,753,810	12,556,099
BRITISH COLUMBIA (Bituminous).....	24	1,382,272	5,306,287	21	1,485,969	5,351,108
YUKON (Bituminous).....	1	862	3,670	1	638	2,217
Canada—						
Bituminous.....	110	7,979,283	27,757,156	100	10,658,782	44,356,274
Sub-bituminous.....	21	554,118	1,274,017	19	537,508	1,256,936
Lignite.....	464	3,369,943	6,892,795	415	3,213,903	6,432,732
Total.....	535	11,903,344	35,923,962	534	13,810,193	42,045,942

\* Exclusive of 93 small mines in operation during part of 1933 and 92 small mines operating during part of 1934.

† Exclusive of 66 small mines operated under special permits in 1933 and 33 small mines in 1934.

Table 185.—Disposition of Coal from Canadian Mines, 1933 and 1934

	1933			1934		
	Total coal	Total value	Average value per ton	Total coal	Total value	Average value per ton
	Tons	\$	\$	Tons	\$	\$
Supplied to employees for domestic consumption.....	152,724	437,475	2.86	167,005	472,549	2.82
Used for power purposes—						
(a) Shops.....	87,633	312,378	3.57	84,748	291,208	3.43
(b) Colliery boilers.....	546,088	1,431,573	2.62	569,430	1,513,119	2.65
(c) Companies' railroads.....	56,272	200,193	3.56	68,604	250,300	3.65
(d) Harbour tugs and dredges.....						
Shipped. (See Table 187)—						
(a) Ships' bunkers.....	233,847	33,367,673	3.10	340,483	38,921,745	3.11
(b) Railroads.....	2,634,006			3,178,701		
(c) Other.....	7,904,327			8,986,780		
Used in making coke at colliery.....	84,723	249,815	2.95	131,962	368,203	2.79
Used in making briquettes.....	15,886	49,700	3.13	15,028	48,323	3.22
Put on bank.....	487,197	1,674,828	3.44	866,819	2,955,933	3.41
Put on waste heap.....	230,724			230,311		
<b>Total disposition.....</b>	<b>12,433,427</b>	<b>37,723,635</b>	<b>3.03</b>	<b>14,639,871</b>	<b>44,821,390</b>	<b>3.06</b>
Lifted from bank.....	518,991	1,799,673	3.47	814,880	2,775,438	3.40
Lifted from waste heap.....	11,092			14,798		
<b>Total output.....</b>	<b>11,903,344</b>	<b>35,923,962</b>	<b>3.02</b>	<b>13,810,193</b>	<b>42,045,942</b>	<b>3.04</b>

Table 186.—Disposition of Coal from Canadian Mines, by Provinces, 1934

(Short tons)

	Nova Scotia	New Brunswick	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Canada
Supplied to employees for domestic consumption	109,979	3,441	52	3,388	35,491	14,648	6	167,005
Coal shipped. (See Table 187)	5,737,906	307,988	4,006	866,800	4,320,121	1,268,952	191	12,505,964
Used under colliery boilers, etc.	266,557	1,695	55	24,404	175,176	101,520	23	569,430
Used by companies' railroads	44,856	900		6,965	7,084	8,799		68,604
Used for manufacture of coke at colliery					91,745	40,217		131,962
Used in making briquettes				284	14,764			15,048
Used in shops, etc.	84,748							84,748
Used by harbour tugs and dredges								
Put on bank	747,118	16,663		6,983	51,205	44,828	22	866,819
Put on waste heap	48,484	703		6,731	115,181	58,816	396	230,311
<b>Total disposition</b>	<b>7,039,648</b>	<b>331,390</b>	<b>4,113</b>	<b>915,535</b>	<b>4,810,767</b>	<b>1,537,780</b>	<b>638</b>	<b>14,639,871</b>
Lifted from bank	698,023	16,629		5,757	52,401	42,070		814,880
Lifted from waste heap		11		490	4,556	9,741		14,798
<b>Total output</b>	<b>6,341,625</b>	<b>314,750</b>	<b>4,113</b>	<b>909,298</b>	<b>4,753,810</b>	<b>1,485,969</b>	<b>638</b>	<b>13,819,193</b>

Table 187.—Shipments of Coal from Canadian Mines, by Grades and Destinations, 1933 and 1934

Destination	1933				1934			
	Run-of-mine	Screened	Slack	Total	Run-of-mine	Screened	Slack	Total
Prince Edward Island	4,320	50,873	8,533	63,726	5,748	59,670	10,270	75,688
Nova Scotia	110,042	294,894	477,892	882,828	124,542	418,916	625,418	1,168,876
New Brunswick	126,697	110,157	217,649	454,503	135,069	117,653	249,606	502,328
Quebec	58,128	1,070,384	870,473	1,998,985	121,709	1,308,956	1,453,944	2,884,609
Ontario	482	34,361	12,328	47,171	5,273	53,025	20,613	78,911
Manitoba	102,054	350,789	452,540	905,383	70,541	304,460	499,551	874,552
Saskatchewan	280,407	826,470	448,060	1,554,937	239,046	721,074	511,582	1,471,702
Alberta	196,888	422,186	471,692	1,090,766	190,133	393,206	480,629	1,063,968
British Columbia	19,362	584,767	132,987	737,116	18,095	465,874	167,133	651,102
Yukon		328		328		191		191
Northwest Territories						31		31
<b>Total domestic shipments</b>	<b>898,380</b>	<b>3,745,209</b>	<b>3,092,154</b>	<b>7,735,743</b>	<b>910,156</b>	<b>3,843,056</b>	<b>4,018,716</b>	<b>8,771,958</b>
Railroads.. / In Canada	2,002,784	523,616	110,859	2,637,259	2,406,488	607,940	93,655	3,108,083
Ships' bunkers.. / In United States	162,043	71,804		233,847	234,910	105,243	54	340,483
<b>Total railroads and ships' bunkers</b>	<b>2,164,827</b>	<b>595,420</b>	<b>110,859</b>	<b>2,871,106</b>	<b>2,711,962</b>	<b>713,183</b>	<b>94,039</b>	<b>3,519,184</b>
United States	1,515	18,097	58,131	77,743	2,735	21,136	53,506	77,377
Alaska		14,249		14,249		15,290		15,290
Newfoundland	9,940	61,045	1,359	72,344	4,116	115,697	120	119,933
Other countries		995		995		2,222		2,222
<b>Total external shipments</b>	<b>11,455</b>	<b>94,386</b>	<b>59,490</b>	<b>165,331</b>	<b>6,851</b>	<b>154,345</b>	<b>53,626</b>	<b>214,822</b>
<b>Total</b>	<b>3,074,682</b>	<b>4,435,015</b>	<b>3,252,593</b>	<b>10,772,180</b>	<b>3,628,969</b>	<b>4,719,584</b>	<b>4,166,411</b>	<b>12,505,964</b>

Table 188.—Imports of Anthracite and Bituminous Coal into Canada from Great Britain, by Grades and by Provinces, 1933 and 1934

(Short tons)

Destination	1933				1934			
	Anthracite			Bituminous all grades	Anthracite			Bituminous all grades
	Grate, egg, stove, nut, and pea	Screenings or dust	N.O.P.		Grate, egg, stove, nut, and pea	Screenings or dust	N.O.P.	
Prince Edward Island	2,863			1,677			9,557	1,992
Nova Scotia	49,785			59,984	54,623		339	51,719
New Brunswick	76,331		247	10,790	78,700		434	12,789
Quebec	1,329,683	2,168	116,608	244,276	1,427,677	31,077	8,662	293,357
Central Ontario	24,894			1,205	32,165			
Head of Lakes								
Manitoba			150	1,178				1,506
Saskatchewan				101				112
British Columbia			3,647	18,850			282	42
<b>Canada</b>	<b>1,482,956</b>	<b>2,168</b>	<b>120,652</b>	<b>338,051</b>	<b>1,593,165</b>	<b>31,077</b>	<b>19,274</b>	<b>331,517</b>



**Table 189.—Imports of Anthracite, Bituminous and Lignite Coal into Canada from the United States, by Grades and by Provinces, 1933 and 1934**

(Short tons)

Destination	1933					1934				
	Anthracite			Bituminous, all grades	Lignite	Anthracite			Bituminous, all grades	Lignite
	Grate, egg, stove, nut, and pea	Screenings or dust	N.O.P.			Grate, egg, stove, nut, and pea	Screenings or dust	N.O.P.		
Prince Edward Island.....	678			133				1,153	99	
Nova Scotia.....	7,850			449		11,677			678	
New Brunswick.....	18,685		267	9,249		22,513		103	23,020	
Quebec.....	234,910	5,761	43,123	433,706		293,092	8,997	106,826	659,566	
Ontario.....	1,001,561	2,273	109,063	7,624,426		1,206,051	4,172	143,457	9,243,021	
Manitoba.....	1,804	95	3,620	12,035	292	388		5,698	10,597	253
Saskatchewan.....		32	25	1,226	317				1,123	42
Alberta.....			75	998					1,302	10
British Columbia.....			2	7,220	2,098				1,928	2,486
Yukon.....				7					37	
<b>Canada.....</b>	<b>1,265,488</b>	<b>8,161</b>	<b>156,180</b>	<b>8,039,451</b>	<b>2,707</b>	<b>1,533,721</b>	<b>13,169</b>	<b>257,237</b>	<b>9,941,371</b>	<b>2,791</b>

**Table 190.—Imports of Anthracite and Bituminous Coal into Canada from Other Countries, by Provinces, 1933 and 1934**

(Short tons)

Destination	Source	1933				1934			
		Anthracite			Bituminous, all grades	Anthracite			Bituminous, all grades
		Grate, egg, stove, nut and pea	Screenings or dust	N.O.P.		Grate, egg, stove, nut, and pea	Screenings or dust	N.O.P.	
Prince Edward Island.....	Newfoundland.....								24
New Brunswick.....	Germany.....				144				
Quebec.....	Germany.....					72,103			50
	Belgium.....					17,557			
	Newfoundland.....					6			
	Norway.....								280
	Sweden.....								15
British Columbia.....	China.....			6					
	Japan.....								300
	Alaska.....			2					
<b>Canada.....</b>				<b>8</b>	<b>144</b>	<b>89,666</b>			<b>669</b>

**Table 191.—Average Imports of Coal into Canada, by Kinds and by Provinces, for the Five Years, 1930-1934**

(Short tons)

Destination	Anthracite			Total bituminous	Lignite	Total all grades
	Grate, egg, stove, nut and pea	Other	Total			
Prince Edward Island.....	4,006	3,667	7,673	4,226		11,899
Nova Scotia.....	61,397	87	61,484	48,755		110,239
New Brunswick.....	100,124	806	100,930	38,539		139,469
Quebec.....	1,591,398	151,416	1,742,814	906,633		2,649,447
Central Ontario.....	1,360,590	130,218	1,490,808	8,321,114		9,811,922
Head of Lakes.....	15,904	2,675	18,579	840,862		859,441
<b>Total Ontario.....</b>	<b>1,376,494</b>	<b>132,893</b>	<b>1,509,387</b>	<b>9,161,976</b>		<b>10,671,363</b>
Manitoba.....	2,634	2,880	5,514	13,911	140	19,565
Manitoba and Head of Lakes.....	18,538	5,535	24,093	854,773	140	879,006
Saskatchewan.....	73	12	85	1,474	227	1,786
Alberta.....		16	16	1,078	2	1,096
British Columbia.....	224	935	1,159	8,619	6,349	16,127
Yukon.....				13		13
<b>Canada.....</b>	<b>3,136,350</b>	<b>292,712</b>	<b>3,429,062</b>	<b>10,185,224</b>	<b>6,718</b>	<b>13,621,004</b>

Table 192.—Exports of Canadian Coal, by Destinations, 1932-1934

(Compiled in the *External Trade Branch*)

Destination	1932		1933		1934	
	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$
<b>BRITISH EMPIRE</b>						
United Kingdom.....	8,575	53,811	8,918	50,585	21,158	112,653
Irish Free State.....	1,420	8,354	1,753	9,072	1,865	9,437
British South Africa.....	1,607	9,642	5,403	29,466	6,989	34,102
Bermuda.....	44	352	35	262	1,094	5,223
British West Indies—						
B Barbados.....					1,235	5,623
Jamaica.....			282	2,115	200	1,500
Trinidad and Tobago.....					970	4,553
Other British West Indies.....					1,184	5,516
Gibraltar.....	439	2,834				
Newfoundland.....	87,539	466,936	79,995	389,032	102,544	470,969
Sierra Leone.....	3,525	20,250			1,111	5,187
Australia.....	13,472	98,506	23,759	152,082	22,126	135,220
New Zealand.....			2,116	11,109	5,004	22,518
Total British Empire.....	116,627	660,485	122,261	643,723	165,480	812,501
<b>FOREIGN COUNTRIES</b>						
Argentina.....	71	515				
Belgium.....	1,570	8,504	1,038	5,814	2,415	11,849
Brazil.....			822	4,521		
Chile.....					994	4,647
China.....	6,815	50,744	308	2,006	834	4,916
Cuba.....	1,502	9,052	443	2,497	1,896	8,890
Denmark.....	30	225				
France.....	999	5,253	1,463	8,173	5,150	25,976
French Possessions—						
French Africa.....	447	2,682				
St. Pierre and Miquelon.....	3,090	19,069	2,727	13,374	1,325	7,241
Germany.....			123	673		
Greece.....	726	4,964				
Italy.....	307	1,689	84	630		
Japan.....	3,523	26,593	3,765	16,780	1,614	7,458
Netherlands.....	2,098	11,011	891	3,932	2,394	11,739
Panama.....					1,063	4,784
Peru.....	976	6,743				
Poland and Danzig.....					305	1,449
Portuguese Africa.....			1,448	7,964		
Russia (U.S.S.R.).....					2,400	18,000
San Domingo.....					297	1,473
Spain.....	161	960			199	995
Sweden.....			406	2,233	185	925
United States.....	135,698	556,127	108,263	375,150	107,162	396,728
Alaska.....	10,847	68,420	14,583	96,710	12,622	81,407
Puerto Rico.....			608	4,045		
Total foreign countries.....	188,860	772,551	136,972	544,502	140,855	588,477
<b>Total.....</b>	<b>285,487</b>	<b>1,433,036</b>	<b>259,233</b>	<b>1,188,225</b>	<b>306,335</b>	<b>1,400,978</b>

Table 193.—Annual Consumption of Coal in Canada, 1925-1934

Calendar year	Canadian*		Imported coal "entered for consumption"				Total	Per capita
			From U.S.A.	From Great Britain	Total†			
	Short tons	%	Short tons	Short tons	Short tons	%	Short tons	
1925.....	12,125,290	42.6	15,744,957	604,117	16,331,971	57.4	28,457,261	3.062
1926.....	15,086,296	47.7	16,204,405	287,299	16,565,555	52.3	31,651,851	3.349
1927.....	15,944,983	46.7	17,266,434	907,220	18,177,303	53.3	34,122,286	3.541
1928.....	16,487,807	50.0	15,830,688	682,755	16,515,582	50.0	33,003,389	3.356
1929.....	16,387,461	48.0	16,780,452	843,502	17,724,132	52.0	34,111,593	3.402
1930.....	14,052,671	43.3	16,971,933	1,144,861	18,412,039	56.7	32,464,710	3.181
1931.....	11,682,779	47.7	11,793,798	987,442	12,828,327	52.3	24,511,106	2.362
1932.....	11,212,701	49.0	9,889,866	1,727,716	11,654,492	51.0	22,867,193	2.177
1933.....	11,456,273	51.5	8,865,935	1,942,875	10,808,962	48.5	22,265,235	2.085
1934.....	13,236,406	51.1	10,580,710	1,981,116	12,651,168	48.9	25,887,574	2.392

\* The sum of Canadian coal mines sales, colliery consumption, coal supplied to employees, and coal used in making coke, etc., less the tonnage of coal exported.

† Includes small tonnages from countries other than Great Britain and the United States. Deductions have been made to take account of foreign coal re-exported from Canada and bituminous coal ex-warehoused for ships' stores.

Table 194.—Summary Statistics for 1934—Output, Exports, Interprovincial Shipments, Imports and Coal made Available for Consumption in Canada, by Provinces

Province	Canadian coal				Im- ported from U.S.A.	Im- ported from Great Britain	Im- ported from Ger- many	Im- ported from Bel- gium	Im- ported from New- found- land	Im- ported from other count- ries	Coal available for con- sumption
	Output	Re- ceived from other prov.	Shipped to other prov.	Ex- ported							
PRINCE EDWARD ISLAND—											
Anthracite.....					1,153	9,557					10,710
Bituminous.....		75,688			99	1,992			24		77,803
Total.....		75,688			1,252	11,549			24		88,513
NOVA SCOTIA—											
Anthracite.....					11,677	54,962					66,639
Bituminous.....	6,341,625	165	3,333,420	169,972	678	51,719					2,890,795
Total.....	6,341,625	165	3,333,420	169,972	12,355	106,681					2,957,434
NEW BRUNSWICK—											
Anthracite.....					22,616	79,134					101,750
Bituminous.....	314,750	365,153	13,793	42,128	23,020	12,789					659,791
Total.....	314,750	365,153	13,793	42,128	45,636	91,923					761,541
QUEBEC—											
Anthracite.....					408,915	1,467,416	72,103	17,557	6		1,965,997
Bituminous.....		2,884,609		50	659,566	263,357	50			295	3,807,827
Sub-bituminous.....											
Total.....		2,884,609		50	1,068,481	1,730,773	72,153	17,557	6	295	5,773,824
CENTRAL ONTARIO—											
Anthracite.....					1,345,746	32,165					1,377,911
Bituminous.....		26,162		1	8,509,228						8,535,389
Sub-bituminous.....		*20,357									21,357
Lignite.....		*32,392									32,392
Total.....		78,911		1	9,854,974	32,165					9,966,049
MANITOBA AND HEAD OF LAKES—											
Anthracite.....					14,020						14,020
Bituminous.....		213,054		51	744,390	1,506					958,899
Sub-bituminous.....		70,980									70,980
Lignite.....	4,113	586,512		1,383	253						589,495
Total.....	4,113	870,546		1,434	758,663	1,506					1,633,394
SASKATCHEWAN—											
Anthracite.....											
Bituminous.....		74,567		29	1,123	112					75,773
Sub-bituminous.....		14,165									14,165
Lignite.....	909,288	913,037	381,368	3,925	42						1,437,074
Total.....	909,288	1,001,769	381,368	3,954	1,165	112					1,527,012
ALBERTA—											
Anthracite.....											
Bituminous.....	1,915,800	10,616	227,262	349	1,302						1,700,107
Sub-bituminous.....	537,508		132,703								404,805
Lignite.....	2,300,502		1,204,472	1,014	10						1,095,026
Total.....	4,753,810	10,616	1,564,437	1,363	1,312						3,199,938
BRITISH COLUMBIA—											
Anthracite.....						282					282
Bituminous.....	1,485,969	42,899	118,438	82,290	1,928	42				300	1,330,410
Sub-bituminous.....		27,170									27,170
Lignite.....		53,899		5,127	2,486						51,258
Total.....	1,485,969	123,968	118,438	87,417	4,414	324				300	1,409,120
YUKON—											
Bituminous.....	638			16	37						659
Total.....	638			16	37						659
NORTHWEST TERRITORIES—											
Sub-bituminous.....		31									31
Total.....		31									31
CANADA—											
Anthracite.....					1,804,127	1,643,516	72,103	17,557	6		3,537,309
Bituminous.....	10,058,782	3,692,913	3,692,913	294,886	9,941,371	331,517	50		24	595	20,037,453
Sub-bituminous.....	537,508	132,703	132,703								537,508
Lignite.....	3,213,903	1,585,840	1,585,840	11,449	2,791						3,205,245
Total.....	13,810,193	5,411,456	5,411,456	308,335	11,748,289	1,975,033	72,153	17,557	30	595	27,317,515

\* Shipments to any point in Ontario from western mines.

Table 195.—World Production of Coal\* 1930-1934

(Including brown coal)  
(Long tons)

Country	1930	1931	1932	1933	1934
<b>BRITISH EMPIRE</b>					
Great Britain—					
Anthracite.....	6,400,705	5,829,175	6,616,972	7,053,043	7,128,123
Bituminous.....	237,481,119	213,629,776	202,116,168	200,059,200	213,599,565
Irish Free State—					
Anthracite.....	†	73,393	64,506	86,246	89,731
Semi-bituminous.....	†	18,347	16,674	19,041	21,343
Nigeria.....	347,842	327,681	252,485	235,133	259,754
Southern Rhodesia.....	923,915	577,983	431,183	476,340	632,790
Union of South Africa.....	12,029,529	10,709,114	9,764,425	10,545,197	12,002,100
Canada—					
Bituminous.....	9,665,035	7,911,929	6,887,749	7,124,360	8,981,055
Sub-bituminous.....	538,713	420,842	500,805	494,748	479,918
Lignite.....	3,083,149	2,598,668	3,092,618	3,008,878	2,869,556
British Borneo—					
State of North Borneo.....	58,491	28,926	163	78	28
Sarawak.....	14,680	18,213			†
Federated Malay States.....	565,573	402,355	277,848	218,247	321,461
India—					
Gondwana Coalfields.....	23,342,372	21,331,872	19,814,524	19,456,254	21,691,404
Tertiary Coalfields.....	460,676	384,563	338,863	332,909	366,043
Used by mines.....	†	543,000	504,000	495,060	†
Australia.....					
Bituminous.....	9,531,359	8,401,260	8,585,858	9,091,976	9,353,714
Lignite.....	1,831,507	2,194,453	2,612,512	2,580,060	2,617,534
New Zealand—					
Bituminous.....	1,382,875	979,636	928,234	843,845	831,702
Brown coal.....	1,046,677	1,069,749	806,397	860,238	1,103,968
Lignite.....	112,540	108,371	107,391	117,175	124,645
Total British Empire.....	309,000,000	278,000,000	264,000,000	263,000,000	283,000,000
<b>FOREIGN COUNTRIES</b>					
Albania—					
Lignite.....	4,215	3,109	†	†	†
Austria—					
Bituminous.....	212,478	224,541	217,819	235,150	246,861
Brown coal.....	3,014,605	2,934,978	3,055,021	2,966,862	2,805,905
Belgium—					
Anthracite and semi-anthracite.....	5,710,956	5,865,653	4,656,753	5,246,607	5,731,792
Bituminous.....	21,270,796	20,749,689	16,428,442	19,653,598	20,240,618
Bulgaria—					
Anthracite.....	2,303	6,117	3,075	3,465	6,812
Bituminous.....	62,312	78,161	93,758	75,184	70,731
Lignite.....	1,498,345	1,414,217	1,636,501	1,469,896	1,543,192
Czechoslovakia—					
Bituminous.....	14,207,021	12,895,773	10,877,907	10,365,655	10,518,684
Brown coal.....	18,890,532	17,648,430	15,607,935	14,825,194	14,932,486
France—					
Saar.....	13,026,730	11,187,485	10,273,195	10,394,373	11,138,953
Other districts—					
Anthracite and bituminous (a).....	53,049,020	49,220,890	45,535,513	46,113,162	47,870,063
Lignite.....	1,138,235	1,018,575	995,761	1,071,102	1,014,325
Germany—					
Bituminous.....	140,444,006	116,766,357	103,086,309	107,959,643	122,884,578
Lignite.....	143,704,018	131,205,263	120,709,596	124,791,923	135,105,863
Greece—					
Lignite.....	127,576	103,546	135,410	97,496	†
Hungary—					
Bituminous.....	798,731	764,150	880,674	787,418	744,316
Brown coal.....	5,746,586	5,650,352	5,395,064	5,393,595	5,061,394
Lignite.....	332,348	364,451	442,726	420,348	420,101
Lignite (anhydrous).....			115,203	115,310	113,526
Italy—					
Anthracite.....	19,530	15,331	47,004	66,644	83,212
Bituminous.....	207,946	216,640	204,390	262,439	284,481
Brown coal.....	567,750	358,730	370,107	376,712	402,162
Jugoslavia—					
Bituminous.....	360,430	399,914	362,187	377,432	381,098
Brown coal.....	3,748,858	3,467,492	3,030,987	2,806,202	2,942,596
Lignite.....	1,077,869	1,040,425	1,010,853	905,274	921,520
Netherlands—					
Bituminous.....	12,018,229	12,697,631	12,554,978	12,375,372	12,145,975
Brown coal.....	141,873	120,269	122,115	95,511	91,032
Poland—					
Bituminous.....	36,914,000	37,660,667	28,379,163	26,924,235	28,771,390
Brown coal.....	54,000	38,800	32,900	32,963	25,986
Portugal—					
Anthracite.....	183,471		187,632	205,399	195,906
Bituminous.....	27,345	223,475	49,753	19,426	3,652
Brown coal.....	33,928		16,043	11,291	14,835
Roumania—					
Anthracite.....			12,052	17,777	
Bituminous.....	294,105	282,005	172,992	173,986	223,041
Lignite.....	2,038,348	1,606,088	1,440,807	1,292,878	1,585,420



Table 195.—World Production of Coal\* 1930-1934—Concluded

(Including brown coal)

(Long tons)

Country	1930	1931	1932	1933	1934
<b>Russia—</b>					
Anthracite.....					
Bituminous.....					
European.....	47,635,600	55,737,000	63,299,000	71,097,000	92,023,000
Asiatic.....					
Brown coal.....					
<b>Spain—</b>					
Anthracite.....	515,306	516,402	539,110	503,399	634,440
Bituminous.....	6,492,054	6,462,526	6,204,007	5,340,855	5,203,891
Brown coal.....	381,904	336,073	330,981	298,230	293,926
<b>Hebrides and Bear Island.</b>	185,443	239,267	261,500	364,000	501,000
<b>Sweden.....</b>	391,675	337,777	327,816	343,410	408,668
<b>Switzerland (b).....</b>	4,000	4,000	4,000	4,000	4,000
<b>Algeria.....</b>	16,922	25,186	24,584	29,948	33,465
<b>Belgian Congo.....</b>	131,700	84,359	17,000	413	4,622
<b>Morocco (French)—</b>					
Anthracite.....	965	5,574	14,724	26,848	36,501
Bituminous.....	†	†	19,430	15,600	21,524
<b>Greenland.....</b>	4,700	4,600	†	†	†
<b>Mexico.....</b>	1,273,818	970,723	642,314	556,144	620,000
<b>United States—</b>					
Anthracite.....	61,950,747	53,255,046	44,513,590	44,233,343	51,237,000
Bituminous and lignite.....	417,434,196	341,151,246	276,526,671	297,884,404	320,894,305
<b>Brazil.....</b>	359,673	454,061	499,170	560,918	612,331
<b>Chile.....</b>	1,419,367	1,083,014	1,063,027	1,512,241	1,775,291
<b>Colombia (estimated).....</b>	200,000	200,000	200,000	200,000	200,000
<b>Peru.....</b>	196,855	138,332	25,416	29,600	34,703
<b>Venezuela (c).....</b>	12,360	3,000	4,644	4,862	†
<b>China (d).....</b>	26,037,000	17,741,573	18,370,000	19,143,000	†
<b>Dutch East Indies.....</b>	1,841,278	1,382,223	1,033,712	1,018,881	1,015,442
<b>Formosa.....</b>	1,573,478	1,399,093	1,333,595	1,315,000	1,355,000
<b>French Indo-China—</b>					
Anthracite.....	1,860,000	1,650,000	1,640,637	1,517,861	1,530,025
Bituminous.....	47,000	28,000	22,328	25,508	†
Brown coal.....	28,000	23,000	23,091	22,644	30,620
<b>Japan—</b>					
Semi-anthracite.....	30,880,669	27,545,251	27,610,211	32,010,079	35,357,004
Bituminous.....	126,593	115,881	106,818	113,968	122,815
Brown coal.....	634,788	627,886	666,691	874,874	1,177,748
<b>Manchuria.....</b>					
Anthracite.....	870,174	904,000	1,086,755	729,511	966,855
Bituminous.....	†	8,984,200	7,992,000	556,585	695,122
<b>Manchoukuo.....</b>	20,423	18,668	18,184	9,005,000	†
<b>Philippine Islands.....</b>				15,668	†
<b>Turkey in Asia—</b>					
Bituminous.....	1,569,966	1,549,230	1,568,411	1,830,607	2,252,130
Lignite.....	9,241	7,652	13,340	29,094	39,516
<b>New Caledonia.....</b>	9,517	†	†	†	†
<b>Total Foreign countries.....</b>	1,080,000,000	960,000,000	850,000,000	890,000,000	970,000,000
<b>Grand Total.....</b>	1,399,000,000	1,210,000,000	1,110,000,000	1,150,000,000	1,250,000,000

\* Data obtained from *The Mineral Industry of the British Empire and Foreign Countries*.

† Information not available.

(a) Includes about 5,900,000 tons of anthracite each year.

(b) United States Bureau of Mines estimate.

(c) Including production in government owned mines.

(d) Of which about 3,000,000 tons are anthracite and 300,000 tons are lignite.

## THE COKE AND ARTIFICIAL GAS INDUSTRY

Forty-one coke and gas plants, with total fixed and current assets of \$99,297,395, were in operation in Canada during 1934. These plants employed on the average 4,278 salaried employees and wage-earners who received a total remuneration of \$5,648,969.

The output of gas-house, by-product and beehive coke in Canada during 1934 totalled 2,243,420 tons as compared with 1,772,164 tons in 1933 and 1,637,701 tons in 1932. Production by the by-product coke plants and the two beehive oven plants amounted to 1,948,294 tons; the city gas plants produced only 295,126 tons. In addition, 61,760 tons of petroleum coke were recovered as a by-product in petroleum refining; this production has not been included in the coke figures given for the coke and gas industry.

Production of artificial gas amounted to 40,125,201 thousand cubic feet of which 31,755,936 thousand cubic feet were obtained from by-product coke ovens and 8,369,265 thousand cubic feet from other plants. Sales of gas by the producers totalled 18,409,927 thousand cubic feet

valued at \$15,766,750 of which 7,890,488 thousand cubic feet valued at \$7,622,449 were from by-product plants and 7,519,439 thousand cubic feet at \$8,144,301, from gas works. Most of the remaining gas was used as a fuel, in the producing plants or their associated metallurgical works. In addition to the above, 3,768,886 thousand cubic feet of still gas were produced as a by-product from petroleum refineries, practically all of which was used for fuel purposes in the refineries.

Imports of gas-house and by-product coke rose to 930,221 tons in 1934 from 644,075 tons in 1933 while exports during the same period declined to 1,137 tons from 5,199 tons. Mixed gas imported into Canada by pipe line advanced to 107,171 thousand cubic feet from 100,854 thousand cubic feet imported in the previous year.

The number of customers served by the producers of illuminating and fuel gas in 1934 was 514,907; the number of active meters was 511,360 and the length of distributing mains was 3,821 lineal miles or 6,296 miles in terms of 3-inch mains. The calorific value of the gas sold ranged from 450 to 550 B.T.U. per cubic foot.

Table 196.—Materials used in the Coke and Gas Industry in Canada, 1932-1934

Materials	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
Bituminous coal:—		\$		\$		\$
Canadian..... tons	449,264	2,175,573	604,017	2,491,991	844,303	3,459,633
Foreign..... tons	1,767,748	8,134,302	1,861,944	8,405,030	2,271,801	10,270,998
Coke for gas-making:—						
Purchased..... tons	4,507	42,225	4,614	43,343	4,457	42,590
Companies' own make..... tons	118,338	854,525	108,654	732,662	77,255	530,351
Oil used for enriching water gas..... imp. gal.	9,849,710	580,816	9,558,945	610,147	6,140,084	355,953
Oil used for making oil gas..... imp. gal.	1,796,878	109,522	756,410	56,546	866,905	68,424
Absorbing and wash oil..... imp. gal.	135,813	14,294	261,583	33,796	182,417	25,080
Caustic soda..... lb.	201,981	6,499	384,452	12,643	678,006	19,515
Calcium carbide..... lb.	40,000	1,691	28,000	1,236		
Lime..... tons	691	5,728	1,374	8,784	1,911	11,686
Water.....		16,197		15,672		33,484
Oxide or purifying materials..... tons	3,736	35,284	2,734	29,076	3,757	47,010
Sulphuric acid, 66° Bé..... lb.	19,062,397	124,787	28,905,528	187,420	33,907,546	238,148
All other materials.....		140,255		100,729		134,153
<b>Total cost.....</b>		<b>12,241,698</b>		<b>12,729,075</b>		<b>15,237,031</b>

Table 197.—Production in Canada, Imports and Exports of Coke and Its By-Products, 1932-1934

	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>Coke</b>		\$		\$		\$
<b>PRODUCTION—by provinces—</b>						
Nova Scotia, New Brunswick and Quebec..... tons	403,330	3,115,737	445,755	2,840,433	654,305	4,369,150
Ontario..... tons	1,087,122	7,876,941	1,153,509	8,429,660	1,388,709	10,200,363
Manitoba Alberta and British Columbia..... tons	147,249	1,101,827	172,900	1,196,102	200,406	1,292,244
<b>Total..... tons</b>	<b>1,637,701</b>	<b>12,094,505</b>	<b>1,772,164</b>	<b>12,466,195</b>	<b>2,243,420</b>	<b>15,861,757</b>
<b>IMPORTS..... tons</b>	<b>651,802</b>		<b>644,075</b>		<b>934,833</b>	
<b>EXPORTS..... tons</b>	<b>15,469</b>	<b>114,460</b>	<b>5,199</b>	<b>36,381</b>	<b>7,396</b>	<b>45,390</b>
<b>AVAILABLE FOR CONSUMPTION..... tons</b>	<b>2,274,034</b>		<b>2,411,040</b>		<b>3,170,857</b>	
<b>Other products</b>						
<b>PRODUCTION—</b>						
Ammonium sulphate..... tons	11,050	212,182	16,723	318,973	20,512	413,729
Gas: (a) Sales..... M cu. ft.	17,083,631	12,895,039	15,893,248	11,839,345	15,409,927	15,766,750
(b) Used in own plants..... M cu. ft.	6,274,218	1,392,273	7,166,473	1,668,524	13,636,957	1,753,926
(c) Used in associated metallurgical works..... M cu. ft.	4,300,510	686,498	6,314,165	908,697	8,542,290	1,163,000
(d) Gas otherwise accounted for, but not sold..... M cu. ft.	160,947	58,258	133,329	46,619	836,962	294,718
(e) Not accounted for..... M cu. ft.	781,796	816,696	844,069	881,654	970,684	876,824
Benzol..... imp. gal.	2,331,171	475,300	2,645,649	552,595	3,412,864	621,799
Light oils..... imp. gal.	918	184	57,925	61,250	473,412	51,347
Tur..... imp. gal.	20,176,843	1,158,506	21,292,622	1,172,797	25,840,781	1,397,413
Ammonia liquor..... pound N H <sub>3</sub>	1,700,152	20,352	1,607,326	18,729	1,981,728	23,371
All other products.....		2,857		1,597		47,386
<b>IMPORTS—</b>						
Ammonium sulphate..... tons	13,811	280,026	4,156	100,415	11,046	245,372
Coal tar and pitch..... gal.	1,807,946	103,983	371,987	42,663	844,363	80,063
<b>EXPORTS—</b>						
Ammonium sulphate..... tons	38,741	701,707	62,383	1,081,392	57,704	1,144,164
Coal tar and pitch..... gal.	3,017,552	203,126	8,513,031	495,999	6,745,866	390,751

## THE NATURAL GAS INDUSTRY

Natural gas production in Canada during 1934 advanced to 23,162,324 thousand cubic feet valued at \$8,759,652 from the 1933 total of 23,138,103 thousand cubic feet worth \$8,712,234.

Alberta continued to be the leading producing province with an output of 14,841,491 thousand cubic feet; Ontario came next with 7,682,851 thousand cubic feet; New Brunswick followed with 623,601 thousand cubic feet, and Saskatchewan entered the list of natural gas producers with a production of 13,781 thousand cubic feet. Manitoba, as usual, recorded a small output from several private wells.

Wells in the Stony Creek field, near Moncton, are the source of New Brunswick's natural gas supply. This gas is piped to Moncton and Hillsboro where approximately 5,400 consumers are served. Thirty natural gas wells were in operation in New Brunswick at the end of 1934; two wells were abandoned during the year and one new producer was drilled.

The Canadian Seaboard Oil and Gas, Ltd., completed a deep test in 1934 on lot 300, Parish of Saint-Gregoire, in Nicolet county, Quebec. According to a provincial government report, this well was spudded in some time in February and reached a depth of 6,030 feet in October when it was plugged and abandoned. Eight gas horizons were encountered in the course of drilling, but none of these proved of economic importance.

The Cartier Natural Gas Company drilled two wells in 1934. One in the Parish of Lanoraie, Berthier county, had reached 2,000 feet at the end of the year and the other in the Parish of Saint Hubert, Chambly county, was at a depth of 3,200 feet on December 31st. According to the provincial government's records another well was drilled in Lanoraie Parish by Carl M. Mohr; this well struck a flow of gas, estimated at 15,000 cubic feet per day, at a depth of 1,206 feet, but on deepening to 1,390 feet, a heavy flow of highly saline water was encountered. This water was shut off with a lead plug and the well remains with a valve at the casinghead to seal off the gas.

Ontario's production advanced 7.2 per cent in 1934 to 7,682,851 thousand cubic feet from the preceding year's total of 7,166,659 thousand cubic feet.

Col. R. B. Harkness, Commissioner of Gas for Ontario, reports that 1934 was the outstanding year in new production since the years 1910 to 1914, when the Tilbury field reached its peak of development.

Consumption of natural gas in the city of Medicine Hat, Alberta totalled 1,914,606 thousand cubic feet as compared with 2,149,535 thousand cubic feet in 1933. About 2,500 consumers were supplied with gas from the Medicine Hat field in 1934. Wells in the Redcliff field, about two miles west of Medicine Hat, supplied gas to approximately 300 industrial and domestic consumers.

The Viking field, which is approximately 80 miles southeast of Edmonton, was the source of supply for over 10,000 consumers within that city. Outside of Edmonton some 500 consumers were furnished with gas from the Viking field.

The Maple Leaf well, in the Fabryan field, supplied gas to 300 users in Wainwright.

At the close of the year 92 wells were producing gas in Alberta as compared with 87 wells a year ago. The capital employed by companies operating in this industry in Alberta amounted to \$26,101,630. During the year, 377 employees receiving salaries and wages totalling \$496,979 were employed by Alberta producers.

Mixed gas (natural and artificial) imported into Canada from the United States during 1934 reached a total of 107,171 thousand cubic feet valued at \$69,734 as against 100,854 thousand cubic feet worth \$73,435 imported in 1933.

The 198 firms operating in the Canadian natural gas industry during 1934 reported a capital investment of \$70,767,123. On an average, 1,553 salaried employees and wage-earners were employed in this industry in 1934; salaries and wages paid to these employees totalled \$1,789,811. Fuel and electricity used during the year cost the operators \$67,341.



Table 198.—Production of Natural Gas in Canada, by Provinces, 1925-1934

(For the years 1892 to 1924 see Mineral Production of Canada, 1928)

Year	New Brunswick		Ontario		Manitoba		Alberta		Canada	
	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value
		\$		\$		\$		\$		\$
1925.....	639,235	122,394	7,143,962	3,958,006	200	60	9,119,500	2,752,545	16,902,897	6,833,005
1926.....	648,316	128,300	7,784,996	4,409,593	200	60	10,794,897	3,019,221	19,208,209	7,557,174
1927.....	630,755	124,637	7,311,215	4,331,780	200	60	13,434,621	3,586,533	21,376,791	8,043,010
1928.....	600,981	324,344	7,632,800	4,535,312	200	60	14,288,605	3,754,466	22,582,586	8,614,182
1929.....	678,453	333,002	8,586,475	4,959,665	600	180	19,112,931	4,681,247	28,378,462	9,977,124
1930.....	661,875	325,751	7,965,761	5,034,828	600	180	20,748,583	4,929,226	29,376,919	10,289,985
1931.....	655,891	323,184	7,419,534	4,635,497	600	180	17,798,698	4,067,893	25,871,723	9,026,751
1932.....	662,452	326,191	7,386,154	4,719,297	600	180	15,370,968	3,853,794	23,420,174	8,899,462
1933.....	618,033	302,706	7,166,659	4,523,085	600	180	15,352,811	3,886,263	23,138,163	8,712,234
1934.....	623,601	306,005	7,682,851	4,741,368	600	180	14,841,491	3,707,276	(a) 23,162,324	(a) 8,759,652

(a) Includes production in Saskatchewan.

Table 199.—Production of Natural Gas in Canada, by Months, 1934

Month	New Brunswick	Ontario	(a) Manitoba	Saskatchewan	Alberta	Canada
	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.
January.....	88,903	920,832	50		2,120,290	3,130,075
February.....	83,426	1,056,820	50		1,730,511	2,870,507
March.....	78,014	832,088	50		1,748,179	2,758,331
April.....	68,582	882,399	50		1,369,292	2,320,223
May.....	47,880	547,782	50		938,048	1,533,760
June.....	37,934	416,049	50		759,196	1,213,259
July.....	25,490	332,593	50		651,047	1,009,180
August.....	20,883	307,461	50		623,992	952,386
September.....	24,233	376,226	50		844,174	1,244,683
October.....	34,131	503,298	50	1,753	985,543	1,321,775
November.....	52,455	684,621	50	4,867	1,313,495	2,055,488
December.....	61,640	722,682	50	7,161	1,757,724	2,549,257
<b>Total.....</b>	<b>623,601</b>	<b>7,682,851</b>	<b>600</b>	<b>13,781</b>	<b>14,841,491</b>	<b>23,162,324</b>

(a) Estimated.

Table 200.—Natural Gas Production in Ontario, by Fields, 1933 and 1934 (a)

County	Fields	1933	1934
		M cu. ft.	M cu. ft.
Kent, including Kingsville.....	Tilbury and Kingsville.....	4,201,704	4,093,186
Kent.....	Dover.....	252,694	363,344
Lambton.....	Dawn and Oil Springs.....	265,061	517,009
Elgin.....	Bayham.....	45,998	51,483
Norfolk.....	Norfolk.....	346,621	354,274
Lincoln.....	Lincoln.....		
Haldimand.....	Haldimand.....	1,524,251	1,801,160
Wentworth.....	Wentworth.....		
Brant.....	Onondaga.....	121,578	109,486
Bruce.....	Amabel.....	500	500
Welland.....	Welland.....	333,619	318,409
Wells in surface drift.....	Howard and Sarnia.....	14,663	14,000
Private wells.....		60,000	60,000
<b>Total produced.....</b>		<b>7,166,659</b>	<b>7,682,851</b>
<b>Value.....</b>		<b>\$ 4,523,084</b>	<b>4,741,368</b>
<b>Imported mixed gas.....</b>	<b>M cu. ft.</b>	<b>97,075</b>	<b>102,667</b>
<b>Total distributed.....</b>	<b>M cu. ft.</b>	<b>7,263,734</b>	<b>7,785,518</b>

(a) Prepared by the Ontario Department of Mines.



Table 201.—Number of Gas Wells in Canada, by Provinces, 1932-1934

		New Brunswick	Ontario	Manitoba	Saskatchewan	Alberta	Canada
Productive wells at beginning of year.....	1932	28	2,266	6		90	2,390
	1933	30	2,620	6		89	2,745
	1934	31	2,708	6		87	2,832
Number of productive wells drilled.....	1932	2	151			4	157
	1933	1	173				174
	1934	1	217		1	1	220
Number of dry wells drilled.....	1932	2	32				34
	1933	2	67				69
	1934		77		2		(a) 81
Number of wells abandoned.....	1932		42	1		3	45
	1933		55				55
	1934	2	60				62
Productive wells at end of year.....	1932	30	2,620	6		89	2,745
	1933	31	2,708	6		87	2,832
	1934	30	2,869	6	1	92	2,998

(a) Includes one dry well drilled in Quebec.

Table 202.—Natural Gas Wells in Ontario, by Townships, 1933 and 1934

Township	1933				1934			
	No. of producing wells in operation Dec 31, 1933	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year	No. of producing wells in operation Dec 31, 1934	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year
Aldborough.....	2						1	
Amabel.....	2				2		1	
Ancaster.....								1
Bayham.....	35				38		2	4
Bertie.....	95			5	99	1		4
Binbrook.....	53	1			53	1		1
Caistor.....	53	1			60	2		3
Canboro.....	168	4	2	9	181	3	1	16
Caledon, East.....						1		
Cayuga, North.....	154	3	2	12	173		4	18
Cayuga, South.....	53	2			54		1	1
Charlotteville.....	13				13			
Chatham Gore.....			1					
Chinguacousy.....							1	
Crowland.....	32	12			25	7		
Dawn.....	15		1	3	15		4	1
Dover, East.....	8			1	12		2	3
Dover, West.....								
Dunn.....	49		7	21	52	5	1	7
Ekfrid.....			1					
Enniskillen.....	4				4			
Euphemia.....	1					3	1	
Gainsboro.....	5				13		5	10
Glanford.....	11				11			
Gosfield.....	16			1	17		1	1
Houghton.....	7				5	2		
Humberstone.....	62	4			60	2		
Maldstone.....			1					
Malthide.....					1			
Mercer.....	3				3			
Middleton.....	38		4	4	44		2	7
Moulton.....	106	2	3	14	112	3	1	13
Oneida.....	50	2	2	4	59	1	4	8
Onondaga.....	39				39	9	2	8
Orford.....			2					
Puslinch.....	1							
Rainham.....			10	22	276	1	2	8
Raleigh.....	269		4	1	32	1	3	5
Romney.....	32				140	1		
Sarnia.....	142	1			13			
Sarnia.....	13				13			
Sarnia.....	169	11	6	5	174	12	2	19
Sherbrooke.....	13				13			
Sombra.....							3	
Tilbury, East.....	143	1	1	7	144			3
Townsend.....	1				2			1
Tuscarora.....	64		2	7	74	1		11
Wainfleet.....	26	2		1	27			
Walpole.....	270	2	14	50	323	1	29	55
Walsingham, N.....	10			1	14			
Walsingham, S.....	14			1	12			1
Windham.....	8				10		1	2
Willoughby.....	41		2	4	42	3	2	2
Woodhouse.....	55	1	1		59		1	4
Private wells.....	296				300			
Surface wells.....	69				69			
<b>Total.....</b>	<b>2,708</b>	<b>55</b>	<b>67</b>	<b>173</b>	<b>2,869</b>	<b>60</b>	<b>77</b>	<b>217</b>

Table 203.—Capital Employed in the Natural Gas Industry in Canada, by Provinces, 1933 and 1934

	1933				1934			
	Quebec	Ontario	Alberta	Canada	Quebec	Ontario	Alberta	Canada
	\$	\$	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—								
Cost of lands, buildings, plant, machinery and tools .....	73,729	39,458,882	25,263,517	64,796,128	38,000	35,557,607	24,433,232	60,028,939
Cost of supplies and stock on hand .....		470,435	213,750	684,185		425,307	166,200	591,507
Cash, trading and operating accounts and bills receivable.....	50,000	11,814,877	1,801,798	13,666,675		6,821,544	1,502,198	8,323,742
<b>Total .....</b>	<b>123,729</b>	<b>51,744,194</b>	<b>27,279,065</b>	<b>*80,937,170</b>	<b>38,000</b>	<b>42,804,458</b>	<b>26,101,630</b>	<b>170,767,123</b>

\* Includes data for New Brunswick and Saskatchewan.

† Includes data for New Brunswick, Manitoba and Saskatchewan.

Table 204.—Employees, Salaries and Wages in the Natural Gas Industry in Canada, by Provinces, 1933 and 1934

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
<b>1933</b>					\$	\$	\$
New Brunswick.....	13	5	53	71	35,330	61,844	97,174
Quebec.....	1		11	12	4,080	15,345	19,425
Ontario.....	373	96	471	940	616,260	405,396	1,021,656
Saskatchewan.....	1		3	4	150	4,495	4,645
Alberta.....	76	23	241	340	162,132	345,783	507,915
<b>Canada.....</b>	<b>464</b>	<b>124</b>	<b>779</b>	<b>1,367</b>	<b>817,952</b>	<b>832,863</b>	<b>1,650,815</b>
<b>1934</b>							
New Brunswick.....	14	6	51	71	36,102	65,383	101,485
Quebec.....	1		11	12	3,800	19,605	23,405
Ontario.....	382	104	588	1,074	632,237	515,337	1,147,574
Manitoba.....			1	1		1,802	1,802
Saskatchewan.....	1		17	18	400	18,166	18,566
Alberta.....	87	25	265	377	169,520	327,459	496,979
<b>Canada.....</b>	<b>485</b>	<b>135</b>	<b>933</b>	<b>1,553</b>	<b>842,659</b>	<b>947,752</b>	<b>1,789,811</b>

\* See footnote on page 26.

## THE PEAT INDUSTRY

The Canadian production of peat for use as fuel in 1934 amounted to 1,878 tons valued at \$7,343 as compared with 1,131 tons worth \$3,449 produced in 1933. The 1934 output was obtained from Winchester, Ellice, and Elma townships, Ontario.

Table 205.—Production of Peat in Canada, 1924-1934

Year	Tons	Value
		\$
1924.....		
1925.....	1,370	8,394
1926-27.....		
1928.....	1,497	5,845
1929.....	2,607	13,339
1930.....	2,847	10,932
1931.....	1,674	7,033
1932.....	3,248	7,593
1933.....	1,131	3,449
1934.....	1,878	7,343

## THE PETROLEUM INDUSTRY IN CANADA

Including (1) Production of Crude Petroleum; and (2) Petroleum Products.

## 1. Production of Crude Petroleum

The Canadian production of crude petroleum during 1934 totalled 1,410,895 barrels or 23.2 per cent above the output in the preceding year. The 1934 production consisted of 11,106 barrels from New Brunswick, 141,385 barrels from Ontario, 1,253,966 barrels from Alberta and 4,438 barrels from the Northwest Territories.

Alberta wells produced 1,253,966 barrels as compared with 995,832 barrels in 1933. During the year under review the Turner Valley field produced 1,220,862 barrels of crude naphtha and light crude oil, the Red Coulee and Keho fields, 20,854 barrels, and the Wainwright and Skiff fields, 12,250 barrels. One hundred and twenty-two wells were in operation in Alberta at the close of 1934 and drilling was in progress on eighteen other wells in the Turner Valley, Skiff, Pekisko, Cardston, Hunter Valley and Watson Structure fields. Eight new wells were brought into production during the year. Approximately 72,000 feet of drilling was done in 1934 compared with 19,000 feet in the preceding year and 190,125 feet in 1930. Alberta operators reported the use of 128,830 feet of casing weighing 2,838 tons in 1934; during the previous year 36,937 feet of casing weighing 726 tons were used. Casing used in 1934 was valued at \$252,710 as compared with the 1933 valuation of \$59,475 and the 1931 total of \$369,734.

Crude naphtha and oil prices to Alberta producers in 1934, as quoted in the Western Oil Examiner, were as follows:—

	To March 6	To May 21	From May 21
Crude naphtha.....	\$3.15	\$2.87	\$2.55
Discoloured.....	2.91	2.63	2.31
Crude oil, 50° up.....	2.66	2.44	2.19
Crude oil, 45° to 49.9°.....	2.07	2.07	2.07
Crude oil, 40° to 44.9°.....	1.50	1.50	1.50

Two natural gasoline absorption plants, owned by the Royalite Oil Company, Ltd., and the Gas and Oil Products Ltd., respectively, were in operation in the Turner Valley field during the year. The latter company's plant, which is located in South Turner Valley, was completed in September.

Crude petroleum production in Ontario has shown a steady increase during the past four years and the average price per barrel has shown a decided improvement during the same period. In 1934 the output amounted to 141,385 barrels averaging \$2.12 per barrel as compared with 136,058 barrels with an average of \$1.86 in 1933 and 117,302 barrels worth \$2.01 per barrel in 1930.

"The increase in production during 1934 was mostly in the old portion of the Bothwell field where wells drilled 70 years ago and idle for 30 years, have been cleared out and rejuvenated. These wells are north and south of the Thames river in Zone, Aldborough, Orford and Mosa townships where the four townships find a common corner. In addition to these old wells, some new wells have been drilled with favourable results. Although this new production can scarcely be considered as permanent, as a new field the results have been better than in many of the recent producing areas, most of which gave a high initial production but became exhausted in 30 to 90 days.

"The major drilling activity was in Brooke township where a producing well was drilled late in 1933 on the Atcheson farm, Lot 23, Concession XIII. Development spread eastward through Concessions XI, XII, XIII and XIV to the township of Metcalfe, where two dry holes were drilled years ago." (1)

(1) From a report by Col. R. B. Harkness, Commissioner of Gas for Ontario.

Eleven producing wells and 12 dry wells were drilled in the search for oil in Ontario during 1934. Approximately 11,000 feet were drilled during the year as compared with 5,213 feet in 1933. One hundred and two wells were abandoned in 1934. At the end of the year 2,066 wells were in operation as against 2,151 wells active on January 1st.

Production from New Brunswick wells rose to 11,106 barrels in 1934 from the 1933 total of 8,835 barrels. As usual, this oil was obtained from wells in the Stony Creek field near Moncton. The crude oil was treated in a small topping plant at Weldon, and gasoline and fuel oil were recovered.

Discovery Nos. 1 and 2 wells near Fort Norman, Northwest Territories, were operated in 1934 and produced 4,438 barrels; in 1933 these wells produced 4,608 barrels. This oil, which ranged from 38° to 41° Bé, was treated at a small refinery near Fort Norman and a considerable part of the gasoline and fuel oil produced was used in connection with mining operations in the Great Bear Lake area.

Capital employed by companies operating and drilling oil wells in Canada during 1934 amounted to \$35,408,801. This industry furnished employment to 944 salaried employees and wage-earners who received a remuneration of \$1,072,617. Fuel and electricity used during the year cost the operators \$168,338.

**Table 206.—Production of Crude Petroleum in Canada, by Provinces, 1925-1934**

(For the years 1881 to 1924 see Mineral Production of Canada, 1928.)

(Barrel=35 Imp. gal.)

Year	New Brunswick		Ontario		Alberta		Northwest Territories		Canada	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$		\$		\$
1925.....	5,376	18,756	143,134	386,555	183,491	845,394			332,001	1,250,705
1926.....	10,544	29,940	137,850	379,221	216,050	902,504			361,441	1,311,665
1927.....	18,244	41,748	139,606	288,347	318,741	1,185,948			476,591	1,515,043
1928.....	8,043	21,191	134,094	249,737	482,047	1,764,172			621,181	2,035,300
1929.....	7,499	19,909	121,194	253,678	988,675	3,458,177			1,117,368	3,731,764
1930.....	6,758	17,378	117,302	235,746	1,398,160	4,780,696			1,522,220	5,033,820
1931.....	6,577	15,461	122,365	219,993	1,413,631	3,976,220			1,542,573	4,211,674
1932.....	6,408	14,332	130,343	247,468	906,751	2,751,541	910	9,251	1,044,412	3,022,592
1933.....	8,835	18,111	136,058	253,486	995,832	2,844,157	4,608	23,037	1,145,333	3,138,791
1934.....	11,106	22,277	141,385	299,874	1,253,966	3,104,823	4,438	22,188	1,410,895	3,419,162

**Table 207.—Production of Crude Petroleum in Canada, by Months, 1934**

(Barrel=35 Imp. gal.)

	New Brunswick	Ontario	Alberta	Northwest Territories	Canada
	Barrels	Barrels	Barrels	Barrels	Barrels
January.....	1,529	12,119	110,716		124,364
February.....	578	9,148	106,797		116,523
March.....	972	10,307	118,728		130,007
April.....	795	11,621	106,443		118,859
May.....	839	12,223	104,598		117,660
June.....	882	12,284	95,821	1,128	110,115
July.....	1,111	11,502	108,115	1,339	122,067
August.....	687	13,053	101,011	1,160	115,911
September.....	1,065	11,097	102,038	811	115,011
October.....	845	13,947	107,231		122,023
November.....	817	13,741	98,638		113,196
December.....	986	10,343	105,804		117,133
<b>Total.....</b>	<b>11,106</b>	<b>141,385</b>	<b>1,265,940</b>	<b>4,438</b>	<b>1,422,869</b>



Table 208.—Production of Crude Petroleum in Canada, by Provinces, 1933 and 1934

Provinces	1933		1934	
	Barrels	Total value	Barrels	Total value
		\$		\$
NEW BRUNSWICK.....	8,835	18,111	11,106	22,277
ONTARIO—				
Petrolia and Enniskillen.....	57,298	106,527	57,938	121,642
Oil Springs.....	31,343	61,396	29,863	65,684
Moore Township.....	2,192	4,075	2,963	6,221
Sarnia Township.....	2,181	4,054	825	1,732
Plympton Township.....	211	392	202	424
Bothwell.....	22,935	42,633	32,133	67,463
West Dover.....	763	1,334	558	1,171
Onondaga.....	946	1,798	601	1,311
Mosa Township.....	8,168	15,183	9,031	18,961
Thamesville.....	847	1,574	614	1,289
Dawn and Euphemia.....	8,589	13,433	4,169	8,753
Raleigh.....	239	444	264	554
Brooke.....			1,941	4,075
Dunwich.....	346	643	283	594
Total for Ontario.....	136,058	253,486	141,385	299,874
ALBERTA—				
Turner Valley.....	968,055	2,816,061	1,220,862	3,065,955
Red Coulee-Border-Keho.....	23,305	23,747	20,854	28,051
Wainwright-Skiff.....	4,472	4,349	12,250	10,817
Total for Alberta.....	995,832	2,844,157	1,253,966	3,104,823
NORTHWEST TERRITORIES.....	4,608	23,037	4,438	22,189
Canada.....	1,145,333	3,128,701	1,410,895	3,449,162

Table 209.—Petroleum Wells in Canada, by Provinces, 1932-1934

		New Brunswick	Ontario	Alberta	Canada
Productive wells at beginning of year.....	1932	26	2,208	109	2,343
	1933	23	2,036	111	2,170
	1934	23	2,151	113	2,287
Number of productive wells drilled.....	1932		7	7	14
	1933		5	5	10
	1934		11	8	19
Number of wells abandoned.....	1932		159	1	160
	1933		237	2	239
	1934		102	9	111
Number of dry wells drilled.....	1932		14		14
	1933		3	1	4
	1934		12	3	15
Number of productive wells in operation at end of year.....	1932	23	2,036	111	2,170
	1933	23	2,151	113	2,287
	1934	23	2,066	122	(a) 2,213

(a) Includes 2 wells in the Northwest Territories.

Table 210.—Imports into Canada and Exports of Petroleum, Asphalt and Their Products, 1932-1934

	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
IMPORTS—						
ASPHALT AND ITS PRODUCTS		\$		\$		\$
Asphaltum, or asphalt, solid..... tons	12,532	193,912	4,462	106,586	5,015	114,951
Asphalt, not solid..... gals.		10,709		10,312	98,657	11,030
Asphaltum oil for paving purposes only.gals.		8,887		1,458	14,619	1,832

Table 210.—Imports into Canada and Exports of Petroleum, Asphalt and Their Products, 1932-34—Concluded

	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>IMPORTS—(Concluded)</b>		\$		\$		\$
<b>CRUDE PETROLEUM, FUEL AND GAS OILS</b>						
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.....gals.	889,838,742	26,310,278	954,392,366	20,290,580	1,072,327,425	31,907,176
Crude petroleum, gas oils other than naphtha, benzine and gasoline lighter than .8235 but not less than .775 specific gravity at 60 degrees.....gals.	306,975	13,837	60,331	3,773	181,278	9,740
Petroleum, crude, not in its natural state, .725 specific gravity or heavier at 60 degrees temperature, when imported by oil refiners to be refined in their own factories.....gals.	20,061,147	1,021,485	25,636,911	1,031,971	1,782,276	98,920
Petroleum (not including crude petroleum imported to be refined or illuminating or lubricating oils) .8235 specific gravity or heavier at 60 degrees temperature (fuel oil).....gals.	57,292,849	2,062,912	43,271,325	1,445,467	32,959,499	1,149,341
Petroleum, and other oils, imported by miners or mining companies or concerns for use in the concentration of ores of metals in their own concentrating establishments.....gals.	116,987	58,400	95,421	47,948	77,126	85,364
Fuel oil, ex-warehoused for ships' stores.....gals.	32,008,998	857,490	26,896,996	723,863	23,481,946	589,843
<b>KEROSENE AND ILLUMINATING OILS</b>						
Coal oil and kerosene, lighter than .8235 specific gravity at 60 degrees temperature, n.o.p.....gals.	1,670,205	126,768	1,569,384	116,657	1,985,739	142,025
Illuminating oils, composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon.....gals.	2,117	890	3,658	1,585	1,062	345
Engine distillate, lighter than .8235 specific gravity at 60 degrees temperature.....gals.	63,842	6,843	64,626	6,880	132,795	12,946
<b>LUBRICATING OILS</b>						
Lubricating oils, composed wholly or in part of petroleum, and costing less than 25 cents per gallon.....gals.	7,849,532	1,460,204	6,208,152	1,160,093	6,872,364	1,047,882
Lubricating oils, n.o.p.....gals.	3,753,387	1,567,818	3,660,582	1,464,241	3,648,960	1,345,094
<b>GASOLINE AND OTHER OILS</b>						
Natural casinghead compression or absorption gasoline, lighter than .6690 specific gravity at 60 degrees temperature, when imported by distillers of petroleum for blending with other gasoline distilled in Canada.....gals.	26,693,969	1,530,657	39,688,271	2,545,302	48,376,014	2,593,460
Gasoline lighter than .8235 specific gravity at 60 degrees temperature.....gals.	74,859,806	7,503,705	17,122,366	1,446,766	13,205,856	1,248,497
All other oils, n.o.p.....gals.	229,589	80,093	305,985	90,768	580,667	117,509
<b>OTHER PRODUCTS OF PETROLEUM</b>						
Grease, axle.....lb.	3,148,868	169,484	2,417,038	130,792	3,374,842	169,183
Paraffine wax.....lb.	1,619,905	53,508	1,760,621	60,955	6,063,526	268,741
Paraffine wax candles.....lb.	309,486	58,204	165,491	32,174	146,075	28,647
Vaseline and all similar preparations of petroleum for toilet, medicinal or other purposes.....		200,084		214,539		241,063
Naphtha and products of petroleum, n.o.p., lighter than .8235 specific gravity at 60 degrees temperature.....gals.	1,884,315	176,702	1,244,930	113,627	1,868,361	142,927
<b>Total.....</b>		<b>43,472,870</b>		<b>31,046,337</b>		<b>41,326,516</b>
<b>EXPORTS—</b>						
Oil, petroleum, crude.....gals.	7,297,332	244,613	10,658,848	394,727	5,438	497
Oil, coal and kerosene, refined.....gals.	884,623	116,897	996,468	179,986	782,350	78,618
Oil, gasoline and naphtha.....gals.	4,209,436	585,790	4,042,959	627,851	4,757,175	528,197
Oil, mineral, n.o.p.....gals.	7,922,816	276,015	12,938,982	537,776	12,994,817	585,785
Wax, mineral.....cwt.	23,855	66,144	2,498	6,955	2,633	10,219
<b>Total.....</b>		<b>1,289,459</b>		<b>1,747,295</b>		<b>1,203,316</b>

Table 211.—World Production of Crude Petroleum

(Supplied by Imperial Institute)

(Long tons)

	1932	1933	1934
<b>BRITISH EMPIRE</b>			
United Kingdom (estimated) (c).....	119,000	118,000	119,000
Canada.....	132,204	145,432	174,047
Barbados.....	596	574	480
Trinidad (b).....	1,387,140	1,309,775	1,492,378
British Borneo (Sarawak).....	335,287	321,299	278,037
Brunei (exports).....	176,275	280,523	371,591
India (b).....	1,191,529	1,181,502	1,243,341
New Zealand.....	931	693	636
Australia (Victoria).....	80	80	23
<b>Total.....</b>	<b>3,340,000</b>	<b>3,360,000</b>	<b>3,680,000</b>
<b>FOREIGN COUNTRIES</b>			
Austria.....	118	842	4,113
Czechoslovakia.....	18,201	17,495	25,561
Estonia (c).....	36,017	37,617	46,137
France.....	73,441	88,654	76,613
Germany.....	226,107	234,819	309,645
Greece.....	500	(a)	(a)
Italy (c).....	28,100	26,107	20,007
Jugoslavia.....	284	498	471
Poland.....	547,894	541,976	520,849
Roumania.....	7,232,264	7,260,101	8,335,103
Russia.....	21,038,200	21,287,000	25,100,000
Spain (c).....	5,846	5,184	(n)
Algeria.....	877	551	367
Egypt.....	266,515	233,970	217,532
Morocco (French).....	266	552	547
Mexico (b).....	4,970,530	5,151,641	5,783,628
United States (b).....	106,102,600	122,385,900	122,711,486
Argentina (d).....	1,847,153	1,924,731	1,971,736
Bolivia.....	6,300	(n)	(n)
Colombia (b).....	2,312,002	1,852,975	2,441,958
Ecuador.....	280,058	231,415	234,145
Peru.....	1,381,820	1,837,673	2,124,189
Venezuela.....	16,815,380	17,020,071	20,385,588
China (c).....	327	313	(a)
Formosa (b).....	4,984	5,204	5,008
Iraq.....	113,000	113,000	1,015,195
Japan (b).....	221,282	202,549	256,757
"Manchoukuo".....	74,317	87,078	(a)
Netherlands East Indies.....	5,012,725	5,440,019	5,959,104
Iran (Persia).....	6,445,808	7,086,706	7,537,372
<b>Total.....</b>	<b>175,000,000</b>	<b>193,000,000</b>	<b>205,000,000</b>
<b>World's Total.....</b>	<b>178,000,000</b>	<b>196,000,000</b>	<b>209,000,000</b>

(a) Information not available.

(b) The following conversion rates have been used: 35 gallons=1 barrel and the undermentioned barrels=1 ton:—Mexico 6.6, Trinidad 7.3, India 7.4, United States 7.4, Colombia 7.1, Formosa 7.0, Japan 7.2.

(c) Including shale oil.

(d) Converted from cubic metres at rate of 1 cubic metre=·8843 long tons.

Table 212.—Capital Employed in the Petroleum Industry in Canada, by Provinces,\* 1933 and 1934

	1933			1934		
	Ontario	Alberta	Canada	Ontario	Alberta	Canada †
	\$	\$	\$	\$	\$	\$
<b>CAPITAL EMPLOYED AS REPRESENTED BY—</b>						
Cost of lands, buildings, plant, machinery and tools.....	1,201,464	29,728,185	31,919,649	1,355,498	27,330,881	28,719,653
Cost of supplies and stocks on hand.....	8,762	798,045	806,807	10,363	1,178,663	1,235,331
Cash, trading and operating accounts and bills receivable.....	9,774	5,136,298	5,146,072	12,016	5,433,440	5,453,817
<b>Total.....</b>	<b>1,310,000</b>	<b>35,662,528</b>	<b>36,972,528</b>	<b>1,377,877</b>	<b>33,942,984</b>	<b>35,408,801</b>

\* Data for New Brunswick included in the "Natural Gas Industry".

† Includes data for the Northwest Territories.

Table 213.—Employees, Salaries and Wages in the Petroleum Industry in Canada, by Provinces,† 1933 and 1934

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1933					\$	\$	\$
Ontario.....	12		166	178	13,233	84,530	97,763
Alberta.....	79	20	441	540	181,529	494,442	675,971
<b>Canada.....</b>	<b>91</b>	<b>20</b>	<b>607</b>	<b>718</b>	<b>194,762</b>	<b>578,972</b>	<b>773,734</b>
1934							
Ontario.....	12		192	204	12,007	98,001	110,008
Alberta†.....	117	31	592	740	221,650	740,959	962,609
<b>Canada.....</b>	<b>129</b>	<b>31</b>	<b>784</b>	<b>944</b>	<b>233,657</b>	<b>838,960</b>	<b>1,072,617</b>

\* See footnote on page 26.

† Data for New Brunswick included in the "Natural Gas Industry".

‡ Data for the Northwest Territories included with Alberta.

Table 214.—Casing Used in the Petroleum Industry in Alberta, 1933 and 1934

Size	1933		1934		Size	1933		1934	
	Weight	Length	Weight	Length		Weight	Length	Weight	Length
	Pounds	Feet	Pounds	Feet		Pounds	Feet	Pounds	Feet
4.....	22,400	1,400			13½.....	5,400	100	1,205,770	21,890
6.....			66,000	3,000	13.....	154,602	2,845	15,914	292
6½.....			21,504	768	15½.....	93,405	1,437	98,091	1,816
6.....	201,024	5,584	147,924	5,283	16.....	26,250	350	593,640	9,117
7.....			141,200	5,043	18.....	42,875	400	48,972	634
8.....	300,770	8,790	493,632	13,712	18½.....	7,400	100	231,137	3,020
8½.....	180,288	5,008	569,389	15,817	18.....			8,229	105
8.....			131,652	3,657	20.....			46,620	518
8½.....	304,754	8,333	618,480	17,839	21.....			3,605	35
10.....	113,750	2,500	514,543	11,663	21½.....			43,449	476
10½.....			409,481	9,055	25.....			2,513	25
12.....			7,500	150					
12½.....			237,786	4,583	<b>Total....</b>	<b>1,452,918</b>	<b>36,937</b>	<b>5,675,571</b>	<b>128,830</b>
13.....			18,480	330					

## (2) The Petroleum Products Industry in Canada

Forty-two petroleum refineries were in operation in Canada during 1934 as follows:—10 in Alberta, 10 in Saskatchewan, 7 in Ontario, 5 in Quebec, 4 in British Columbia, 1 in Nova Scotia, 1 in New Brunswick and 1 in the Northwest Territories. The total capacity of these plants was reported at 159,400 barrels of crude oil per day. Fourteen refineries operated cracking units with a combined capacity of 74,350 barrels per day.

Capital employed in the petroleum refining industry was reported at \$66,450,496. The average number of employees was 4,876 and the payments to these workers in salaries and wages amounted to \$6,274,799. Materials used in refineries cost \$56,659,492 and products were valued at \$75,691,078.

The oil refineries used, in 1934, a total of 1,109,510,343 gallons of crude oil, of which 770,382,530 gallons were from the United States, 297,666,050 gallons from Trinidad and South American countries and 41,461,763 gallons from Canadian wells. The crude oil from the United States included 768,765,241 gallons in its natural state and 1,617,289 gallons not in its natural state. The Canadian oil included 34,304,479 gallons in its natural state and 7,157,284 gallons of naphtha and absorption gasoline which was run to the refinery stills. Shipments from other countries included 265,845,557 gallons of crude in its natural state and 31,820,493 gallons of reduced crude. The total cost at the refineries of the oil used during the year was \$53,642,101. Stocks of crude held at the refineries at the end of 1934 were reported at 103,939,321 gallons of crude in its natural state and 8,120,356 gallons not in its natural state; a total of 112,059,677 gallons.



Gasoline production in 1934 amounted to 461,753,363 gallons of which 166,773,271 gallons were made by cracking and 294,980,092 gallons by straight run. In addition, the refineries used 51,568,707 gallons of imported casinghead gasoline which were not included in the production figure; this imported gasoline was used for blending with the refinery product. Refinery stocks at the end of 1934 totalled 70,144,704 gallons including 2,919,450 gallons of imported casinghead. The value of the gasoline produced in 1934 was \$42,457,623.

Fuel oil production in 1934 totalled 353,989,989 gallons of which 53,918,147 gallons were used for fuel by the reporting refineries. Imports amounted to 56,441,445 gallons and exports were reported at only 5,438 gallons. Refinery stocks at the end of the year (excluding quantities held for pressure cracking operations) totalled 51,657,784 gallons.

Output of gas oils was reported at 102,005,336 gallons in 1934, imports at 181,278 gallons and refinery stocks at 18,296,163 gallons. Kerosene production was shown at 37,741,993 gallons, imports at 1,985,739 gallons, exports at 782,350 gallons and refinery stocks at 8,436,554 gallons.

In 1934, nine firms were engaged primarily in the compounding of lubricating oils and greases. These plants produced lubricating oils, greases, etc., valued at \$551,836; the preceding year's production was worth \$464,544. Capital employed in this industry in 1934 was recorded at \$570,545; employment was furnished during the year to 81 persons who received \$104,427 in salaries and wages.

Table 215.—Materials Used and Products Made by the Oil Refineries of Canada, 1932-1934

	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>MATERIALS USED—</b>		\$		\$		\$
<i>Petroleum refining—</i>						
Crude oil, in its natural state from						
Canadian wells..... imp. gal.	37,340,321	3,233,136	32,404,139	2,774,379	34,304,471	2,598,824
Naphtha, absorption gasoline, etc. from Canadian wells..... imp. gal.					7,157,284	640,074
Crude oil in its natural state—						
(a) From the United States..... imp. gal.	892,773,734	45,494,788	688,869,955	30,835,697	768,765,241	38,165,168
(b) From other countries..... imp. gal.			322,936,756	11,729,822	265,845,557	10,140,741
Crude oil, not in its natural state—						
(a) From the United States..... imp. gal.	Included	with natural	crude		1,617,289	171,205
(b) From other countries..... imp. gal.					31,820,495	1,926,089
Sulphuric acid (66° Bé, not made by						
firm reporting..... lb.	26,653,976	266,403	24,057,138	239,016	24,696,413	250,501
Sulphur (not used in acid manufacture) lb.	62,244	2,425	67,730	2,464	117,279	4,095
Caustic soda..... lb.	3,079,914	99,852	3,291,438	104,992	3,324,629	111,870
Soda ash..... lb.	323,840	6,870	284,761	6,483	289,418	9,636
Litharge..... lb.	588,499	27,415	364,934	23,536	356,048	26,898
Fullers' earth..... lb.	19,642,179	258,934	22,811,655	314,515	18,588,514	239,357
Compounding materials.....		424,729		372,020		338,247
Tetraethyl fluid.....		408,615		1,451,453		1,249,314
Other materials.....				113,419		264,055
Shipping containers.....		1,806,304		949,170		526,418
<b>Total.....</b>		<b>52,629,471</b>		<b>48,916,966</b>		<b>56,659,492</b>
<i>Lubricating oils and greases—Total.....</i>		<i>207,916</i>		<i>270,791</i>		<i>399,523</i>
<b>Grand total.....</b>		<b>52,237,387</b>		<b>49,187,757</b>		<b>56,969,015</b>
<b>PRODUCTS MADE—</b>						
<i>Petroleum refining—</i>						
Made for sale—						
Gasoline (a) straight run..... imp. gal.	207,750,871	23,148,720	267,010,338	25,933,516	294,665,214	28,478,159
(b) by cracking processes..... imp. gal.	192,113,405	19,957,260	155,843,903	13,911,439	166,773,271	13,956,313
Fuel oil..... imp. gal.				9,617,675	300,071,842	10,560,733
Gas oils..... imp. gal.	312,814,636	11,262,147	91,390,183	4,712,675	101,549,871	5,412,798
V.M. & P. or solvent naphtha and engine distillate..... imp. gal.	18,075,192	2,043,823	33,947,241	2,987,440	36,223,392	3,183,330
Kerosene..... imp. gal.	52,466,990	5,141,001	48,951,129	4,455,425	37,675,985	3,635,618
Lubricating oils..... imp. gal.	15,105,061	3,656,856	17,194,703	2,983,331	18,928,008	3,896,754
Grease..... lb.	9,629,492	531,759	8,339,991	357,205	9,960,640	563,514
Tar..... lb.						
Asphalt..... imp. gal.	23,082,228	1,934,046	21,627,780	1,698,023	25,584,495	2,303,717
Petroleum coke..... tons	53,787	293,755	54,646	322,379	52,467	200,512
Wax and candles..... lb.	9,195,542	417,304	8,997,682	355,308	10,655,682	476,899
Other products.....		176,402		4,350		171,114
<b>Total for sale.....</b>		<b>68,563,973</b>		<b>67,338,766</b>		<b>72,839,461</b>

Table 215.—Materials Used and Products Made by the Oil Refineries of Canada, 1932-24—Concluded

	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>PRODUCTS MADE—Concluded</b>		\$		\$		\$
Made for own use—						
Gasoline (a) straight run.... imp. gal.			75,892	6,940	314,778	23,151
(b) by cracking process.... imp. gal.	72,402	7,472				
Fuel oil (except for cracking).... imp. gal.			6,600	743		
Gas oils..... imp. gal.	53,459,252	1,787,253	55,864,197	1,611,981	53,918,147	1,839,395
V.M. & P. or solvent naphtha and engine distillate..... imp. gal.			458,804	25,981	455,465	23,484
Kerosene..... imp. gal.	106,435	9,985	71,914	5,611	70,255	4,245
Lubricating oils..... imp. gal.	58,067	5,406	77,200	6,188	66,008	5,365
Tar..... imp. gal.	38,842	9,380	54,957	8,731	48,404	12,589
Grease..... lb.					1,306,410	49,927
Asphalt..... imp. gal.			4,855	255	7,158	444
Petroleum coke..... tons			18,420	1,496	108,563	2,044
Still gas..... M cu. ft.	19,278	104,181	20,079	115,400	9,293	57,961
Wax and candles..... lb.	3,836,413	824,386	3,505,405	631,116	3,772,746	777,351
Other products.....			386	15	433	29
		48,288		50,498		58,632
Total for own use.....		2,796,351		2,464,955		2,851,617
<b>Total Petroleum refining.....</b>		<b>71,369,324</b>		<b>69,803,721</b>		<b>75,691,078</b>
Eng and gas oils made and used in pressure cracking process.... imp. gal.	355,368,388		364,389,832		*309,595,780	
<b>Lubricating oils and greases—</b>						
Lubricating oils..... imp. gal.	462,888	242,196	576,560	311,767	543,258	397,751
Lubricating greases..... lb.	260,853	34,811	898,755	112,656	832,201	104,042
Soaps and soap powders..... lb.	290,955	29,092	310,996	30,386	475,591	39,476
Other products.....		31,334		9,735		10,567
<b>Total lubricating oils and greases.....</b>		<b>337,433</b>		<b>464,544</b>		<b>551,836</b>
<b>Grand total.....</b>		<b>71,697,757</b>		<b>70,268,265</b>		<b>76,242,914</b>

\* Not including 5,475,682 gallons of heavy naphtha and 1,389,045 gallons of crude.

## CHAPTER EIGHT

## THE NON-METAL MINING INDUSTRIES IN CANADA. (Other than Fuels)

Including detailed data relating to operations in the following industries:—

Abrasives	Miscellaneous—	Manganese bog
Asbestos	Actinolite	Mineral waters (natural)
Feldspar and Quartz	Barytes	Natro-alunite
Gypsum	Bituminous sands	Phosphate
Iron oxides (ochre)	Fluorspar	Pyrites
Mica	Graphite	Silica brick
Salt	Magnesitic dolomite	Sodium carbonate
Talc and soapstone	Magnesium sulphate	Sodium sulphate

## THE ABRASIVES INDUSTRY IN CANADA

The abrasives industry in Canada includes two main divisions: (1) The Natural Abrasives Industry, covering the production of natural abrasives such as grindstones, pulpstones and scythestones, corundum, diatomite, volcanic dust, etc., and (2) The Artificial Abrasives and Abrasive Products Industry, which covers the manufacture of silicon carbide, fused alumina, abrasive wheels, abrasive paper, etc.

## (1) NATURAL ABRASIVES

**Corundum.**—Corundum crystals are found in an area embracing several townships in Renfrew and Hastings counties in the province of Ontario. The commercial production of the mineral commenced in this area about 1900 and shipments reached a maximum in 1906. Corundum mining practically ceased with the perfection and production of artificial abrasives by the electric furnace. In 1921 grain corundum amounting to 403 tons valued at \$55,965 was exported to the United States; since that year no shipments of corundum have been reported in Canada.

The world's supply of corundum now comes almost entirely from the Transvaal in the Union of South Africa where the mineral is described as usually occurring in unconsolidated surface deposits resulting from the disintegration of corundum-bearing gneiss. Shipments of corundum in South Africa during 1934 totalled 3,201·90 tons valued at £23,844 as compared with 1,303·837 tons worth £9,531 in 1933.

The greater portion of the corundum mined is used normally in the manufacture of abrasive wheels. The lens and optical grinding trades also utilize some of the mineral in the form of fine flour or grain.

The higher grades of emery, a mixture of magnetite and corundum, comes largely from Asiatic Turkey and Greece; emery powder is consumed chiefly in the surfacing of plate glass and in the manufacture of abrasive cloth, grinding compounds and polishing and grinding wheels.

No imports or exports of corundum were reported in Canada during either 1933 or 1934. The value of emery, crushed or ground, imported into Canada in 1934 totalled \$40,709 as compared with \$26,371 in 1933. Imports of sand paper, glass, flint and emery paper or emery cloth in 1934 totalled in value \$92,046 as against \$81,559 in the preceding year and of the 1934 imports, \$60,112 came from the United States and \$25,621 from the United Kingdom.

"Metal and Mineral Markets" quoted emery, September, 1935—per ton, f.o.b. New York, domestic crude ore, first grade, \$10. Other American ore, delivered to grinders, per gross ton, \$16; Turkish and Naxos ore, \$30 to \$40. F.o.b. Pennsylvania, in 350 pound kegs: Turkish Khasia and Naxos grain emery, 6½ cents per pound; American, 4 cents.

**Diatomite.**—Production of diatomaceous earth in Canada during 1934 totalled 1,372 short tons valued at \$54,910 as compared with 1,789 tons worth \$36,648 in 1933. The material in 1934 came from the provinces of Nova Scotia, Ontario and British Columbia. In Nova Scotia



shipments of diatomite were made during 1934 by International Diatomite Industries, Ltd., from the Little River, Digby county, and from East New Annan, Colchester county, about eleven miles south of Tatamagouche harbour. The crude material is excavated from bogs, air-dried to remove moisture, and then fed into a kiln where the balance of the moisture is removed and the carbonaceous matter burned.

In Ontario calcined diatomite was shipped from stock by Diatomite Products Ltd.; the large treatment plant of this company located at Martin Siding, in the Muskoka district, remained inactive throughout the year. At Novar the mill of Dominion Diatomite Ltd. was in operation throughout the latter part of October and shipments of calcined diatomite were made; no crude diatomite was mined during 1934. The plant and deposits of this company were optioned towards the end of the year by Diatomite Refiners Co., Toronto.

At Quesnel in the Cariboo district, British Columbia, a relatively few tons of diatomite was mined by the B.C. Refractories Ltd. This output was shipped to the company's plant in Vancouver and was utilized chiefly for insulation purposes. The Quesnel area contains the largest deposits of diatomite known within the Dominion. During 1934 it was reported that a small testing plant was erected in Vancouver for the treatment of diatomite mud from Burnaby Lake; this deposit is located only a short distance from the city of Vancouver.

The Department of Mines, Ottawa, reports that:—"Deposits containing medium quality diatomite are very common in some parts of Canada. Owing, however, to foreign competition and to the present comparatively small Canadian demand, only the highest quality and properly prepared diatomite can be successfully marketed on a scale sufficiently large to warrant the operations of a property and the erection of a plant."

The National Research Council, Ottawa, recently conducted research to ascertain whether any of the Canadian deposits of diatomaceous earth could be satisfactorily used in place of the imported earths now used to assist the filtration of syrups in sugar refining. It was found that the earths so far tested were not efficient enough in their raw state. The possibility of increasing their efficiency by processing will next be taken up by the Council.

The amount of diatomite used as an abrasive material in polishes, etc., is relatively small; much greater quantities of the material are now used for filtration purposes and insulation. It is also utilized in the manufacture of asphalt battery boxes, insulation for acoustical purposes, absorbents, light-weight fillers, paints, etc.

Tripoli is a form of silica which closely resembles diatomite but is of entirely different origin, being generally regarded as a chalcedonic variety of silica; no production of this mineral is reported in Canada. It is used to a considerable extent as a mechanical cleanser, in admixture with soap and other detergents and for foundry partings; it is also employed interchangeably with pulverized silica for use as a filler or inert extender in paints and transparent wood fillers. The material is usually sold by sample, the governing factors being the quantity of free quartz grains or "grit," colour and fineness.

Imports of diatomaceous earth or infusorial earth (Kieselguhr) into Canada during 1934 totalled 24,832 cwt. valued at \$39,315 as compared with 48,600 cwt. worth \$72,133 in 1933. In 1934 the entire imports came from the United States.

"Canadian Chemistry and Metallurgy" quote diatomite, September, 1935, various grades \$40—\$60 per ton.

Diatomite shipments in Canada during the first six months of 1935 totalled 293 tons valued at \$5,682 as compared with an output of 755 tons at \$15,110 for the same months of 1933.

**Garnets.**—Garnets have not been commercially produced in Canada for some years. In 1933 some prospecting work was conducted on garnet deposits occurring in the vicinity of Labelle, Quebec, and northwest of North Bay, Ontario; small trial shipments of the mineral were made from both areas during that year. According to the Department of Mines, Ottawa, about 85 per cent of the world's garnet production is used for making abrasive coated papers and cloths and almost all the balance for glass surfacing. During recent years the artificial abrasive coated papers have made increasing inroads into the garnet paper production.

The bulk of the world's supply of garnet is reported as coming from Gore Mountain, Warren county, New York State, U.S.A. Prices f.o.b. United States mines were quoted \$80—\$85 per ton for concentrates, and \$45 for glass surfacing fines in 1934. No imports of crude garnet into Canada were reported in 1934.



**Grinding Pebbles.**—No shipments of Canadian pebbles suitable for use as grinding material have been reported since 1926; during that year 64 tons were shipped from deposits occurring on the north shore of Lake Superior near Jackfish. In the United States, pebbles and tube mill liners are made from quartzite at Jasper, Minn.; their use, however, is declining owing to the increasing use of metal balls and steel and rubber liners. The Department of Mines, Ottawa, reports that a considerable deposit of pebbles suitable for grinding purposes occurs on the north shore of Gabarus Bay, Cape Breton county, Nova Scotia.

**Grindstones, Pulpstones and Scythestones.**—Shipments of grindstones, pulpstones and scythestones from Canadian quarries in 1934 amounted to 987 tons valued at \$46,478 as compared with 498 tons worth \$21,919 in 1933, an increase of 97.8 per cent in quantity and 212 per cent in value.

During 1934 the Read Stone Company, Ltd., operated its sandstone quarry at Quarry Island, Pictou county, Nova Scotia, from May to October; crude grindstones produced at Quarry Island were shipped, for finishing, to the company's plant located at Stonehaven, New Brunswick.

The same company maintained steady production of grindstones and scythestones in the province of New Brunswick, stone being obtained in this province largely in the vicinity of Stonehaven. At Quarryville, New Brunswick, the National Trust Company, receiver for the Miramichi Quarry Company, Ltd., shipped pulpstones finished from stone taken from stock; the dressing works was operated throughout the months of July, August and September. Sandstone quarried by E. A. Smith at Shediac, New Brunswick, was exported to the United States for use as sharpening stone.

In British Columbia, J. A. and C. H. McDonald, Ltd., shipped finished pulpstones from their dressing works located in Vancouver; stone used for these was quarried during 1934 in the Rupert district of Gabriola Island, near Nanaimo.

Report No. 760, recently issued by the Department of Mines, Ottawa, states: "The large size Canadian grindstones are mainly used for sharpening pulp mill knives, and in the United States are used in the file, machine-knife, granite tool, and shear manufacturing industries. The small stones are used for scythe and axe grinding . . . There is a demand for good pulpstones, particularly for use in large magazine grinders, but since deposits containing thick beds of the proper quality sandstone are very scarce in Canada, only about 1 per cent of the stones used in Canadian pulp mills is being produced in Canada . . . The artificial pulpstones made of silicon carbide segments and also more recently of fused alumina segments are gradually but surely replacing the natural stone."

Imports of grinding wheels manufactured by the bonding together of either natural or artificial abrasives, totalled \$103,630 in value in 1934 as compared with a value of \$47,965 in 1933. Imports of grinding stones or blocks, manufactured by the bonding together of either natural or artificial abrasives, amounted to \$10,366 in 1934 as against a value of \$5,141 in the preceding year. Grindstones numbering 1,024 with a value of \$140,327 were imported in 1934, these were not mounted and not less than 36 inches in diameter. Imports of grindstones, n.o.p., in 1934 numbered 4,056 worth \$4,491. Exports of manufactured grindstones were evaluated at \$1,947 in 1934 as compared with a value of \$2,840 in 1933.

**Volcanic Dust (Pumicite).**—Shipments of volcanic dust in Canada totalled 31 tons valued at \$620 in 1934 as compared with 118 tons worth \$2,360 in 1933. Most of the production during 1934 came from Williams Lake, British Columbia, and was for use as an oil filtering medium. The material was mined for some years from deposits occurring near Waldeck, situated a few miles east of Swift Current, Saskatchewan. The Saskatchewan deposits were not actively operated in 1934 and shipments in the province amounted to only one ton during the year.

Volcanic dust has been successfully used as a cold water calcimine, as a cleanser, as a glass and metal polish, as a hand cleanser, and as a sweeping compound. The University of Saskatchewan has recently experimented with the mineral as a ceramic glaze.

Possible imports of volcanic dust are not recorded as such, however, imports of pumice and pumice stone, lava and calcareous tufa, not further manufactured than ground, were valued at \$25,142 in 1934 as compared with \$18,113 in 1933.

Tripoli was quoted, United States, October, 1935: car lots, f.o.b. seller's works, air floated, bags, ton, \$27.50 up; double ground, car lots, works, bags, ton, \$18.00 up; once ground, car lots, works, bags, ton, \$16.00 up.

Table 216.—Capital Employed in the Natural Abrasives Industry in Canada, 1933 and 1934

	1933	1934
	\$	\$
Capital employed as represented by:		
(a) Present value of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	31,991	197,637
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	1,274	10,565
(c) Inventory value of finished products on hand.....	8,710	8,935
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	16,581	17,639
<b>Total.....</b>	<b>58,556</b>	<b>234,776</b>

Table 217.—Employees, Salaries and Wages in the Natural Abrasives Industry in Canada, 1933 and 1934

	1933				1934			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	1		1	1,500	6		6	5,208
Wage earners.....	18		18	6,296	28		28	15,372
<b>Total.....</b>	<b>19</b>		<b>19</b>	<b>7,796</b>	<b>34</b>		<b>34</b>	<b>20,580</b>

Table 218.—Wage-Earners, by Months, in the Natural Abrasives Industry, 1934

Month	No.	Month	No.
January.....	5	July.....	49
February.....	10	August.....	44
March.....	12	September.....	61
April.....	13	October.....	29
May.....	45	November.....	21
June.....	41	December.....	5

Table 219.—Production (Sales) of Natural Abrasives in Canada, 1933 and 1934

Province	Diatomite		Grindstones, Pulpstones and Scythestones		Volcanic Dust	
	Tons	\$	Tons	\$	Tons	\$
<b>1933</b>						
Nova Scotia.....	1,747	34,940	21	868		
New Brunswick.....			277	12,051		
Ontario.....	28	1,298				
Saskatchewan.....					118	2,360
British Columbia.....	14	410	200	9,000		
<b>Total.....</b>	<b>1,789</b>	<b>36,648</b>	<b>498</b>	<b>21,919</b>	<b>118</b>	<b>2,360</b>
<b>1934</b>						
Nova Scotia.....	1,320	52,800	50	1,762		
New Brunswick.....			535	27,091		
Ontario.....	46	1,920				
Saskatchewan.....					1	20
British Columbia.....	6	190	402	17,625	30	600
<b>Total.....</b>	<b>1,372</b>	<b>54,910</b>	<b>987</b>	<b>46,478</b>	<b>31</b>	<b>620</b>

Table 220.—Production of Diatomite in Canada, 1925-1934

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925-1926.....			1931.....	1,610	32,789
1927.....	266	6,650	1932.....	1,496	29,509
1928.....	368	8,960	1933.....	1,789	36,048
1929.....	429	10,330	1934.....	1,372	54,910
1930.....	554	13,247			

NOTE.—For years 1896 to 1924, see previous reports.

Table 221.—World Production of Diatomaceous Earth

(Supplied by Imperial Institute—London)

(Long tons)

Producing Country	1932	1933	1934
<b>BRITISH EMPIRE</b>			
Northern Ireland.....	3,731	3,998	5,269
Canada.....	1,336	1,597	1,225
Barbados.....	10	10	2
Australia.....	1,484	2,840	(f) 2,672
<b>FOREIGN COUNTRIES</b>			
Denmark (moler) (estimated).....	29,000	21,000	40,000
Finland.....	451	620	626
France.....	9,000	3,000	2,233
Germany.....	(d) 3,945	(d) 4,483	(e) 4,255
Hungary (exports).....	1,017	1,246	1,394
Italy.....	758	1,910	2,264
Norway (exports).....	113	221	84
Portugal.....	—	—	228
Spain (estimated).....	2,200	3,300	2,200
Sweden.....	702	640	1,102
Algeria.....	10,285	10,826	9,772
United States.....	(e) 73,891	(b) 80,300	(b) 98,200
Chile.....	49	1	(a)
Japan.....	7,032	14,371	(a)
Korea.....	1,761	2,994	(a)
Netherlands East Indies.....	40	40	95

Diatomaceous earth is also produced in U.S.S.R. (Russia).

(a) Information not available.

(c) Average of 3 years' production, 1930-1932.

(e) Production of Hoesen only.

(b) Estimated.

(d) Exports.

(f) Excluding the production of Victoria, which amounted to 884 long tons during 1933.

Table 222.—Production of Grindstones in Canada, by Provinces, 1925-1934

(For the years 1886 to 1924, see Mineral Production of Canada, 1928)

Year	Nova Scotia		New Brunswick		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1925.....	439	16,723	1,296	45,061	1,735	61,784
1926.....	311	15,136	1,202	43,850	1,513	58,986
1927.....	11	220	1,306	47,255	1,317	47,475
1928.....			1,250	45,901	1,250	45,901
1929.....	6	110	1,032	37,291	1,038	37,401
1930.....	6	110	229	9,764	235	9,874
1931.....			198	8,164	198	8,164
1932.....	12	433	188	8,903	200	9,336
1933.....	21	868	140	6,211	161	7,079
1934.....	50	1,762	303	12,781	353	14,543

Table 223.—Production of Pulpstones and Sharpening Stones in Canada, 1925-1934

Year	Pulpstones		Sharpening stones		Year	Pulpstones		Sharpening stones	
	Tons	Value	Tons	Value		Tons	Value	Tons	Value
		\$		\$			\$		\$
1925.....	781	57,781	46	4,600	1930.....	573	49,897	22	2,250
1926.....	1,155	89,541	27	2,700	1931.....	342	27,305	81	2,634
1927.....	911	75,242	23	2,300	1932.....	60	3,500	68	2,899
1928.....	581	52,659	24	2,400	1933.....	214	9,870	123	4,970
1929.....	754	62,336	155	6,617	1934.....	523	27,225	111	4,710

Table 224.—Consumption of Pulpstones by the Canadian Pulp and Paper Industry, 1931-1934

Year	Number for 2 ft. wood		Value		Number for 4 ft. wood		Value	
		\$		\$				\$
1931.....	225	72,588	225	71,760	285	337,580		
1932.....	210	65,450	139	46,436	222	249,373		
1933.....	321	98,475	95	31,945	199	223,635		
1934.....	378	103,811	84	29,680	268	292,359		

## 2. THE ARTIFICIAL ABRASIVES AND ABRASIVE PRODUCTS INDUSTRY

Production of artificial abrasives increased considerably in 1934, the tonnage of crude silicon carbide and fused alumina at 60,994 tons being more than double the output of 28,854 tons in 1933 and the highest reported since 1930. The record production was in 1929 when 75,449 tons were made.

In 1934 reports were received from 14 plants of which 13 were located in Ontario and 1 in Quebec. The total value of production was \$7,414,853 and the average number of employees was 861.

Artificial abrasives were made in 6 works located near the power centres of Niagara Falls and Shawinigan Falls; 3 of these establishments made only fused alumina, 1 made only silicon carbide, and 2 made both fused alumina and silicon carbide. The output of these works was valued at \$6,278,142, including 60,994 tons of silicon carbide and fused alumina worth \$5,814,583 and other products and by-products such as ferrosilicon, firesand, fused magnesia, refractory cements, boron carbide and boron carbide shapes, etc.

Abrasive products such as wheels, paper, cloth, pulpstones, sharpening stones and files, were manufactured in 9 different plants in 1934. Seven concerns made wheels and segments and 2 made abrasive cloth or paper. The production of wheels and segments was valued at \$569,764 in 1934.

Table 225.—Artificial Abrasives Manufactured, 1933 and 1934

Products	Unit of measure *	1933		1934	
		Quantity	Selling value at works	Quantity	Selling value at works
			\$		\$
Crude silicon carbide.....	ton	7,887	765,192	16,398	1,858,746
Fused alumina.....	ton	20,967	1,726,191	44,596	3,955,837
Refractories (silicon carbide, firesand, etc.).....	ton	982	27,060	1,383	33,515
Abrasive wheels and segments.....	xx		336,647		569,764
Sharpening stones and files.....	xx		43,886		62,929
Other products(x).....	xx		651,480		934,062
<b>Total.....</b>	<b>xx</b>		<b>3,550,456</b>		<b>7,414,853</b>

(x) Includes ferrosilicon, abrasive cloth, abrasive paper, tiles, artificial pulpstones, graphite, boron carbide, boron carbide shapes, fused magnesia, refractory cements, firebrick, adhesive tape, etc.



Table 226.—Imports into Canada and Exports of Abrasives in 1933 and 1934

	1933		1934	
	Quantity	Value	Quantity	Value
		\$		\$
<b>IMPORTS</b>				
Artificial abrasives in bulk, crushed or ground, when imported for use in the manufacture of abrasive wheels and polishing composition.....		194,618		306,377
Diamond dust or bort, and black diamonds for borers.....		354,999		1,365,404
Emery in bulk, crushed or ground.....		26,371		40,709
Grinding wheels, manufactured by the bonding together of either natural or artificial abrasives.....		47,065		103,630
Grinding stones or blocks manufactured by the bonding together of either natural or artificial abrasives.....		5,141		10,366
Grindstones, not mounted, and not less than 30 inches in diameter... No.		76,615	1,024	140,327
Grindstones, n.o.p. .... No.		2,516	4,056	4,491
Pumice and pumice stone, lava and calcareous tufa, not further manufactured than ground.....		18,113		25,142
Sand paper, glass, flint and emery paper or emery cloth.....		81,559		92,046
Iron, sand or globules, or iron shot, and dry putty, adapted for polishing glass or granite or for sawing stone.....		7,063		12,642
Manufactures of emery or of artificial abrasives, n.o.p. ....		24,717		38,342
Diatomaceous earth or infusorial earth (kieselguhr), ground or unground..... Cwt.	48,600	72,133	24,832	39,315
<b>Total</b> .....		<b>911,810</b>		<b>2,208,791</b>
<b>EXPORTS</b>				
Grindstones, manufactured.....		2,840		4,947
Abrasives—				
Natural, n.o.p., in ore or bulk, crushed or ground (x)..... Cwt.	36,096	43,906	26,434	33,512
Artificial, crude, including silicon carbide..... Cwt.	628,958	2,121,681	1,267,651	3,869,613
Artificial, made up into wheels, stones, etc.....		35,933		43,838
<b>Total</b> .....		<b>2,204,360</b>		<b>3,951,910</b>

(x) Including infusorial earth, rotten stone, tripoli, etc.

## ASBESTOS

The principal asbestos of commerce occurs in serpentine. That from Canada, and especially from Quebec mines, is found to be more uniform in requisite commercial qualities and therefore more desirable and valuable than asbestos from most other countries.

Finally revised statistics relating to Canadian asbestos production during the calendar year 1934, show an output of 155,980 short tons valued at \$4,936,326 as compared with 158,367 short tons worth \$5,211,177 in 1933. The figures of shipments for 1934 are lower than for the preceding year, both in tonnage and value, by proportional decreases of 1.5 per cent and 5.25 per cent, respectively. The Bureau of Mines for the province of Quebec, from which province the Dominion's entire output of this mineral comes, states that in the latter half of 1933 there had been a very marked improvement in the asbestos market which had raised hopes that the 1934 figures would greatly exceed those of the preceding year and it was a disappointment to notice the falling-off of the monthly shipments after the first quarter of 1934; this, however, is considered only a temporary setback. It may be added that a large proportion of the year's output was stored as "stocks on hand." The average value per ton for asbestos in 1934 was \$31.65 as against \$32.90 in 1933, \$24.72 in 1932, and \$29.29 in 1931. Rock mined in 1934 totalled 2,320,750 tons as compared with 1,566,919 tons in 1933; the tonnage milled in 1934 totalled 1,935,129 while in 1933 the quantity was 1,329,814 tons.

In contrast with the falling-off in production there was an encouraging increase in exports, the tonnage amounting to 83,267 in 1934, representing a 5.8 per cent increase over 1933. Exports of asbestos manufactures including roofing totalled in value \$140,826 in 1934, or an increase of 92.8 per cent over 1933; asbestos sand and waste exports amounted to \$1,100,305 as compared with a value of \$991,417 in the preceding year. Included among the many countries importing Canadian asbestos in 1934, and reflecting the world wide demand for this product of Quebec mines, were the United Kingdom, United States, Australia, Belgium, France, Germany, Italy, Japan, Netherlands and Spain.

A report "Chrysotile Asbestos in Canada" as issued by the Department of Mines, Ottawa, states:—"To be of any commercial value, asbestos needs length, fineness of fibre, combined with infusibility, toughness or tensile strength, and flexibility. It is surprising that sometimes specimens from foreign countries—although very beautiful in appearance—are often wanting in some of these essential physical properties. Qualities like silkiness, length, and flexibility may be determined very easily by the eye and fingers; but tensile strength, and infusibility—those necessary qualities upon which the great value of asbestos depends—can only be determined by systematic tests, made either in a practical way during the course of manufacture or in the laboratory. The Canadian chrysotile asbestos possesses all the above mentioned properties and qualities in a marked degree, the length of the fibre being one of the principal factors determining the grades. Temperatures of 2,000° to 3,000° F. are easily withstood by Canadian asbestos, while with some varieties a temperature of 5,000° F. has apparently produced no visible effect. Specimens of asbestos from the Eastern Townships of Quebec from a depth of 500 feet, and from drill cores to a depth of 1,700 feet are equal in grade to the material produced near the surface."

Both surface and underground methods are utilized in the mining of Quebec asbestos and the milling practices employed in the recovery of the various high grade fibres are considered among the most efficient employed anywhere in the world. Exploration and development on the properties of the operating companies have disclosed reserves of the mineral sufficient for many years to come.

During 1934 research work was continued at the National Research Laboratories, Ottawa, on problems pertaining to the Canadian asbestos industry.

### GENERAL REVIEW

**United States.**—The United States Bureau of Mines reports that commercial production, imports and apparent consumption of raw asbestos in the United States in 1934 showed gains over 1933. The total quantity of asbestos commercially produced in the United States in 1934 was 5,087 short tons valued at \$158,347, compared with 4,745 short tons valued at \$130,677 in 1933. It was practically all chrysotile from Arizona and Vermont, by far the larger part originating in Vermont. Amphibole was mined in Maryland, Montana and Washington. In 1934, Canada contributed 93.9 per cent in quantity and 89.6 per cent in value of the total imports of asbestos into the United States. The U.S.S.R. (Russia in Europe) was the second largest source of raw asbestos imported into the United States in 1934. The Russian total of 2,595 short tons valued at \$89,439 was 2.2 per cent in quantity and 2.6 per cent in value of all imports of asbestos into the United States. An interesting development in the import situation is the rise of Malta, Gozo, and Cyprus Islands to third place in 1934 in the rank of countries exporting asbestos to the United States. Africa ranked fourth among sources of raw asbestos imported into the United States in 1934, the material consisted wholly of high-grade crudes with an average value per ton of \$110.63.

**Rhodesia.**—Asbestos production in Rhodesia during 1934 totalled 32,213.51 tons valued at £402,745; the average number of Europeans employed in asbestos mining was 182 and the number of natives totalled 3,955.

The Government Mining Engineer for Southern Rhodesia reports that the asbestos industry is now gradually recovering from the effects of the "slump." The output of asbestos reached its peak in 1929 when the amount exported and sold was valued at £892,717. This dropped considerably during 1930-1932, when the output was worth only £248,513. Since then it has gradually recovered and in 1934 £391,636 was exported.

Rhodesian asbestos is mostly mined in the Shabani and Mashaba districts where the deposits are very large, and the grade exceedingly good, the long fibre being of the very best quality and the output second only to Canada. At the present most of the Rhodesian asbestos is quarried, the occurrences being about 250 feet thick, but as they dip away under the overlying serpentine, underground mining is being resorted to and experiments are being made as to the best method of mining.

**Union of South Africa.**—The Department of Mines for the Union reports that although the average number of persons in service on asbestos mining in the Cape was 102 more during 1934 than during 1933, the quantity of fibre sold dropped from 3,224.656 tons to 2,810.7 tons, and the value from £60,306 to £51,673. This tonnage is less than half what it was during the

peak year 1929. The decrease in production is due to curtailment of operations by some of the larger companies, one of which has produced no fibre during the last two years. The reason given for the curtailment is that the market for blue asbestos is weak. Some of the larger companies function as buyers as well as producers, and they also hold leases over large areas of Crown land at low rental, which leases are subject to cancellation unless the lease areas are worked in a fair and bona fide manner and to the satisfaction of the Inspector. In regard to the sales of asbestos in the Union during 1934 the relative figures for each class of mineral are as follows:—

	1934	
	Tons (2,000 lb.)	Value £
Amosite (Transvaal only).....	3,756-420	37,104
Chrysotile (Transvaal only).....	11,025-300	114,241
Blue (mainly Cape).....	2,812-143	51,688
<b>Total</b> .....	<b>17,593-863</b>	<b>203,033</b>

The largest asbestos mines in the Union of South Africa are those producing chrysotile in the Barberton district of the Transvaal. The asbestos bearing serpentine occurs in two zones. The belts dip 10 degrees to 20 degrees and underground mining is practised. Amosite of the Lydenburg district of the Transvaal occurs in banded ironstones and underground mining is generally followed. Much of the crocidolite (blue asbestos) of the Cape of Good Hope is obtained from small open pits or from shallow mines worked by natives.

**Russia.**—In Russia the chrysotile asbestos deposits of the Bajanova district have a thin overburden and a paper by the United States Bureau of Mines states that hand methods of removal were first employed, in 1929 two shafts were sunk and connected with a haulage level at a depth of 50 metres. They were designed for glory-hole mining which proved uneconomical. This method was supplemented and largely superseded in 1930 by electric-shovel loading in open pits with transport by locomotives to inclined haulways up which cars were taken by electric hoists. Mining costs are estimated at about 75 cents a metric ton of rock.

The U.S.S.R. Chamber of Commerce, Moscow, reports that the asbestos works of the Yaroslavl Rubber Combine has started the mass production of pressed asbestos brake linings and it is stated that in 1935, 770,000 metres of asbestos brake lining will be manufactured for motor vehicles of the Gorki and Stalingrad factories. Statistics relating to Russian asbestos production in 1934 are not available. According to the American-Russian Chamber of Commerce, New York, exports of asbestos from Soviet Russia in 1934 totalled 33,715 metric tons valued at 3,247,000 roubles as compared with 21,458 metric tons valued at 2,651,000 roubles in 1933. Exports of asbestos articles in 1934 totalled 98 metric tons worth 9,000 roubles.

**Cyprus.**—In Cyprus chrysotile asbestos occurs on the slopes of Mount Troodos in irregular veins traversing serpentine formed by alteration of olivine. In 1927 approximately 6,000 workers were employed in the quarries and about 1,500,000 tons of rock were broken. Operations have been conducted on a much smaller scale since that year. Production consisted exclusively of short fibre until 1934 when, according to a report, a small quantity of spinning fibre was shipped. (Abstract from a United States Bureau of Mines Paper).

Work Done by the Cyprus and General Asbestos Co. Ltd., Amiantos  
(Imperial Institute)

	Last six months 1934	Last six months 1933
Rock mined .....	303,851	238,002
Rock treated .....	68,546	52,958
Finished asbestos produced .....	4,338	2,277
Finished asbestos exported .....	4,000	3,388
Average daily labour (quarries only) .....	580	625
Average daily labour (all operations) .....	1,036	1,080



The following information has been supplied by "Asbestos," Philadelphia:—"Deposits of asbestos are reported to have been discovered at Hohen Bogen, near Rimbach, in the Bavarian Forest. The deposits are said to be fairly large, and while the asbestos is not of the spinning variety it may find use as micro-asbestos—Plans have been made to open an asbestos quarry in the Chateau-Ville-Vielle-et-Chateau-Queyras commune in the Guil Valley, France—What has every prospect of becoming a new mining industry for New Zealand is the discovery of an extensive deposit of asbestos by a Cromwell asbestos syndicate, the syndicate has, for some time past, been prospecting on what appears to be an extensive deposit on the Kawayay face of Mt. Pisa, results of any tests the mineral may be put to, are being awaited with considerable interest . . . So far only a few tons of asbestos have been taken from the deposits near Onslow, Western Australia, but the seam has been located and explored and is known to extend for at least eight miles from the present working; an asbestos expert states that the asbestos mined is remarkably clean. Western Australia hopes to obtain valuable trade through the development of her deposits."

**Uses.**—The consumption of asbestos in industry is ever growing and its diversified employment steadily expanding throughout the world. Spinning fibre is utilized in the manufacture of theatre curtains, blankets, clothing, conveyor belts for carrying hot materials, tape, rope, gaskets, clutch facings, brake-band linings and a variety of other manufactures.

Large quantities of the non-spinning fibre are consumed in the production of roofing materials and asbestos paper for pipe coverings, heaters, automobile mufflers, etc. Cement and asbestos compressed in sheets is utilized extensively as millboard, floor tile, corrugated sheeting, lumber, and as lining for electric switch boxes, garages, safes, etc. Non-corrosive, acid resisting pipes made of cement and asbestos are being employed extensively for water and gas mains and sewers. A standard European pipe consists of 80 per cent cement and 20 per cent asbestos. Large quantities of short fibres are consumed in the manufacture of plastic fireproof cements used for boiler, pipe and furnace lining. Short fibres are also used in fireproof paints and as a constituent of asphalt-roofing coatings. The use of asbestos in aircraft construction is becoming increasingly important. Ignited asbestos balls soaked in kerosene are now employed in the extermination of the "tent caterpillar"; asbestos buffers are now being used successfully in all types of power plant foundations, with shallow foundations an additional pack of fibre three inches in depth is often placed in the bottom to absorb jar. "Asbestos," Philadelphia, describes the latest factory built house in the United States as being made of cement, asbestos and steel. It is equipped with a heat and air-cooling unit, and can be put up ready for occupancy in two or three weeks. It sells at from \$3,800 to \$9,900, has a combination living and dining room, two bedrooms, kitchen, store room and bathroom; the asbestos, in the form of panels (asbestos cement board or lumber) is used for the exterior walls, a special aluminium alloy was employed as a trim and the roof was designed for use as a sun deck.

It is interesting to note that an asbestos bearing material which works well under water is reported to have been recently developed; it is tough but readily machined, has a low co-efficient of friction and water is its best lubricant.

**Table 227.—Capital Employed in the Asbestos Industry in Canada, 1932-1934**

	1932	1933	1934
Capital employed as represented by:	\$	\$	\$
(a) Present value of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	23,620,216	18,127,332	18,211,468
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	789,742	389,714	429,551
(c) Inventory value of finished products on hand.....	1,423,282	894,059	1,371,714
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	4,248,122	1,698,862	1,803,617
<b>Total.....</b>	<b>30,081,362</b>	<b>21,109,967</b>	<b>21,816,350</b>



Table 228.—Employees, Salaries and Wages in the Asbestos Industry in Canada, 1933 and 1934

	1933				1934			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
Salaried employees.....	118	22	140	\$ 261,684	125	22	147	\$ 281,493
Wage-earners—								
Mine.....	659		659		770		770	
Mill.....	830		830		938		938	
Total.....	1,489		1,489	1,017,409	1,708		1,708	1,327,319
Grand total.....	1,607	22	1,629	1,279,093	1,833	22	1,855	1,608,812

Table 229.—Number of Wage-Earners on Pay Roll in Asbestos Mining Industry, by Months, 1932-1934

Month	1932	1933	1934
January.....	1,344	1,218	1,577
February.....	1,436	1,048	1,587
March.....	1,380	1,016	1,595
April.....	1,130	1,119	1,587
May.....	1,219	1,399	1,780
June.....	1,234	1,392	1,928
July.....	1,216	1,543	1,902
August.....	1,002	1,564	1,808
September.....	1,229	1,920	1,823
October.....	1,275	2,059	1,688
November.....	1,340	1,819	1,762
December.....	1,367	1,754	1,653

Table 230.—Sales and Shipments (x) of Canadian Asbestos, 1932-1934

	1932		1933		1934	
	Tons	\$	Tons	\$	Tons	\$
Crucibles.....	471	119,221	1,306	341,734	1,603	409,853
Fibres.....	45,323	1,885,841	82,605	3,843,887	77,465	3,456,399
Shorts.....	77,183	1,034,659	74,456	1,025,556	76,852	1,070,074
Total.....	122,977	3,039,721	158,367	5,211,177	155,980	4,936,326
Sand, gravel and stone (waste rock only) (a)	3,473	3,369	6,445	3,215	4,672	3,480
	1932		1933		1934	
	Tons	Tons	Tons	Tons	Tons	Tons
Quantity of rock mined.....	1,145,340	1,566,919	2,320,750			
Quantity of rock milled.....	1,029,709	1,329,814	1,935,129			
Quantity of tailings retreated.....	709,094	521,930				

(x) All from the province of Quebec.

(a) This production is included under the sand and gravel industry.

Table 231.—\*Production of Asbestos in Canada, 1925-1934

(For the years 1880 to 1924, see Mineral Production of Canada, 1928)

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1925.....	273,524	8,977,546	1930.....	242,114	8,390,163
1926.....	279,403	10,099,423	1931.....	164,296	4,812,886
1927.....	274,778	10,621,013	1932.....	122,977	3,039,721
1928.....	273,033	11,238,360	1933.....	158,367	5,211,177
1929.....	306,055	13,172,581	1934.....	155,980	4,936,326

\* Sales.

Table 232.—Imports of Asbestos into Canada, 1932-1934

Item	1932		1933		1934	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Asbestos in any form other than crude, and all manufactures of, n.o.p.....		226,619		233,966		408,020
Asbestos packing.....	55	52,733	79	54,148	83	94,713
Asbestos brake and clutch lining.....		194,745		165,994		218,052
<b>Total.....</b>		<b>474,097</b>		<b>454,108</b>		<b>690,785</b>

Table 233.—Exports of Canadian Asbestos, by Countries of Destination, 1932-1934

Commodity and Destination	1932		1933		1934	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<b>ASBESTOS—</b>						
United Kingdom.....	1,420	82,567	4,633	303,492	4,618	316,468
United States.....	27,392	1,274,646	48,469	2,324,246	44,541	1,996,015
Australia.....	451	24,800	744	39,162	998	49,859
Belgium.....	1,080	49,707	5,051	275,046	3,548	191,519
France.....	2,360	150,911	2,620	167,832	3,969	243,416
Germany.....	1,969	117,148	4,572	306,713	5,435	441,188
Italy.....	666	48,162	1,647	94,047	618	58,090
Japan.....	6,683	338,576	9,530	422,252	18,489	679,723
Netherlands.....	421	17,300	1,088	50,333	734	35,800
Spain.....	219	11,323	343	14,976	162	7,887
Other countries.....			4	278	155	8,326
<b>Total.....</b>	<b>42,641</b>	<b>2,115,149</b>	<b>78,761</b>	<b>3,998,377</b>	<b>83,267</b>	<b>4,029,191</b>
<b>SAND AND WASTE—</b>						
United Kingdom.....	1,151	25,830	2,816	54,979	2,080	44,620
United States.....	65,618	901,927	63,744	869,994	68,171	964,429
Germany.....	733	13,934	1,666	32,222	2,497	50,787
Netherlands.....	764	18,385	377	7,220	579	11,541
Other countries.....	1,503	26,019	1,693	27,002	1,650	28,928
<b>Total.....</b>	<b>69,769</b>	<b>986,095</b>	<b>70,296</b>	<b>991,417</b>	<b>74,977</b>	<b>1,100,365</b>
<b>ASBESTOS MANUFACTURES, INCLUDING ASBESTOS ROOFING—</b>						
United Kingdom.....		35,325		37,420		91,501
United States.....		7,212		2,033		1,770
Newfoundland.....		3,085		2,125		5,245
Argentina.....		8,513		5,185		4,463
Other countries.....		20,482		26,280		37,847
<b>Total.....</b>		<b>75,517</b>		<b>73,044</b>		<b>140,826</b>

Table 234.—Manufactures in Canadian Asbestos Products Industry, 1933 and 1934

Products	Unit of measure	1933		1934	
		Quantity	Selling value at works	Quantity	Selling value at works
			\$		\$
Asbestos brake linings.....	ft.	1,707,544	316,938	2,692,184	458,147
Asbestos boiler and pipe coverings.....	ft.	827,667	65,725	1,207,301	99,948
Asbestos clutch facings.....	No.	126,362	19,572	338,069	49,317
Asbestos gaskets and tape.....	lb.	5,294	4,058	38,775	21,058
Asbestos packings.....	lb.	213,752	91,597	196,627	78,860
All other products*.....			259,736		203,653
<b>Total.....</b>			<b>757,626</b>		<b>910,983</b>

\* Includes asbestos blackboards, millboard, paper, shingles, yarn, cement, etc., and rubber, duck and flax packings.

NOTE.—A total of 11 plants reported in this industry in 1934, 4 were located in Quebec, 6 in Ontario and 1 in Nova Scotia.

Table 235.—Materials Used in Canadian Asbestos Products Industry, 1933 and 1934

Materials	Unit of measure	1933		1934	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Asbestos crude.....	lb.	3,703,800	51,504	4,844,692	66,524
Asbestos cloth and strips.....	lb.	57,784	24,285	36,291	15,703
Asbestos paper, corrugated or plain.....	lb.	173,616	8,454	48,183	2,771
Asbestos yarn.....	lb.	151,128	41,507	247,555	67,044
Portland cement.....	lb.	457,838	2,639	255,452	1,507
Cotton cloth, yarn and waste.....			16,841		10,397
Rubber.....	lb.	37,413	2,775	66,801	8,799
Containers, boxes, etc.....			21,581		30,071
All other materials.....			161,476		184,258
<b>Total.....</b>			<b>331,062</b>		<b>387,074</b>

Table 236.—World Production of Asbestos

(Long tons)

(Supplied by Imperial Institute—London)

Producing country and description	1932	1933	1934	Producing country and description	1932	1933	1934
BRITISH EMPIRE				FOREIGN COUNTRIES			
Southern Rhodesia.....	14,077	26,945	28,762	Finland (fibre).....	1,677	2,311	3,629
Swaziland.....	4			France.....	300	(a)	(a)
Union of South Africa (b).....	7,844	15,185	15,709	Greece.....	8	14	(a)
Canada—				Italy.....	1,461	3,215	(a)
Chrysotile (c).....	112,902	147,153	143,439	United States (sales).....	3,178	4,237	4,542
Crude.....	421	1,166	1,485	Argentina.....	7		(a)
Fibre.....	40,467	73,754	69,165	Brazil.....	36	97	(a)
Shorts.....	68,913	66,479	68,618	China (estimated).....	500	500	500
Sand and gravel.....	3,101	5,754	4,171	Japan (estimated).....	1,000	1,000	1,000
Actinolite.....			27	Korea.....		12	
Cyprus.....	1,520	3,494	7,081	Manchoukuo.....	118	104	(a)
India.....	90		25	Turkey.....		118	4
Australia.....	130	279	170				
<b>Total.....</b>	<b>137,000</b>	<b>193,000</b>	<b>195,000</b>	<b>Total*.....</b>	<b>8,000</b>	<b>12,000</b>	<b>14,000</b>
				<b>World's Total*.....</b>	<b>145,000</b>	<b>205,000</b>	<b>209,000</b>

\* Excluding the production of U.S.S.R. (Russia); statistics for which are not available.

(a) Information not available.

(b) Production is not available by kinds, but sales were as follows:—

	1932	1933	1934
Amosite.....	1,242 long tons	2,765 long tons	3,354 long tons
Blue.....	2,647	2,879	2,511
Chrysotile.....	6,888	8,546	9,844

(c) Sales and shipments.

## FELDSPAR AND QUARTZ

Owing to the very close physical association of these minerals in many Canadian deposits (pegmatites), it has been found difficult for some operators to make a separation of all data pertaining to the mining of each individual mineral and for this reason the general statistics relating to capital, employment, fuel and electricity, etc., have been combined in this report.

**Feldspar.**—Production of feldspar in Canada during 1934 totalled 18,302 tons valued at \$147,281 as compared with 10,658 tons worth \$105,117 in 1933 and 7,047 tons at \$81,982 in 1932. The 1934 production records a gain of 71.7 per cent in quantity and 40.1 per cent in value over that of the preceding year and represents the third successive annual increase in feldspar production since 1932.

Imports of ground feldspar into Canada during 1934 totalled 917 tons valued at \$14,255 as compared with 506 tons appraised at \$7,374 in 1933; the imports during both years came entirely from the United States. Exports of Canadian feldspar totalled 10,532 tons valued at \$65,158, representing increases of 192.8 per cent in quantity and 182.4 per cent in value over those of 1933; of the tonnage exported in 1934, 10,496 went to the United States.

Canadian production of feldspar in 1934, as in 1933, came entirely from the provinces of Quebec, Ontario and Manitoba. It is worthy of note that prior to 1933 the commercial output of feldspar was confined only to Quebec and Ontario with the exception of the year 1921 when a relatively small tonnage was shipped in Nova Scotia. In 1933 feldspar was recorded as being mined and sold on a commercial basis for the first time in Manitoba; in 1934 the Manitoba product was utilized largely by the ceramic trade, the mineral being ground at Warrood, Minnesota.

Most of the feldspar mined in Canada is of the high-potash variety. Deposits of soda-rich spar are relatively uncommon and often carry a high proportion of objectionable impurities. A proportion of the best grade feldspar mined in the Buckingham district, Quebec, is utilized for dental purposes.

In Quebec the mineral was mined and shipped during 1934 in the townships of Portland, Derry, and Buckingham in the Gatineau-Lièvre section of the Ottawa valley; shipments from mines in this area went to both Canadian and foreign plants. The grinding mill of the Canadian Flint and Spar Co. Ltd., located at Buckingham, was active throughout the year; various grades of pulverized feldspar are marketed by this company.

Mining activities in the Ontario feldspar industry in 1934 centred chiefly at the McDonald and Bathurst mines in the Perth area of Lanark county. Shipments were also made from the MacDonald mine at Hybla; from a deposit in Fraser township, Renfrew county; from the Mount Pleasant Mine, Burwash; from properties at Britt and Warren in the Parry Sound and Nipissing districts, respectively, and from the Gunter mine, Sabine township, Nipissing district. At Kingston the grinding plant of the Frontenac Floor and Wall Tile Company, Ltd., maintained production throughout the year; this company, in addition to marketing ground feldspar, utilized the material in the manufacture of ceramic products.

During the year the economic importance of nepheline syenite occurring near Bancroft in Hastings county was investigated and a test shipment of the rock made to the United States. For certain ceramic purposes and for use in the glass industry nepheline syenite has been reported as an adequate substitute for feldspar.

In Manitoba near Point du Bois on the Winnipeg river, Feldspar Products Co. Inc., of Warrood, Minnesota, operated the feldspar properties of the Winnipeg River Tin Mines Ltd. Operations were continuous from July to the end of the year and shipments on a royalty basis were made to a grinding plant located at Warrood; in addition to the exports to the United States a relatively small tonnage went to Winnipeg firms.

"Feldspar is used chiefly in the ceramic industry. Another important outlet is the glass industry which, in recent years, has absorbed about 30 per cent of the production. Feldspar is used in glass manufacture primarily as a source of alumina but also contains other valuable ingredients, such as alkalis, soda, and potash. Because of these constituents it melts without becoming entirely fluid and when cool forms a strong, colorless, or only slight colored glass. In most forms of pottery, feldspar is an essential ingredient of both the body and the glaze. Electrical insulators and similar forms of porcelain also contain feldspar." (Minerals Yearbook, 1934—United States Bureau of Mines).

"Metal and Mineral Markets"—New York—publish feldspar prices in September, 1935, as follows: per ton, f.o.b. North Carolina, potash feldspar, 200 mesh, white, \$17 in bulk; soda feldspar, \$19. F.o.b. Maine, Potash, feldspar, white, 200 mesh, \$17 in bulk. Granular glass spar, white, 20 mesh, f.o.b. North Carolina, \$12.50 in bulk. No. 1 potash spar, \$5.50 New Mexico; Crude Clean No. 1 potash spar, \$4.75; ground, \$9.50.

**Table 237.—Capital Employed in the Feldspar and Quartz Mining Industry in Canada, 1932-1934**

	1932	1933	1934
	\$	\$	\$
<b>CAPITAL EMPLOYED AS REPRESENTED BY:</b>			
(a) Present value of land, buildings, fixtures, machinery, tools and other equipment. (Estimated value if rented).....	831,620	1,050,026	1,170,106
(b) Inventory value of minerals on hand, stocks in process, fuel and miscellaneous supplies on hand.....	4,904	37,837	55,358
(c) Inventory value of finished products on hand.....	77,679	32,274	41,484
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	21,974	23,655	43,234
<b>Total.....</b>	<b>936,177</b>	<b>1,143,792</b>	<b>1,310,182</b>



**Table 238.—Employees, Salaries and Wages in the Feldspar and Quartz Mining Industry in Canada, 1933 and 1934**

	1933				1934			
	Number			Salaries and wages \$	Number			Salaries and wages \$
	Male	Female	Total		Male	Female	Total	
Salaried employees.....	20	3	23	34,979	37	7	44	50,888
Wage-earners.....	123		123	82,058	268		268	154,620
<b>Total.....</b>	<b>143</b>	<b>3</b>	<b>146</b>	<b>117,037</b>	<b>305</b>	<b>7</b>	<b>312</b>	<b>205,508</b>

**Table 239.—Number of Wage-Earners on Pay Roll in Feldspar and Quartz Mining Industry, by Months, 1932-1934**

Month	1932	1933	1934
January.....	69	39	170
February.....	81	32	153
March.....	106	34	153
April.....	56	18	145
May.....	102	123	263
June.....	111	172	300
July.....	122	187	356
August.....	113	193	389
September.....	84	200	377
October.....	90	163	355
November.....	122	139	286
December.....	105	132	232

**Table 240.—Production of Feldspar in Canada, by Provinces, 1925-1934**

Year	Quebec		Ontario		Manitoba		Canada	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1925.....	11,287	94,730	17,394	141,059			28,641	235,789
1926.....	13,168	111,136	22,783	199,102			35,951	310,238
1927.....	12,730	104,618	17,119	154,533			29,849	259,151
1928.....	12,943	104,789	18,954	180,153			31,897	284,942
1929.....	15,790	133,492	21,737	206,979			37,527	340,471
1930.....	17,074	163,802	9,722	104,667			26,796	268,469
1931.....	10,381	86,842	7,962	100,119			18,343	186,961
1932.....	3,390	39,062	3,657	42,920			7,047	81,982
1933.....	6,183	59,283	4,387	45,350	88	484	10,658	105,117
1934.....	9,207	78,853	7,302	61,665	1,793	6,763	18,302	147,281

**Table 241.—Imports and Exports of Feldspar, 1930-1934**

	Imports*		Exports	
	Tons	\$	Tons	\$
1930.....	3,177	53,341	21,183	165,482
1931.....	1,877	37,297	10,975	88,913
1932.....	1,487	24,875	2,017	15,465
1933.....	561	7,970	3,596	23,076
1934.....	1,039	15,245	10,532	65,158

\* Crude and ground.

Table 242.—Consumption of Feldspar in Canada by Specified Industries, 1930-1934

Year	Abrasive products industry		Imported clay products industry		Soaps and cleaning preparations industry		Total all industries (x)	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1930.....	19	370	2,254	51,211	1,000	29,904	7,406	159,220
1931.....	8	190	1,885	34,394	1,001	37,460	6,406	130,635
1932.....	6	173	1,406	28,043	956	26,647	6,049	116,465
1933.....	6	115	861	16,297	989	13,293	6,859	113,536
1934.....	25	688	1,487	30,577	1,091	13,420	7,918	132,209

(x) Includes feldspar consumed in glass manufacture and in 1934 includes feldspar used in the manufacture of glass, enamel and steel products.

NOTE.—The value of feldspar consumed in Canada in the manufacture of iron and steel products in 1931, 1932 and 1933 totalled, \$3,386, \$2,799, and \$2,969, respectively.

Table 243.—World Production of Feldspar, 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom (China stone).....	45,091	33,462	47,993	Germany (Bavaria).....	3,494	4,419	6,700
Canada.....	6,292	9,516	16,341	Italy.....	5,137	4,794	7,516
Australia (including China stone).....	1,006	2,570	2,885	Norway.....	20,249	18,202	25,194
India.....	473	677	628	Roumania (b).....	670	1,288	(a)
FOREIGN COUNTRIES				Sweden.....	23,319	32,053	33,924
Czechoslovakia (estimated).....	30,000	30,000	30,000	United States (sales).....	104,715	150,633	154,188
Finland (exports).....	1,505	2,663	3,276	Argentina.....	363	370	(a)
				Egypt.....	176	59	(a)
				Manchoukuo.....	1,753	(a)	(a)
				Brazil.....	60	.....	(a)

Feldspar is also produced in U.S.S.R. (Russia).

(a) Information not available.

(b) Converted from cubic metres at the rate of 1 cubic metre=2 long tons.

**Quartz (Silica).**—Production of natural silica, including quartzite, silicious fluxing gravel, lode quartz and natural silica sand, totalled 272,563 short tons valued at \$482,265 in 1934 as compared with 185,783 tons worth \$297,820 in 1933 and 189,132 tons at \$276,147 in 1932. Production in 1934, as for the preceding year, came from the provinces of Nova Scotia, Quebec, Ontario, Manitoba, Saskatchewan and British Columbia.

A report on silica by the Department of Mines, Ottawa, states that "Quartz and quartzite in sizes from 2 to 6 inches are used in the manufacture of ferro-silicon and as a smelter flux. For silica brick, quartzite is crushed to about 8 mesh. Some quartz is also crushed to make silica sand. Silica sand is generally prepared from a friable sandstone by crushing, washing, drying, and screening to recover different grades of material according to the industry for which it is required. For example, for the manufacture of glass the material should range between 20 and 100 mesh. Silica sand is also prepared from a friable quartz and from vein quartz. Silix is the washed sand or pure quartz crushed and ground in some form of ball mill then either air or water-floated to recover the fine flour. The ceramic industry requires 150 mesh or finer while the paint trade requires air-floated material 250 mesh or finer. The Canadian producers of silica sand are steadily improving their position and each year sees an increasing use of their products. The use of Canadian sand for sand blasting is increasing and the prospects are promising for a still further use of Canadian material for this purpose."

During 1934 the Dominion Steel and Coal Corporation, Limited, quarried silica rock at Leitches Creek, Cape Breton, the product of this quarry was shipped to the silica brick plant of the company located at Sydney. At Melford, Inverness county, silica sand from the Old River Denys property was shipped to New Glasgow by the new operators—Smith and MacDougall.

In Quebec the quarry and mill of the Canadian Carborundum Company, Limited, located at St. Canute, were active from January 1st to December 21st; glass, crude and brick silica sands

were sold or used by this company. At Buckingham, the Canadian Flint and Spar Company, Limited, produced and sold pulverized quartz and at St. Remi d'Amherst, Canadian Kaolin Silica Products Limited maintained steady operations throughout the year producing various grades of silica products; crushing, drying, screening and fine grinding are employed in this plant. At East Templeton, Ottawa Silica and Sandstone, Ltd., conducted both quarry and mill operations and made shipments of silica products. In Joly county a garnet-bearing rock was mined and milled for the production of "garno-grit" for sand blasting; these operations were conducted by McLean-McNicoll Limited of Montreal. At St. Bruno de Guigues (near Ville Marie) Flint Sands Limited erected a pilot mill for the treatment of material from a loosely, consolidated sandstone deposit; commercial production was expected in 1935. Fine ground silica products were also produced and shipped from the Lake St. John area by Canadian Silica Products Limited. In addition to the operations referred to, there were numerous shippers of crude quartz; these were located principally in the Ottawa Valley and a considerable proportion of the tonnage sold by them went to the electro-chemical industry.

In Ontario the Killarney quarry of Dominion Mines and Quarries Ltd., was in operation from May to October. Milling was conducted from June to September, and the crushed, sized and washed product was shipped to Welland, Ontario, and Niagara Falls, New York. In Sabine township, Nipissing district, crude quartzite was shipped from Gunter's mine and in Deroche township the quarry of Wright & Company was in operation from July to October; crude material was shipped from this quarry to Sault Ste. Marie, Ontario. In the Sudbury area a considerable tonnage of silica was consumed as a flux in the copper-nickel smelting operations conducted by Falconbridge Nickel Mines Ltd. It was reported that a sandstone occurring near Springvale was being marketed in the crushed state as a moulding sand and that Canadian Refractories Limited was investigating the economic importance of silica sands which occur north of Smoky Falls in association with refractory clays.

In Manitoba, natural silica sands were shipped from Black Island on Lake Winnipeg by the Lake Bar Sand and Gravel Company, Limited, while in Saskatchewan the production recorded as quartz for 1934 represents silicious flux mined and consumed by the Hudson Bay Mining and Smelting Company, Limited. The British Columbia quartz output in 1934 was comprised entirely of this mineral consumed as flux at the Anyox smelter of the Granby Consolidated Mining, Smelting and Power Co. Ltd.

"Metals and Mineral Markets," September, 1935, quotations for silica were: per ton, water ground and floated, in bags, f.o.b. Illinois—325 mesh—\$21 to \$40 for 92 to 99½ per cent grades. Dry ground, air-floated, 325 mesh, 92 to 99½ per cent silica, \$20 to \$30. Glass sand, f.o.b., producing plant, \$1.25 to \$5 per ton; moulding sand, 50 cents to \$3.50; blast sand, \$1.75 to \$6. California, \$5 for quartz and \$2.50 for sand.

"Canadian Chemistry and Metallurgy," August, 1935, quoted silica sand, various grades, car lots at \$8.00—\$9.00 per ton; silica, quartz, 99 per cent, 110 to 220 grade, car lots, max. \$15.00.

Table 244.—Production in Canada and Imports of Quartz and Silica Products, 1933 and 1934

	1933		1934	
	Tons	Value	Tons	Value
		\$		\$
<b>PRODUCTION (x) (SHIPMENTS)—</b>				
Nova Scotia.....	1,017	1,447	7,292	12,107
Quebec.....	28,294	109,533	57,208	229,817
Ontario.....	66,562	86,146	89,838	134,572
Manitoba.....	7,736	23,507	931	3,031
Saskatchewan.....	59,506	59,506	92,447	88,748
British Columbia.....	22,868	17,681	24,847	13,990
<b>Canada.....</b>	<b>185,783</b>	<b>297,820</b>	<b>272,543</b>	<b>482,265</b>
<b>IMPORTS—</b>				
Flint and ground flint stones.....	2,277	26,615	2,340	28,427
Silex or crystallized quartz, ground or unground.....	4,370	82,823	2,323	53,430
Silica sand for glass, carborundum and steel and filtration plants and sand blasting.....	64,114	160,131	96,165	226,188
Silica fire brick, 90 per cent silica.....		147,901		210,190

(x) Includes both crude and crushed quartz and quartzite, silica flux and natural silica sands.



Table 245.—Production of Quartz (Silica) in Canada, 1925-1934

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	197,224	363,612	1930.....	226,200	418,127
1926.....	232,082	553,161	1931.....	195,724	303,158
1927.....	233,984	496,364	1932.....	189,132	276,147
1928.....	282,522	523,933	1933.....	185,783	297,820
1929.....	265,949	561,527	1934.....	272,563	482,265

Table 246.—Silica and Sands Consumed in Specified Canadian Industries, 1930-1934

Industry and item	1930	1931	1932	1933	1934
Glass—					
Silica sand.....ton	73,349	62,868	59,143	52,585	65,306
\$	347,553	297,158	290,854	272,689	300,834
Acids, Alkalies and Salts—					
Silica.....ton	5,345	6,012	6,342	5,800	12,945
\$	19,672	21,262	20,921	21,714	55,330
Artificial Abrasives—					
Silica sand.....ton	45,595	19,358	5,207	13,574	29,901
\$	223,499	98,371	27,588	68,186	150,869
Imported Clay Products—					
Flint.....ton	2,816	1,419	1,136	752	1,266
\$	28,958	27,853	18,277	10,457	19,709
Paints, Pigments and Varnishes—					
Silica (x).....ton	823	588	483	410	483
\$	22,951	18,244	14,837	12,970	22,613
Soaps and Cleaning Powders—					
Silica sand.....ton	3,160	3,170	3,502	3,272	4,831
\$	80,422	82,278	76,264	67,930	72,371
Iron and Steel—					
Sands (a).....ton	131,924	91,310	48,945	44,853	81,641
\$	576,815	389,214	245,466	197,514	320,576
Brass and Copper Products—					
Moulding and other sands.....ton	2,665	2,694	2,183	1,788	3,108
\$	23,146	19,929	12,149	10,307	14,499

(x) Includes any silex or infusorial earth used.

(a) Includes moulding, blast and other sand used in the manufacture of primary iron and steel, castings and forgings, boilers, agricultural implements, machinery, automobile parts, railway rolling stock, etc.

NOTE.—In addition to the consumption recorded, silica sand is employed for sand blasting in the stone industry.

## GYPSUM

A distinct improvement in the Canadian gypsum industry was realized in 1934. The 1934 sales at 461,237 tons represents a 21.3 per cent increase over the shipments of 380,234 tons in 1933; the value of the 1934 production totalled \$863,776 as compared with \$663,312 for the preceding year or an increase of 30.2 per cent. The 1934 output, as in 1933, came from the provinces of Nova Scotia, New Brunswick, Ontario, Manitoba and British Columbia and increases in tonnage and value of production were recorded for each of these provinces. The quantity of gypsum mined or quarried in 1934 amounted to 493,295 tons as against 370,691 tons in 1933; the quantity of the mineral calcined in "quarry" plants totalled 74,356 tons as compared with 44,086 tons in the preceding year.

Gypsum deposits have been known in Nova Scotia since the time of the earliest settlers and shipments of the crude rock were made from the Windsor district to the United States a number of years before the Revolutionary War. After the war of 1812 these shipments assumed larger proportions and have been increasing almost ever since. The first recorded production in Ontario was in 1822 when a small amount was mined and crushed for fertilizer. During the first half of the nineteenth century the industry in Canada had a varied career, Nova Scotia and Ontario being the principal producers. Of the first discovery of gypsum in New Brunswick very little is known, evidence of very early work having been carried on in the district adjacent to the town of Hillsborough. The deposits in Manitoba were first operated in 1901 and have produced extensively ever since. The first production of gypsum in British Columbia was made in 1911 but it was not until 1926 that the industry was put on a sound basis in this province. Extensive deposits of gypsum are known in Northern Ontario and these deposits form a potential reserve which in years to come, may be called upon to supply material to the northern parts of



Ontario and Quebec. The deposits in Northern Alberta, although situated at a distance from markets are of good grade. The use of anhydrite in England for the manufacture of sulphuric acid, ammonium sulphate and special plasters is rapidly increasing. At the present time Canadian anhydrite is exported principally as a fertilizer for the peanut crop.

The possibilities for expansion of the gypsum industry in Canada are considered bright. The increasing tendency in construction to make buildings as nearly fireproof as possible has greatly increased the demand for gypsum products; special insulating plasters and other products prepared from gypsum have been developed and are finding a ready market. In the field of sound-deadening products, the market for acoustic plasters prepared from gypsum is being rapidly extended.<sup>(1)</sup>

"One of the more important developments during the past year has been the perfecting of a process whereby grinding and calcining of gypsum is effected in one operation with a greatly reduced equipment outlay . . . products introduced during 1933 include a wall board with a new type of wood-grained surface, a perforated plaster-board lath, and a sound-absorbent gypsum board—a light-weight cellular wall board, weighing only 1,250 pounds per 1,000 square feet, is now manufactured; the process involves the use of hydrogen peroxide and a catalyzer mixed with gypsum plaster. Total decomposition of the peroxide is effected, the gas evolved creating a cellular condition that becomes permanent when the plaster sets. Gypsum-coated sawdust has been tried in the West as an aggregate ingredient in concrete used for fireproofing. Fire tests of building columns protected by gypsum have demonstrated the value of a sanded gypsum-plaster finish through a greater fire resistance proportionate to the thickness than for other block coverings."<sup>(2)</sup>

**Nova Scotia.**—At Cheticamp, Inverness county, the Atlantic Gypsum Products Limited conducted extensive gypsum mining operations during 1934; the number 1 quarry was enlarged by connecting the two open faces into one long face of gypsum; the quarries here are connected by rail with the crushing and storage plant at Cheticamp, a conveyor belt running in a tunnel beneath the stock pile conveys the crushed material to the loading pier where it is discharged directly into the hold of the ship. The company also conducts operations at Dingwall, Victoria county; gypsum of two grades are made here. Number 1 grade is worked by hand selection and the balance or Number 2 grade is handled by a half cubic yard power shovel, a conveyor belt having a capacity of 300 tons per hour is utilized for loading ships up to 3,000 tons capacity. At Walton, Hants county, the Atlantic Gypsum Products Limited recently started a new quarry at the head of the old "North Quarry" and a 35-foot face opened up for about 100 feet, the standard gypsum of this quarry is shipped from Walton to New York where it is calcined for use as plaster. The anhydrite goes to Norfolk, Va., where it is used largely as a fertilizer and moisture retainer around peanut plants.

The Connecticut Adamant Plaster Company operates a quarry at Cheverie, Hants county, where a face 18 feet high has been opened up for about 500 feet; overburden is stripped by gasoline shovel. Shipments in 1934 were based on demand; a narrow gauge railway is used to transport the gypsum from the quarry to the pier for shipment to New Haven, Connecticut.

The largest gypsum operations in the province are conducted by the Canadian Gypsum Company at Wentworth, Hants county. The company is operating two main quarries called "The Cables" and "The Meadow" respectively. The "Cables" quarry is the chief producer, overburden here is removed by steam shovel and holes about 60 feet in depth drilled with well-drills; after blasting the displaced mineral is loaded by power shovel into light railway cars for transportation to the crushing plant at the shipping wharf.

The North American Gypsum Company operates a quarry near the town of Baddeck and a narrow gauge railway about a mile long connects the deposit with the crushing and storage plant located on their pier at Baddeck Bay. The quarry face was extended during the year and a programme of diamond drilling was carried out on the property to determine the thickness of the deposit and also the contour of the anhydrite.

Near the entrance of the Mabou Harbour is situated the quarry, crushing, storage and loading plant of the Nova Scotia Coal and Gypsum Company. A quarry face 30 feet in height is worked, tunnelling is employed where the overburden is heavy; the property was inactive in 1934.

(1) Department of Mines, Ottawa.

(2) U.S. Bureau of Mines—1934 Minerals Year Book.

The Windsor Gypsum Company operates the quarry known as the "Mosher" located near Newport Station. The overburden is removed by steam shovel and recent work has been on a face 350 feet long and 40 feet high; broken material is transported by rail to the wharf at Windsor where ocean shipment is made by steamer or sailing vessel to Newburg, New York.

The manufacturing plant of the Windsor Plaster Company is located at Windsor, Hants county, and the company operates a quarry near the village of Brooklyn. At Windsor the ground plaster is calcined in kettles; hard wall and selenite plasters are marketed by the company.

**New Brunswick.**—The Canadian Gypsum Company operating at Hillsborough, Albert county, possesses extensive deposits of excellent gypsum from which are manufactured various gypsum products at their plant at Hillsborough. The company quarried a considerably greater tonnage of rock in 1934 than in 1933 and a somewhat larger output of gypsum products was realized at the Hillsborough plant.

Near Petiteodiac Station, F. M. Thompson quarried and shipped a high grade while close grained gypsum, the mineral from this quarry, was shipped to Montreal for manufacture.

**Ontario.**—The output of gypsum in Ontario rose from 24,460 tons in 1933 to 33,234 tons in 1934 and came from two companies—Gypsum, Lime and Alabastine, Canada, Limited, with a plant at Caledonia, and the Canadian Gypsum Company Limited at Hagersville. The increase of about 26 per cent in quantity coincides with the general revival in the building industry of Ontario. The Canadian Gypsum Company operates on a gypsum seam at a depth of about 90 feet through a three compartment shaft; the modern plant of this company includes a continuous rotary calcining kiln. The Gypsum, Lime and Alabastine, Canada, Limited, manufacturing an extensive line of plasters, insulating materials, acoustic products, etc., announced that the new plant erected at Rochester, England, by Gyproc Products Limited, in which their company has a forty per cent interest, was completed and in production in June, 1934; satisfactory progress has been made and the plant is now working to capacity. Gypsum products plants are also operated by the Canadian company at Montreal and Calgary.

**Manitoba.**—The tonnage of gypsum sales in Manitoba increased from 6,830 in 1933 to 9,657 in 1934. Two companies operate in this province—the Western Gypsum Products Limited with a quarry at Amaranth and mill in Winnipeg, and Gypsum, Lime and Alabastine, Canada, Limited, with quarries near Gypsumville. This latter company also ships material to Winnipeg for further processing. The plants of both companies were active throughout 1934.

**British Columbia.**—The only gypsum mining operations of any magnitude in British Columbia were those conducted by Gypsum, Lime and Alabastine, Canada, Limited. The quarry of this company is located at Falkland and the crude gypsum is shipped to Port Mann where it is manufactured into plaster of Paris, plaster boarding, wall board, gypsum wall-block, etc. In addition to the Falkland output a relatively small shipment of gypsite was reported from an independent producer.

**Table 247.—Capital Employed in the Gypsum Industry in Canada, by Provinces, 1933 and 1934**

	1933			1934		
	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada
	\$	\$	\$	\$	\$	\$
<b>CAPITAL EMPLOYED AS REPRESENTED BY:</b>						
(a) Present value of land, buildings, fixtures, machinery, tools and other equipment..... (Estimated value if rented)	3,613,620	3,996,236	7,609,856	2,074,143	3,758,031	5,832,174
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	29,946	114,819	144,765	43,950	97,900	141,850
(c) Inventory value of finished products on hand.....	226,416	41,564	267,980	204,601	53,051	257,652
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	419,281	327,682	746,963	613,009	507,877	1,120,886
<b>Total.....</b>	<b>4,289,263</b>	<b>4,480,301</b>	<b>8,769,564</b>	<b>2,935,703</b>	<b>4,416,859</b>	<b>7,352,562</b>

Table 248.—Employees, Salaries and Wages in the Gypsum Industry in Canada, 1933 and 1934

	1933				1934			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	21	4	25	48,942	35	4	39	59,534
Wage-earners—								
Mine.....	256		256		243		243	
Mill.....	134		134		146		146	
Total.....	390		390	214,337	389		389	265,197
Grand total.....	411	4	415	263,279	424	4	428	324,731

Table 249.—Number of Wage-Earners on Pay Roll or Time Record on the 15th of Each Month or Nearest Representative Date, 1933 and 1934

Month	1933		1934	
	Mine	Mill	Mine	Mill
January.....	89	101	110	92
February.....	86	92	78	124
March.....	81	86	110	154
April.....	164	116	116	134
May.....	224	120	270	153
June.....	279	171	318	180
July.....	393	204	353	150
August.....	495	180	358	181
September.....	345	150	388	184
October.....	367	173	326	147
November.....	333	119	245	149
December.....	209	112	213	112

Table 250.—Annual Production of Gypsum in Canada, by Provinces, 1925-1934

(For the years 1874 to 1924, see Mineral Production of Canada, 1928)

Year	Nova Scotia		New Brunswick		Ontario		Manitoba		British Columbia		Canada	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$		\$		\$
1925..	551,230	1,070,408	71,745	408,917	82,020	491,833	35,088	417,868	240	865	740,323	2,389,891
1926..	678,107	1,187,918	59,546	468,411	89,987	496,059	35,172	461,401	20,916	156,964	893,728	2,776,813
1927..	829,438	1,512,015	85,293	524,550	83,998	500,688	39,895	512,008	24,493	201,754	1,063,117	3,251,015
1928..	1,013,257	1,850,243	75,033	501,252	85,811	553,271	51,285	609,039	20,982	220,843	1,246,368	3,743,648
1929..	948,896	1,152,160	70,482	485,982	100,347	832,689	67,269	631,051	24,696	243,814	1,211,689	3,345,696
1930..	827,063	982,287	82,674	513,677	94,946	776,069	34,157	298,297	32,128	248,458	1,076,968	2,818,788
1931..	707,817	878,487	58,957	451,264	53,358	374,469	23,076	231,124	20,544	176,173	863,752	2,111,517
1932..	341,508	398,861	38,019	297,520	35,655	186,175	12,719	113,739	10,728	84,084	433,629	1,066,379
1933..	315,948	363,528	30,391	88,500	24,460	112,319	6,830	65,471	5,107	46,004	382,736	675,823
1934..	378,287	488,044	30,398	104,709	33,234	141,389	9,657	81,553	9,661	48,081	461,237	863,776



Table 251.—Production in Canada, Imports and Exports of Gypsum, 1933 and 1934

	1933		1934	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
<b>SHIPMENTS BY GRADES—</b>				
Crude (1)—Lump or mine run.....	36,439	43,002	33,165	41,475
Crushed.....	298,579	329,419	369,696	473,558
Fine ground.....	1,030	6,067	652	3,494
Calcined gypsum (2).....	46,688	297,334	57,724	345,249
<b>Total.....</b>	<b>382,736</b>	<b>675,822</b>	<b>461,237</b>	<b>863,776</b>
Total gypsum mined and quarried.....	370,691		493,295	
Total gypsum calcined (2).....	44,086		74,356	
<b>IMPORTS—</b>				
Gypsum, crude (sulphate of lime).....	18	524	18	320
Gypsum ground, not calcined.....	136	4,251	173	4,938
Plaster of Paris or gypsum, calcined and prepared wall plaster.....	615	16,745	551	15,890
<b>Total.....</b>	<b>769</b>	<b>21,520</b>	<b>742</b>	<b>21,148</b>
<b>EXPORTS—</b>				
Gypsum or plaster, crude.....	287,305	344,085	354,978	413,961
Plaster of Paris, ground, and prepared wall plaster.....	634	13,999	712	16,078
<b>Total.....</b>	<b>287,939</b>	<b>358,084</b>	<b>355,690</b>	<b>430,039</b>

(1) Includes some anhydrite quarried in Nova Scotia.

(2) Does not include gypsum calcined in manufacturers' plants at Montreal and Calgary.

The statistics as thus given for Canada cover the primary production of gypsum; these include data for gypsum quarries and for calcining and plaster works when operated in connection with the quarries. In addition there are the secondary or manufacturing plants which include the works making wallboard, blocks, tile, etc.; some of these works purchase crude gypsum from the primary producers and calcine it before using it to manufacture the gypsum products.

Table 252.—Consumption of Gypsum in Canadian Cement Industry, 1930-1934

Year	Tons
1930.....	74,227
1931.....	56,677
1932.....	27,537
1933.....	13,319
1934.....	19,172

## GYPSUM PRODUCTS INDUSTRY

In 1934 there were eight manufacturing plants in Canada operating as follows:—a plant at Montreal, P.Q., brought crude gypsum from Nova Scotia, calcined it, and produced gypsum wallboard and acoustical plasters. At Caledonia, Ontario, another manufacturing works brought calcined gypsum from its own quarries and made gypsum blocks, wallboard, acoustical plasters, etc. Gypsum wallboard was also produced at Hagersville, Ontario, the company operating here, also produced wallboard at Hillsborough, New Brunswick. At Winnipeg 2 plants utilized calcined gypsum, obtained from primary plants in that province, in the manufacture of wallboard and tile. At Calgary, Alberta, gypsum wall plasters were manufactured from crude rock obtained from quarries situated in British Columbia while at Port Mann, B.C., a plant utilized calcined gypsum obtained from the Falkland quarries in the production of gypsum blocks, wallboard, tile and dry insulex.



Table 252 (a).—Production of Gypsum Products, including Wallboard, Blocks, Tile, etc., 1931-1934

Year	Selling value at works
	\$
1931.....	1,621,382
1932.....	1,222,004
1933.....	980,589
1934.....	1,089,710

Table 253.—Materials Used in the Gypsum Products Industry, 1933 and 1934

Materials	Unit of measure	1933		1934	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
<b>GYPSUM PRODUCTS GROUP—</b>					
Crude gypsum.....	ton	18,397	68,977	17,481	80,328
Calcined gypsum.....	ton	30,784	198,393	23,120	156,078
Clay.....	ton	56	999	78	1,487
Glue.....	xx		2,024		238
Hair.....	lb.	69,533	4,151	48,331	2,886
Paper.....	ton	2,034	145,815	3,071	156,575
Retarder.....	lb.	64,688	1,767	93,648	3,106
Sawdust or shavings.....	lb.	300,100	1,545	419,648	2,024
Starch or paste.....	lb.	179,047	11,494	168,000	10,994
Other materials.....	xx		33,179		18,127
Containers, etc.....	xx		13,529		30,123
<b>Total</b> .....	<b>xx</b>		<b>481,873</b>		<b>462,566</b>

## DEFINITION OF SPECIFIED GYPSUM PRODUCTS\*

When gypsum is calcined at a red heat, or over, and certain substances (usually borax or alum) added and then heated again, the resultant plaster is known as hard finish plaster. It is slower in setting than ordinary plaster but attains a greater degree of hardness. Several different methods have been employed to produce these plasters and the products so obtained are known under such names as Keene's cement, Parian cement, Martin's cement, etc.

The manufacture of insulex is comparatively simple. It consists essentially of the addition of certain chemicals to the calcined gypsum at the plant, which, when water is added to the mixture on the job where it is employed, react together with the liberation of a gas, expanding the mass to many times its normal bulk. Dry insulex is a light, fluffy, flaky gypsum insulation. It can be placed direct from its containers into places to be insulated: it is both fireproof and vermin proof.

Acoustic plasters consist essentially of gypsum plaster to which has been added certain chemicals which develop gas cells during the period of hydration and application of the plaster, and during the initial set. Porous volcanic rock sands are added to these plasters and greatly assist the artificially formed pores in absorbing sound waves.

Gypsum wall board is essentially composed of a layer of gypsum plaster enclosed between two sheets of fibrous material somewhat resembling a high grade blotting paper though not so absorbent. Ingredients used in the manufacture of gypsum wall board consist of calcined plaster to which has been added some material such as sawdust, starch, etc., and water, the core of the plaster being enclosed between two sheets of the fibrous paper material.

In the manufacture of gypsum blocks the material used is calcined plaster and some filler material such as shavings or starch; the materials used in the manufacture of gypsum roofing slabs are the same as for tiles or blocks, with the addition of steel reinforcing rods.

\* Excerpts from Report 714, Department of Mines, Ottawa.

Table 254.—World Production of Gypsum, 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	995,462	985,055	961,581	Latvia (exports).....	37,759	48,130	89,909
Canada.....	392,585	330,974	440,442	Luxemburg.....	9,254	12,643	(a)
Union of South Africa.....	7,001	11,822	22,929	Roumania (b).....	39,386	56,192	(a)
Cyprus (estimated).....	12,000	14,000	14,000	Spain (g).....	1,133,282	1,070,509	(a)
Palestine.....	1,458	2,561	(a)	Sweden.....	113	48	(a)
India.....	51,421	33,142	46,757	Algeria.....	89,200	82,083	80,026
Australia.....	53,971	60,572	83,258	United States.....	1,264,530	1,192,136	1,371,580
Total.....	1,514,000	1,438,000	1,572,000	Tunis (estimated).....	25,000	25,000	25,000
FOREIGN COUNTRIES				Argentina.....	33,013	34,255	(a)
Austria (d).....	35,000	(a)	(a)	Chile.....	11,800	13,467	(a)
Estonia.....	8,168	5,670	4,828	China.....	52,400	64,100	(a)
France.....	2,048,100	(a)	(a)	Egypt (estimated).....	130,000	130,000	130,000
Germany.....	392,109	477,000	(a)	New Caledonia.....	11,719	11,380	13,400
Greece (b).....	4,334	7,070	(a)	Brazil (estimated).....	2,000	2,000	2,000
Italy (including alabaster).....	521,453	525,395	451,729	Total *.....	5,850,000	(a)	(a)
Yugoslavia.....		927	(a)	* Grand total.....	7,360,000	(a)	(a)

(a) Data not available.

(b) Converted from cubic metres at the rate of 1 cubic metre = 2 long tons.

(d) Estimated by Bundesministerium für Handel und Verkehr.

(g) Including 343,028 cubic metres of gypsum also 80 cubic metres of alabaster converted as per (b) for 1932.

\* Gypsum is also produced in Poland, U.S.S.R. (Russia), French Morocco and Peru.

## IRON OXIDES (OCHRE)

In 1851, an important deposit of ochre was worked at Pointe du Lac, St. Maurice county, Quebec, and shipments of dried ochre were made to the United States, subsequently, this property was abandoned. Thirty-two years later the manufacture of dry ochre was commenced on a small scale in Iberville township on the Little Romaine river. This deposit was later abandoned but in 1916 it was re-opened and a small quantity of crude ochre was taken out for use as a pigment in the paper industry. A deposit was opened up at St. Malo, Champlain county, in 1885 and a calcining plant erected. Calcined ochre was shipped from the mill to Montreal where it was further prepared for use in the manufacture of paint.

Mine shipments of ochreous iron oxide, crude and refined, during 1934 totalled 4,959 short tons valued at \$66,166 as compared with an output of 4,357 short tons worth \$53,450 in 1933 and 5,240 short tons at \$46,161 in 1932. This material during 1934, as in 1933, came entirely from the provinces of Quebec and British Columbia; deposits in the former province contributed 96 per cent of the total output in both 1933 and 1934.

The mineral in 1934 was shipped in the province of Quebec from deposits located in Marchand township, Labelle county, at La Pointe du Lac and at Red Mill in Champlain county. British Columbia shipments during the year were made from a property situated near Mons.

In Quebec the refining of the crude oxide included dehydration, calcining and milling with air flotation; products from properties in this province were marketed in Canada and the United States. The Canadian output of unrefined natural ochre is employed to a considerable extent in the purification of artificial fuel gas whereas the calcined and milled product is largely absorbed in the paint industry.

The Department of Mines, Ottawa, reports that the present producing localities have been able to meet the requirements of the domestic pigment trade for the cheaper grades for many years past. Should the demand increase, there are other prospective deposits which could be drawn upon; two of these are located in the townships of Iberville and Bergeronnes, Saguenay county, Quebec. Deposits of ochres are also known to exist in Nova Scotia, Alberta, British Columbia, Saskatchewan and Manitoba.

The following pigment price quotations were for September, 1935, and were supplied by "Canadian Chemistry and Metallurgy." Iron oxide, red, natural, 2 cents to 8 cents per pound; red, artificial, 6 cents to 12 cents; yellow, conc., ppt. casks, 9 cents to 13 cents per pound; yellow, domestic, ppt. 5½ cents to 6 cents.

"Metal and Mineral Markets" quote ochre in September, 1935, as follows: per ton, f.o.b. Georgia mines, \$19 in sacks, \$22.50 in barrels. Buff clay, 98 per cent through 325 mesh, \$19 f.o.b. Virginia, dark yellow, 300 mesh, 60 per cent ferric oxide, in jute bags, \$19.50.

Table 255.—Capital Employed in the Iron Oxides Industry in Canada, 1933 and 1934

	1933	1934
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:		
(a) Present value of land, buildings, fixtures, machinery, tools and other equipment.....	117,783	128,698
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	18,418	20,942
(c) Inventory value of finished products on hand.....	19,950	21,090
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	400	2,000
<b>Total.....</b>	<b>156,551</b>	<b>172,730</b>

Table 256.—Employees, Salaries and Wages in the Iron Oxides Industry in Canada, 1933 and 1934

Class	1933		1934	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
Salaried employees.....	2	\$ 3,212	2	\$ 3,432
Wage-earners.....	20	12,419	30	21,548
<b>Total.....</b>	<b>22</b>	<b>15,631</b>	<b>32</b>	<b>24,980</b>

Table 257.—Wage-Earners Employed, by Months, 1934

Month	Number	Month	Number
January.....	12	July.....	31
February.....	25	August.....	34
March.....	19	September.....	37
April.....	15	October.....	40
May.....	28	November.....	29
June.....	43	December.....	30

Table 258.—Production of Iron Oxides in Canada, 1925-1934

(For the years 1883 to 1924, see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	7,118	91,913	1930.....	6,596	83,873
1926.....	6,626	101,843	1931.....	5,520	49,205
1927.....	6,125	103,536	1932.....	5,240	46,161
1928.....	5,414	111,198	1933.....	4,357	53,450
1929.....	6,518	115,932	1934.....	4,950	66,166

Table 259.—Production in Canada, Imports and Exports of Iron Oxides, 1933 and 1934

	1933		1934	
	Quantity Tons	Value \$	Quantity Tons	Value \$
PRODUCTION (SALES) (x)—				
Quebec.....	4,192	51,965	4,798	64,566
British Columbia.....	165	1,485	161	1,600
<b>Total.....</b>	<b>4,357</b>	<b>53,450</b>	<b>4,959</b>	<b>66,166</b>
IMPORTS—				
Ochres, ochrey earths, siennas and umbers.....	1,077	35,595	1,028	39,380
Oxides, fireproofs, rough stuff, fillers and colours, dry, n.o.p.....	2,491	573,607	3,130	653,827
EXPORTS—				
Mineral pigments, iron oxides, ochres, etc.....	1,152	70,239	1,618	96,131

(x) Includes both crude and refined.



Of ochres, ochrey earths, siennas and umbers imported in 1934, 139 tons came from the United Kingdom, 593 tons from the United States, 235 tons from France, and 46 tons from Italy.

**Table 260.—Consumption of Non-Oxides in Specified Canadian Industries, 1931-1934**

Year	Coke and gas		Paints pigments and varnishes		Paints pigments and varnishes	
	Tons (a)	\$	Tons (b)	\$	Tons*	\$
1931.....	5,362	50,029	914	67,752	583	86,539
1932.....	3,736	35,284	701	52,323	512	48,037
1933.....	2,734	29,076	504	43,826	491	43,671
1934.....	3,757	47,010	580	53,539	544	53,236

(a) Oxide or purifying materials.

(b) Iron oxide pigments.

\* ochres, siennas and umbers.

### MICA

Production (sales) of primary mica in Canada during 1934 totalled 998 tons valued at \$97,071 as compared with an output of 944 tons worth \$49,284 in 1933. The mineral in 1934 was produced in Quebec, Ontario and British Columbia, with the greater part of the Dominion output coming, as in former years, from the first two named provinces. The quantity and value of 1934 shipments show increases of 5.7 per cent and 97 per cent respectively over those of the preceding year and represent the second successive annual increase in Canadian mica production since 1932.

Increases in both quantity and total sales value of all grades of mica were recorded in 1934, these were especially pronounced for knife and thumb-trimmed shipments. Sales of splittings and scrap revealed relatively little change from those of the previous year; interest was added in 1934 by the revival, to some extent, in shipments of rough cobbled mineral. An improvement in the average prices of thumb-trimmed grades and splittings was realized while the average price for knife-trimmed show a slight falling off which was more or less compensated for by a moderate increase in the price of ground mica and scrap.

A very pronounced increase in the exports of Canadian mica occurred in 1934; the total value of these amounting to \$117,802, represents an increase of 155 per cent over 1933. The increase in exports of thumb-trimmed (and rough cobbled) mica to the United Kingdom is especially worthy of note in that they show an increase from 3,900 pounds valued at \$2,027 in 1933 to 147,000 pounds worth \$60,635 in 1934. All exports of scrap mica and waste went to the United States in 1934 and were somewhat less in both quantity and value than for the preceding year. Exports of splittings to the United States and United Kingdom markets increased, with by far the greater proportion of the shipments going to the former country.

The almost general improvement in both domestic and foreign mica markets in 1934 not only stimulated greater domestic production but resulted in an increase over 1933 of 148 per cent in the number of employees and 101 per cent in salaries and wages in the Canadian mica mining industry.

"The Canadian mica production is confined almost exclusively to the phlogopite variety termed in the trade amber mica. Deposits of muscovite or white mica are known, but attempts to mine this type have usually not proved profitable, and the production has been negligible. The productive mica region lies for the most part within a radius of about one hundred miles from the city of Ottawa, the northern portion of the field lying principally between or adjacent to the Gatineau and Lièvre rivers, in Quebec, and the southern portion in the Perth-Kingston district in Ontario. . . . A further small shipment of scrap-grade, white mica, was made in 1934 from a deposit near Enderby, British Columbia, and sent to a mill in Vancouver for grinding. The mica-grinding plant at Buckingham mine, Templeton township, Quebec, continued in intermittent operation during 1934 and reported about double the volume of sales over 1933. . . . Grinding and sizing tests were run in the Mines Branch Ore Dressing Laboratories on a trial shipment of mica schist from Baker Inlet, near Prince Rupert, British Columbia; the rock is soft and easily pulverized and consists essentially of fine, white, flake mica. . . . Sheet mica is marketed in various classes, depending on the amount of preparation the mine-run material



receives. Formerly, much of the output was sold in the semi-rough form, termed thumb-trimmed, but this practice has now been largely supplanted by knife-trimming, which provides a much higher grade of product. Scrap mica, representing the waste from mining or trimming operations, is sold to grinding mills for the production of mica powder, used extensively in the roofing and rubber trades." (Excerpts from Report 760—Mines Branch, Department of Mines, Ottawa).

**Table 261.—Capital Employed in the Mica Mining Industry in Canada, by Provinces 1933 and 1934**

	1933			1934		
	Quebec	Ontario	Canada	Quebec	Ontario	Canada
	\$	\$	\$	\$	\$	\$
<b>CAPITAL EMPLOYED AS REPRESENTED BY:</b>						
(a) Present value of land, buildings, fixtures, machinery, tools and other equipment..... (Estimated if rented)	206,243	27,037	233,280	47,232	28,037	75,269
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	35,548	1,935	37,483	17,877	2,877	20,754
(c) Inventory value of finished products on hand.....	3,040	2,789	5,829	254	2,785	3,039
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	33,873	1,931	35,804	38,662	1,992	40,654
<b>Total.....</b>	<b>278,704</b>	<b>33,692</b>	<b>312,396</b>	<b>104,025</b>	<b>35,691</b>	<b>139,716</b>

**Table 262.—Employees, Salaries and Wages in the Mica Mining Industry in Canada, 1933 and 1934**

	1933		1934	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
		\$		\$
Salaried employees.....	3	2,242	4	2,475
Wage-earners.....	38	22,765	98	47,916
<b>Total.....</b>	<b>41</b>	<b>25,007</b>	<b>102</b>	<b>50,391</b>

**Table 263.—Production of Mica in Canada, by Provinces, 1925-1934**

(For the years 1886 to 1924, see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1925.....	2,415	178,800	1,605	82,663	4,020	261,463
1926.....	1,664	170,118	881	59,086	2,545	229,204
1927.....	1,454	99,194	1,284	75,183	2,738	174,377
1928.....	1,101	54,224	2,559	32,944	3,660	87,168
1929.....	1,062	72,630	2,991	45,919	4,053	118,549
1930.....	430	61,729	740	34,275	1,170	96,004
1931.....	290	30,601	1,049	23,465	1,339	54,066
1932.....	41	4,076	268	2,752	309	6,828
1933*.....	256	39,060	666	9,371	944	49,284
1934*.....	322	85,967	618	9,059	998	97,071

\* Total for Canada includes 22 tons valued at \$853, produced in British Columbia in 1933 and 58 tons valued at \$2,045 in 1934.

Table 264.—Production of Mica in Canada, by Grades, 1933 and 1934

	1933			1934		
	Quantity	Value, f.o.b. shipping point	Price per lb.	Quantity	Value, f.o.b. shipping point	Price per lb.
	Lb.	\$	\$	Lb.	\$	\$
Rough cobbled.....				2,459	514	0.21
Knife-trimmed.....	8,591	3,923	0.46	61,003	25,628	0.42
Thumb-trimmed.....	51,881	8,397	0.16	90,726	27,360	0.30
Splittings.....	74,550	27,446	0.37	75,050	33,120	0.44
Scrap.....	1,753,375	9,518	0.005	1,766,031	10,449	0.006
<b>Total.....</b>	<b>1,888,397</b>	<b>49,284</b>		<b>1,995,269</b>	<b>97,071</b>	

Table 265.—Imports and Exports of Mica, 1933 and 1934

Imports and exports of mica	1933		1934	
	Pounds	Value	Pounds	Value
		\$		\$
<b>IMPORTS—</b>				
Mica and manufactures of, n.o.p.—				
From—United Kingdom.....		2,070		4,872
United States.....		29,059		40,242
British India.....		1,648		17,268
Germany.....		714		128
Other countries.....		15		170
<b>Total.....</b>		<b>33,506</b>		<b>62,680</b>
Chalk, China, Cornwall or cliff stone and mica schist.....		17,283		21,371
<b>EXPORTS—</b>				
Mica, rough cobbled and thumb-trimmed—				
To—United Kingdom.....	3,900	2,027	147,000	60,635
United States.....	48,900	4,418	43,000	8,939
Mica, scrap and waste—				
To—United States.....	2,138,400	9,476	1,680,400	7,736
Other countries.....	14,000	84		
Mica splittings—				
To—United Kingdom.....	18,700	6,278	19,200	6,635
United States.....	57,000	23,201	69,400	31,967
Mica plate and manufactures of (micanite).....		729		1,890
<b>Total.....</b>		<b>46,213</b>		<b>117,802</b>

Table 266.—Exports of Mica from India, 1932-1934

		1932	1933	1934
In blocks.....	Cwt.	6,693	15,702	20,525
	Rupees	1,382,135	2,429,357	3,509,204
Splittings.....	Cwt.	40,328	40,945	72,301
	Rupees	1,966,808	1,662,676	2,496,375
<b>Total of Mica—</b>				
To—United Kingdom.....	Cwt.	22,389	22,505	29,606
	Rupees	1,860,262	2,268,698	3,106,625
Germany.....	Cwt.	5,013	6,161	10,013
	Rupees	239,505	320,961	565,451
France.....	Cwt.	788	1,067	1,763
	Rupees	87,719	79,831	147,282
To—United States.....	Cwt.	11,264	19,812	39,517
	Rupees	544,569	894,321	1,293,077
Other countries.....	Cwt.	7,567	7,102	11,827
	Rupees	616,888	528,222	893,144
<b>Total.....</b>	<b>Cwt.</b>	<b>47,021</b>	<b>56,647</b>	<b>92,826</b>
	<b>Rupees</b>	<b>3,348,943</b>	<b>4,092,033</b>	<b>6,005,579</b>
Value of rupee in Canadian funds.....		30.29 cents	34.768 cents	37.66 cents

Table 267.—Exports of Phlogopite and Other Micas from Madagascar, 1934

	Kg.	Franc
To—France.....	153,837	1,550,000
England.....	119,707	1,003,000
Germany.....	16,578	194,000
United States.....	89,300	613,000
Other countries.....	126	3,000
<b>Total.....</b>	<b>379,548</b>	<b>3,363,000</b>

Mica is found in payable quality and quantity at Miami and Rusambo, Southern Rhodesia. The Rhodesian mica industry reached its zenith in 1929 when the output realized £80,272, since then it has fallen to practically nothing, due not to shortage of supply but to lack of market. Production in 1934 totalled only 3,867 pounds valued at £272 as compared with 8,841 pounds worth £389 in 1933.

Mica mining in the Union of South Africa is conducted in the Letaba district of the Transvaal; actual production in 1934 totalled 694·924 short tons while sales amounted to 306·114 tons valued at £481 as compared with 604·815 tons at £723 in 1933.

Table 268—Consumption of Mica in Specified Canadian Industries, 1931-1934

Year	Electrical apparatus and supplies		Composition roofing		Rubber		Mica products	
	Pounds	\$	Pounds	\$	Pounds	\$	Pounds	\$
1931.....	150,561	101,531	(a)	(a)	103,177	6,265	(a)	10,099
1932.....	102,410	68,747	42,000	683	73,600	4,111	10,100	4,290
1933.....	35,098	27,129	96,000	1,849	89,165	4,769	10,025	6,553
1934.....	93,297	60,520	142,000	2,086	135,424	6,792	16,553	7,040

(a) Data not available.

Table 269.—World Production of Mica

(Supplied by Imperial Institute)

(Long tons)

Producing Country	1932	1933	1934	Producing Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES</b>			
Nigeria.....	(17 cwt.)			Italy.....	9	3	(a)
Northern Rhodesia.....		1	1	Norway.....	31	5	17
Southern Rhodesia.....	13	4	2	Sweden.....	60	07	16
Tanganyika Territory—				U.S.S.R. (Russia).....	7,607	5,687	(a)
Sheet.....			9				
Waste.....	12	11	22				
Union of South Africa (b)...	242	391	273	Madagascar—			
Canada—				Muscovite.....	(88 lb.)	(692 lb.)	
Knife trimmed.....		4	27	Phlogopite, etc.....	136	170	289
Thumb trimmed.....	1	23	41				
Splittings.....	2	33	33				
Rough cobbled.....			1	United States (sales)—			
Scrap.....	274	783	788	Sheets (uncut).....	151	163	261
Ceylon (exports).....	2	(2 cwt.)	20	Scrap.....	6,286	7,813	6,892
India (exports)—				Argentina.....	54	74	(a)
Sheet.....	335	785	1,026	Bolivia (exports).....	8	23	4
Splittings.....	2,016	2,047	3,615	Brazil.....	52	28	12
Australia.....	30	42	138	Korea.....	20	23	101

(a) Information not available.

(b) Nearly all scrap.

The following amounts of lithia mica were produced:—

	1932	1933	1934
Germany.....	156	72	(a) long tons
Portugal.....	2,014	870	294 "

## SALT

The shipments of salt in Canada during 1934 totalled 321,753 tons valued at \$1,954,953 as compared with 280,115 tons worth \$1,939,874 in 1933 and 263,543 tons at \$1,947,551 in 1932. The 1934 output represents the second largest in the history of Canadian salt production, being surpassed only by that of 1929, and the total quantity of sales amounting to 163,464 tons during the first six months of 1935 as compared with 153,641 tons for the first half of 1934 would indicate a continuation of the almost steady upward trend in production as experienced since 1931. In 1934 gains in quantity over 1933 were recorded for sales of all grades as listed under the classification employed by the Bureau. It is especially interesting to note the rapidly increasing shipments of salt for consumption in the chemical industry; the quantity of this Canadian mineral reported for such purposes rising from 96,242 tons in 1932 to 124,132 tons in 1934, an increase of 28.9 per cent within three years. Salt was produced during 1934 in Nova Scotia, Ontario, Manitoba and Saskatchewan and gains in output over the preceding year were realized in each of these provinces.

The salt industry of Canada is one of the oldest non-metallic industries of the country, dating back to the early years of the last century when the Hudson's Bay Company obtained their local supplies from the brine springs of the MacKenzie basin. The discovery of salt in Ontario in 1866 was, however, the real beginning of the industry on a substantial basis, and production from the Ontario field has been continuous since that time. The opening of the Malagash deposits in Nova Scotia in 1918 inaugurated the first rock salt mine in the country, and has materially assisted in supplying the demands for salt in the Maritimes, while in the Prairie Provinces salt has been produced since 1933 in both Saskatchewan and Manitoba. No commercial production of the mineral has been reported in Alberta since 1927.

In Nova Scotia the mine of the Malagash Salt Company, Limited, was worked steadily throughout the year and the slope has been extended to the 20th level on the Lucas seam, a length of about 1,500 feet on the slope and 950 feet vertical below the surface. All evaporated salt is derived from brine obtained underground on No. 4 level, at which point fresh water is sprayed on the surface of the salt until the underground reservoir is filled, the supply of fresh water is then cut off and the brine circulated until it reaches 100 per cent saturation, after which it is pumped to the evaporator on the surface. The solid white salt mined is sold in all sizes to meet the trade requirements from large lumps down to very fine mesh. All equipment, both on surface and underground, is operated by electric power generated by the company's own Diesel electric plant.

In Anderdon township, Essex county, Ontario, the plants of Brunner, Mond Canada, Limited, were active during 1934. This company employs a saturated brine solution, obtained by forcing water into wells, for the manufacture of chemicals; a plant to recover calcium chloride from their waste material resulting from the manufacture of soda ash is being erected by this company. At Sarnia, Ontario, the Dominion Salt Company, Limited, was in continuous operation employing vacuum pans and grainers in the production of table, dairy, and other grades of salt. The Goderich Salt Company, located at Goderich, Ontario, operated without interruption during 1934 and installed a new and modern triple-effect vacuum evaporator. At Goderich also the Western Canada Flour Mills Company, Limited, produced various grades of salt throughout the year; exhaust steam is employed in the recovery of salt by this company. Production by Canadian Industries Limited at Sandwich, Ontario, was steady throughout the twelve months of 1934. Triple effect vacuum pans were employed for fine salt and grainers for coarse grades; this company also employs large quantities of brine in the manufacture of chemicals and at Cornwall, Ontario, recently erected and placed in operation a plant for the manufacture of caustic soda and chlorine; salt produced at Sandwich will be utilized at Cornwall. The Warwick Pure Salt Company, Limited, one of Canada's newer salt producers, was in continuous production during 1934; this company operates in Warwick township, Lambton county, and uses open pans. The Walker Salt Corporation drilled a new well for salt at Port Franks, Ontario, and brought its open pan plant into operation in May, 1935.

At Neepawa, Manitoba, the Neepawa Salt Company, Limited, utilizing the grainer system, was in steady operation in 1934. It is reported that this company has been absorbed by Canadian Industries Limited.



In Saskatchewan, the Simpson Oil Company, Limited, maintained normal production at its plant located at Simpson; salt is recovered here by open pan evaporation.

Several years ago the Alberta Salt Company produced an excellent grade of salt at McMurray, Alberta, and efforts have recently been made to recommence salt production in this district.

The Department of Mines, Ottawa, reports that experiments have been carried on with encouraging results in Nova Scotia and elsewhere for the past few years to determine the effect of salt with a mixture of clay as a surface veneer on gravel highways, in order to decrease, if not entirely eliminate, the dust nuisance and heavy maintenance cost of such roads. Considerable research work has also been conducted on this same application of salt in the laboratories of the National Research Council, Ottawa, and it has also been taken up quite vigorously in the United States. The mineral appears to possess considerable potentialities as a highway material and would, if used to any extent on secondary roads, increase very largely the salt output of the Dominion.

The chairman of I.C.I. Alkali Ltd (United Kingdom) states that "rationalisation within the group, containing six factories in all, has gradually brought about an arrangement whereby all our heavy soda ash is made at one factory, all our caustic at another, and the bulk of the output of soda crystals at two plants, one at Silvertown and one at Winnington. The main supplies of light soda ash come from two Cheshire works and from Fleetwood, where calcium chloride our chief by-product, is also made, while the manufacture of all sundry other alkali products is centred at Winnington."

In March, 1935, it was announced that Imperial Chemical Industries Limited had decided upon the manufacture of soda ash in Australia and since the salt, which is the principal raw material, will be obtained by the solar evaporation of sea water, some time must, of course, elapse before the required area of evaporating surfaces can be prepared and put into operation. Operations will be conducted in the Port Adelaide district of South Australia. In 1934 out of a total exportation of 4,004,208 cwt. of soda ash, soda crystals, and sodium bicarbonate from the United Kingdom, 436,648 cwt. went to Australia and in addition Australia took 108,746 cwt. of caustic soda out of a total British export in 1934 of 1,952,086 cwt.

Investigations have been made at the Low Temperature Research Station, Cambridge, England, as to the possibilities of using iodized coverings for fruit when placed in storage. The iodized wraps are made by treating tissue paper with a definite volume of iodine solution; laboratory tests are reported to show that storage rots of fruit can be considerably reduced by this kind of wrapping. In this regard it is interesting to note that iodine has been detected in some of the brines occurring in Western Canada.

Production of bromine in the United States in 1934 amounted to 15,344,290 pounds valued at \$3,227,425, an increase of 51 per cent in quantity and 58 per cent in value over 1933. The increase in output was from the plant recently erected at Wilmington, N.C., and represents the first commercial production of bromine directly from sea water. Bromine is used principally in the form of ethylene dibromide for the manufacture of ethyl gasoline.

It was reported early in 1935 that the ammonia-soda plant constructed at Maiquetia, Venezuela, had commenced operations. It expects to find a market for its soda ash and caustic soda within the country, although a small export trade to contiguous countries may be developed. The new electrolytic alkali plant of the Companhia Electro-Quimica Fluminense, located at Rio de Janeiro, is reported to possess an annual capacity of 2,500 tons of caustic soda; the initial manufacture of bleaching powder will be 700 tons per year; other products will include 300 tons of hydrochloric acid and 1,200 tons of liquid chlorine.

Table 270.—Capital Employed in the Salt Industry in Canada, 1933 and 1934

	1933	1934
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented) .....	2,910,371	2,917,000
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand .....	152,093	149,289
(c) Inventory value of finished products on hand .....	142,497	183,079
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.) .....	503,397	462,230
<b>Total .....</b>	<b>3,708,358</b>	<b>3,711,598</b>

Table 271.—Employees, Salaries and Wages in the Salt Industry in Canada, 1933 and 1934

	1933				1934			
	Number of employees		Total	Salaries and wages	Number of employees		Total	Salaries and wages
	Male	Female			Male	Female		
				\$				\$
Salaried employees.....	46	17	63	144,454	53	18	71	164,685
Wage-earners.....	337		337	328,966	360	38	398	387,313
<b>Total.....</b>	<b>383</b>	<b>17</b>	<b>400</b>	<b>473,420</b>	<b>413</b>	<b>56</b>	<b>469</b>	<b>551,998</b>

Table 272.—Number of Wage-Earners on Pay Roll in the Salt Industry on the 15th of each Month, 1933 and 1934

Month	1933		1934	
	Male	Female	Male	Female
January.....	248	37	325	32
February.....	258	37	322	38
March.....	276	38	327	38
April.....	281	36	340	39
May.....	288	36	371	37
June.....	318	37	361	37
July.....	342	37	352	37
August.....	363	37	375	37
September.....	333	37	408	39
October.....	316	38	375	39
November.....	317	40	395	38
December.....	287	39	379	38

Table 273.—Production of Salt in Canada, by Grades, 1933 and 1934

	Manu- factured tons	Sold tons	Value of salt sold
<b>1933</b>			\$
Table, dairy and pressed blocks.....	63,894	61,231	1,120,698
Common, fine.....	67,414	63,786	395,609
Common, coarse.....	18,472	18,118	179,891
Land salt.....	493	305	952
Other grades.....	34,396	31,935	137,984
Brine for chemical works (salt equivalent sold or used).....	104,740	104,740	104,740
<b>Total.....</b>	<b>289,409</b>	<b>280,115</b>	<b>1,939,874</b>
Value of containers.....			591,182
<b>Grand total.....</b>	<b>289,409</b>	<b>280,115</b>	<b>2,531,056</b>
<b>1934</b>			
Table, dairy and pressed blocks.....	71,249	69,779	1,098,817
Common, fine.....	66,194	67,777	384,873
Common, coarse.....	20,224	20,488	185,926
Land salt.....	403	402	1,320
Other grades.....	41,835	39,175	159,885
Brine for chemical works (salt equivalent sold or used).....	124,132	124,132	124,132
<b>Total.....</b>	<b>324,037</b>	<b>321,753</b>	<b>1,954,953</b>
Value of containers.....			603,369
<b>Grand total.....</b>	<b>324,037</b>	<b>321,753</b>	<b>2,558,322</b>

Table 274.—Production of Salt by Provinces (x), 1925-1934

Year	Nova Scotia		Ontario		Manitoba		Saskatchewan	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
1925	6,598	49,889	226,315	1,352,504				
1926	8,165	68,781	252,345	1,388,672				
1927	14,391	102,590	254,181	1,510,777				
1928	19,604	118,342	279,841	1,377,629				
1929	27,819	157,062	302,445	1,420,424				
1930	23,058	136,226	248,637	1,558,405				
1931	27,718	143,761	231,329	1,760,388				
1932	31,897	150,708	231,138	1,789,751	508	7,092		
1933	34,278	161,889	244,107	1,755,087	1,499	18,388	231	4,510
1934	42,886	191,917	276,751	1,734,196	1,664	20,137	452	8,703

(x) In addition, Alberta produced salt as follows:—1925 . . . 833 tons value \$8,304; 1926 . . . 2,037 tons value \$22,696; 1927 . . . 100 tons value \$1,300.

Table 275.—Production in Canada, Imports, Exports and Consumption of Salt, 1932-1934

	1932		1933		1934	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION	263,543	1,947,551	280,115	1,939,874	321,753	1,954,953
IMPORTS—						
Salt, for the use of the sea or gulf fisheries	27,798	100,939	54,439	184,278	57,272	173,023
Salt, in bulk, n.o.p.	39,065	177,623	51,486	222,082	42,256	166,949
Salt, n.o.p., in bags, barrels, etc.	34,990	307,195	29,558	240,657	37,471	234,120
Salt, table, made by an admixture of other ingredients, when containing not less than 90 per cent of pure salt	180	10,197	137	4,220	1,795	11,941
Total	102,033	595,954	135,620	651,237	138,794	586,033
EXPORTS	5,627	36,248	5,335	43,461	6,597	48,097
APPARENT CONSUMPTION OF SALT	359,949	2,507,257	410,400	2,547,650	453,950	2,492,889

Tables 276.—Available Statistics on Consumption of Salt, in Specified Canadian Industries, 1933 and 1934

Industries	1933		1934	
	Quantity used	Cost at works	Quantity used	Cost at works
	Pounds	\$	Pounds	\$
Fish canning and curing (factories only)	43,551,200	216,618	46,095,000	236,185
Slaughtering and meat packing		268,232	62,519,037	392,745
Acids, alkalies and salts—Brine (salt content) and dry salt	231,466,000	149,326	273,296,000	183,214
Explosives	151,019	948	129,770	846
Soaps	4,989,624	32,832	5,613,108	30,309
Dyeing, cleaning and laundry work	3,827,468	34,516	4,227,701	36,315
Dyeing and finishing of textiles	1,217,811	9,493	1,719,970	11,257
Artificial ice	2,049,450	8,246	2,446,515	10,806
Abrasives—artificial	190,000	874	318,000	1,347
Waterworks			1,172,614	
Leather tanneries		16,572		14,085
Pulp and paper mills	17,746,000	81,673	18,874,000	79,106
Woollen textiles		9,126		10,844
Stock and poultry foods	1,015,840	7,690	1,166,240	10,434
Bread and other bakery products	11,845,400	127,861	12,657,120	135,114
Fruit and vegetable preparations	5,589,322	39,515	5,977,986	45,134
Biscuits, confectionery, etc.	1,004,360	11,745	1,324,960	13,343
Food, breakfast	1,018,036	8,046	1,285,698	9,321
Sausage and sausage casings		3,216		5,362
Dairy products,—not specified		2,014	513,520	2,005
Breweries	214,253	1,950	278,612	2,585
Malt and malt products	246,608	1,895	277,070	1,774
Coffee, tea and spices	163,885	1,610	145,213	1,470
Macaroni, vermicelli, etc.	37,982	379	40,765	399
Ice cream cones	3,614	42	3,553	38
Food, miscellaneous	331,609	4,675	484,943	6,422
Tobacco, cigars and cigarettes	16,915	227	14,740	189

Table 277.—World Production of Salt

(Supplied by Imperial Institute)

(Long tons)

Producing country and description	1932	1933	1934
<b>BRITISH EMPIRE</b>			
United Kingdom—			
Rock-salt.....	19,567	21,596	20,848
Brine-salt.....	2,196,632	2,342,579	2,499,025
Malta.....	1,200	1,200	2,200
Mauritius (estimated)			
Sea-salt.....	1,500	1,500	1,500
Nigeria (estimated).....	400	400	400
Somaliland (exports)—			
Sea-salt.....	2,003	2,704	3,161
South West Africa.....	2,069	3,994	2,756
Anglo-Egyptian Sudan.....	9,223	(a)	24,421
Tanganyika Territory.....	6,607	7,209	7,301
Uganda.....	(b) 723	(b) 1,492	(a)
Union of South Africa.....	(a)	86,782	(a)
Canada.....	233,283	258,401	289,319
British West Indies (exports)—			
Sea-salt—			
Bahamas.....	250	2,820	3,143
Leeward Islands.....	759	34	1,336
Turks and Caicos Islands.....	20,625	24,566	18,663
Ceylon.....	17,703	8,222	(a)
Cyprus (estimated).....	3,000	3,000	3,000
India (including Aden)—			
Rock-salt.....	172,043	170,164	1,963,702
Salt.....	1,438,818	1,542,220	
Palestine—			
Rock-salt.....	964	864	(a)
Other salt.....	7,919	8,272	9,241
Australia—			
Victoria (estimated).....	50,000	50,000	50,000
Western Australia.....	2,771	(a)	2,670
South Australia.....	60,063	58,587	61,083
Total*.....	4,200,000	4,600,000	5,000,000
<b>FOREIGN COUNTRIES</b>			
Austria—			
Rock-salt.....	799	1,058	850
Brine-salt.....	167,876	138,447	161,146
Bulgaria—			
Rock-salt.....	3,327	5,590	(a)
Sea-salt, etc.....	32,000	10,000	(a)
Czechoslovakia—			
Rock-salt.....	169,221	148,987	154,992
Brine-salt.....	5,390	5,103	
France—			
Rock-salt and brine-salt.....	1,460,383	1,773,569	1,641,473
Sea-salt.....	164,126	(a)	(a)
Germany—			
Rock-salt.....	2,082,274	1,824,564	1,901,618
Brine-salt.....	477,713	419,564	502,032
Greece—			
Sea-salt (estimated).....	100,000	100,000	100,000
Italy—			
Rock-salt and brine-salt.....	327,066	338,667	387,094
Sea-salt.....	589,137	696,452	566,212
Netherlands (sales).....	59,805	63,923	73,578
Poland.....	380,648	442,393	366,326
Romania—			
Rock-salt.....	283,520	273,615	305,041
Spain—			
Rock-salt.....	150,272	154,280	(a)
Brine-salt and sea-salt.....	793,780	760,260	(a)
Switzerland.....	81,386	79,079	80,307
Yugoslavia (brine-salt).....	52,011	43,156	41,260
U.S.S.R. (Russian).....	2,617,000	2,900,000	(a)
Algeria—			
Rock-salt and sea-salt.....	56,695	77,632	42,207
Abyssinia (estimated).....	10,000	10,000	10,000
Angola (estimated).....	10,000	10,000	10,000
Belgian Congo.....	662	878	(a)
Canary Islands (estimated).....	2,000	2,000	2,000
Egypt (exports).....	139,852	134,271	283,913
French Morocco—			
Rock-salt.....	(a)	1,557	1,047
French Somaliland (exports).....	30,306	33,755	34,936
French West Africa.....	1,565	(a)	(a)
Italian Somaliland.....	156,600	212,900	(a)
Tripoli (estimated).....	22,000	22,000	22,000
Tunis.....	90,817	85,000	85,592
Mexico (estimated).....	80,000	80,000	80,000
Panama (estimated)—			
Crude-salt.....	50,000	50,000	50,000



Table 277.—World Production of Salt—Concluded

(Supplied by Imperial Institute)  
(Long tons)

Producing country and description	1932	1933	1934
<b>FOREIGN COUNTRIES—Con.</b>			
United States—			
Rock-salt.....	1,414,938	1,593,743	1,708,198
Brine-salt.....	2,473,054	3,090,202	3,051,285
Evaporated-salt.....	1,833,412	2,106,209	2,037,012
Cuba.....	31,250	(a)	(a)
Argentina.....	178,277	202,321	(a)
Brazil.....	210,829	150,627	76,840
Chile.....	26,190	30,000	(a)
Colombia (estimated)—			
Rock-salt.....	24,000	24,000	24,000
Brine-salt.....	28,000	28,000	28,000
Sea-salt.....	25,000	25,000	25,000
Ecuador.....	14,722	12,803	(a)
Guatemala.....	9,000	(a)	(a)
Peru.....	31,000	33,000	(a)
Venezuela.....	23,275	(a)	(a)
China (estimated).....	2,500,000	2,500,000	2,500,000
Formosa.....	103,588	166,939	(a)
French Indo-China.....	226,400	113,000	158,000
Japan (c).....	563,455	620,745	684,000
Korea.....	136,000	136,000	136,000
Netherlands East Indies—			
Government production.....	204,340	83,265	(a)
Native production.....	28,211	23,740	(a)
* Manchoukuo.....	220,289	303,940	(a)
Philippine Islands.....	34,938	37,339	(a)
Portuguese India (estimated).....	12,000	12,000	12,000
Syria (estimated).....	10,000	10,000	10,000
Turkey.....	216,000	300,000	(a)
<b>Total*.....</b>	<b>21,000,000</b>	<b>22,000,000</b>	<b>23,000,000</b>
<b>World's total*.....</b>	<b>25,000,000</b>	<b>27,000,000</b>	<b>28,000,000</b>

\* Salt is also produced in many countries for which statistics are not available, e.g., Gold Coast, Kenya, Bolivia, Siam.

(a) Information not available.

(b) Excluding production of Kibero.

(c) Excluding production from salt beds which although on government beach lands have no fixed areas. Figures refer to years ended March 31 following that stated.

## TALC AND SOAPSTONE

Shipments of talc and soapstone ranging from 50 tons to 1,420 tons were made from Canadian deposits during the period 1886 to 1906. Prior to 1900 the production consisted mainly of impure talc and soapstone shipped from Quebec. It was not until 1900 that mining operations were commenced on the high grade talc deposits of the Madoc district. Ground talc was shipped from this district in 1906.

The value of talc and soapstone produced (sales by primary producers) in Canada during 1934 totalled \$180,777 as compared with \$186,749 in 1933 and \$159,038 in 1932. The combined value of these minerals shipped in 1934 represents a decrease from the preceding year of 3.2 per cent. The value of exports at \$95,823 reveals a decline from \$116,950 for 1933; of the 1934 exports 7,858 tons valued at \$81,794 went to the United States and 937 tons at \$12,376 to the United Kingdom. The trend in domestic consumption was generally satisfactory with increases recorded in the paints, pulp and paper, roofing materials and soaps and cleaning preparations industries; consumption of talc and chalk in the toilet preparations industry fell off from 868,952 pounds in 1933 to 723,969 pounds in 1934.

Soapstone products are produced from deposits of the mineral occurring in Broughton and Thetford townships, Quebec. These properties were actively operated in 1934. The mineral is mainly used, in the shape of blocks, as a refractory lining in alkali recovery furnaces in paper mills using the sulphite process. Powdered soapstone finds a good market as a filler in various industries. Mixed with Portland cement it has been used successfully for interior plastering purposes giving a very white velvet finish. It is now used in the manufacture of fireless cookers, fireplaces, stoves, wood or coal burners and electrical heaters. Soapstone is easily carved and when polished takes a soft marble-streaked appearance. Various objects such as tobacco jars, candlesticks, clock cases, and book-holders made of carved and polished soapstone have lately been put on the market and have met with a gratifying reception.

The Canadian talc production in 1934, as for some years past, came chiefly from important deposits of foliated white talc located near Madoc, Ontario; two companies operate mines and mills in this area and produce various grades of high quality talc. Preparation of the mineral for the market includes crushing, drying, grinding and bolting; the products from these mills are marketed in Canada, United States and Europe. Both companies were in continuous operation throughout 1934.

In British Columbia shipments of talc were made in 1934 from Anderson and Sooke Lakes; most of the production in this province is consumed in the manufacture of roofing materials.

Ground talc has many present day uses, being employed in the manufacture of lubricants, toilet preparations, glass, paper, textiles, foundry facings and many other products. It is used as a polishing agent for rice, peanuts and glass and as an insulating material and insecticide. Composition roofing is manufactured from lower grades and in the rubber industry it is employed to prevent compounds from adhering to the heated working parts of machinery. Certain massive tales, free from cracks, grit or iron oxide are reported by the Bureau of Mines, Washington, D.C., to be employed in the manufacture of the so-called "lava" products; the material which is easily carved in its natural soft state is fashioned into innumerable electrical fittings such as bushings, etc. The articles are then heated, rendering the product hard enough to cut glass. Pencils, crayons and French chalk (tailors' chalk) are also fabricated from massive talc.

"Canadian Chemistry and Metallurgy"—Toronto, published talc prices, September, 1935, as follows: talc, car loads, A.A.I.F. grade to \$17.50 per ton; talc, car loads, No. 1 grade to \$11.50 per ton; talc, car loads, S. grade to \$9.00 per ton and imported Italian talc to \$100 per ton.

The United States Bureau of Mines report that compared with 1933, average 1934 prices as reported by United States producers showed little change. Ground talc and soapstone, which comprised about 93 per cent of the total shipments, ranged from about \$5.00 to \$30.00 per ton. Some high-grade crude talc averaged higher than \$35.00 a ton.

**Table 278.—Capital Employed in the Talc and Soapstone Industry in Canada, 1933 and 1934**

	1933	1934
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
(a) Present value of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	595,084	557,143
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	9,581	7,350
(c) Inventory value of finished products on hand.....	8,928	8,410
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	70,782	67,291
<b>Total.....</b>	<b>684,375</b>	<b>640,194</b>

**Table 279.—Employees, Salaries and Wages in the Talc and Soapstone Industry in Canada, 1933 and 1934**

	1933				1934			
	Number of employees		Total	Salaries and wages	Number of employees		Total	Salaries and wages
	Male	Female			Male	Female		
Salaried employees.....	8	2	10	\$ 24,096	9	2	11	\$ 26,516
Wage-earners.....	93	.....	93	58,964	101	.....	101	53,195
<b>Total.....</b>	<b>101</b>	<b>2</b>	<b>103</b>	<b>83,060</b>	<b>110</b>	<b>2</b>	<b>112</b>	<b>79,711</b>

**Table 280.—Production of Talc and Soapstone in Canada, 1925-1934**

(For the years 1888 to 1924, see Mineral Production of Canada 1928)

Year	Value	Year	Value
	\$		\$
1925.....	205,835	1930.....	186,216
1926.....	217,195	1931.....	157,083
1927.....	236,105	1932.....	159,038
1928.....	219,358	1933.....	190,836
1929.....	229,198	1934.....	180,777

**Table 281.—Production (Sales) in Canada, Imports and Exports of Talc and Soapstone, 1932-1934**

	1932		1933		1934	
	Quantity	Value	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$	Tons	\$
<b>PRODUCTION—</b>						
Soapstone (Quebec).....		46,751		47,680		44,297
Talc (Ontario and British Columbia).....	12,103	112,287	15,181	143,156	13,959	136,480
<b>Total Canada.....</b>		<b>159,038</b>		<b>190,836</b>		<b>180,777</b>
<b>IMPORTS—</b>						
Talc or soapstone, ground or unground—						
From—United Kingdom.....	197	17,352	226	17,396	121	5,875
United States.....	1,409	22,570	1,700	23,604	2,496	29,812
Other countries.....	294	9,852	224	7,650	280	9,218
<b>Total imports.....</b>	<b>1,900</b>	<b>49,774</b>	<b>2,150</b>	<b>48,650</b>	<b>2,897</b>	<b>44,905</b>
<b>EXPORTS—</b>						
Talc—						
To—United Kingdom.....	1,482	24,186	1,520	26,506	937	12,376
United States.....	6,313	61,329	9,024	86,852	7,858	81,794
Other countries.....	11	275	180	3,592	94	1,653
<b>Total exports.....</b>	<b>7,806</b>	<b>85,790</b>	<b>10,724</b>	<b>116,950</b>	<b>8,889</b>	<b>95,823</b>

**Table 282.—Consumption of Talc in Specified Canadian Industries, 1932-1934**

Industry and form	1932		1933		1934	
	Quantity	Cost at works	Quantity	Cost at works	Quantity	Cost at works
		\$		\$		\$
<b>Toilet Preparations Industry—</b>						
Talc and chalk.....lb.	747,489	18,600	868,952	25,920	723,969	23,281
<b>Soaps and Cleaning Preparations—</b>						
Talc.....lb.	315,693	2,741	346,641	2,623	371,013	2,989
<b>Roofing Materials Industry—</b>						
Talc.....ton	1,129	12,922	1,180	12,928	1,546	20,448
<b>Pulp and Paper Industry—</b>						
Talc.....ton	213	3,761	1,024	18,862	1,482	23,895
<b>Paints Industry—</b>						
Asbestos.....lb.	2,488,166	32,857	2,758,551	34,597	3,352,426	40,926

**Table 283.—World Production of Talc, 1932-1934**

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES—Con.</b>			
United Kingdom.....	258	166	.....	Greece.....	608	1,252	(a)
Union of South Africa.....	265	276	215	Italy.....	31,860	33,009	37,042
Canada (sales; (c).....	10,806	13,554	12,463	Norway.....	13,322	19,571	33,929
India.....	6,512	17,048	9,375	Roumania.....	(d) 1,770	1,094	1,902
Australia.....	1,347	1,769	1,739	Spain (b).....	4,577	5,682	(a)
<b>FOREIGN COUNTRIES</b>				Sweden.....	4,454	4,630	6,398
Austria (estimated).....	25,000	25,000	25,000	Morocco (French) (exports).....	824	518	776
Finland.....	1,599	(a)	(a)	United States (sales).....	(c) 110,019	148,235	124,022
France.....	67,400	(a)	(a)	Uruguay (exports).....	2,584	1,250	865
Germany (Bavaria).....	3,147	5,026	6,824	Egypt.....	228	2,491	2,562
				Munchoukue.....	43,616	61,444	(a)
				Argentina.....		20	(a)

Talc is also produced in U.S.S.R. (Russia).

(a) Information not available.

(b) In addition the following were quarried, 1,936 and 3,301 cubic yards in 1932 and 1933, respectively.

(c) Excluding steatite, figures of which are not available for publication.

(d) Converted from cubic metres at rate of 1 cubic metre equals 2 long tons.

(e) Excluding soapstone which is only recorded by value and was as follows:—

1932.....	£11,700
1933.....	£10,600
1934.....	£ 8,900

## MISCELLANEOUS NON-METAL MINING INDUSTRIES

Included in this chapter are the following non-metallic minerals:—

Actinolite	Manganese, bog
Barytes	Mineral waters
Bituminous sands	Natro-alunite
Fluorspar	Phosphate
Graphite	Pyrites and Sulphur
Lithium minerals	Silica brick
Magnesitic dolomite	Sodium carbonate
Magnesium sulphate	Sodium sulphate

Statistics relating to capital and labour are combined for these industries and are shown in Tables 284-286. As sulphur output in 1934 represents only a by-product in the smelting and mining of sulphide ores, its value is not included in the net value of shipments in the miscellaneous non-metal mining industry as shown in Table 19.

Finally revised 1934 statistics show a total combined value of \$1,678,482 for the Canadian production (sales) of miscellaneous non-metallic minerals, including actinolite, barytes, bituminous sands, fluorspar, graphite, magnesitic-dolomite (magnesite), magnesium sulphate, mineral waters, peat, phosphate, silica brick, sodium carbonate, sodium sulphate and sulphur. The total value of these sales in 1934 represents an increase of 17.9 per cent over the corresponding total of \$1,423,679 in 1933. Especially noteworthy were the increases recorded in the value of sales for graphite and sodium sulphate, the value in 1934 for the first product represents a gain of 28.9 per cent over 1933 while that for the latter realized a 21 per cent increase. Other non-metal shipments to show increases in value included magnesitic-dolomite, natural mineral waters, and silica brick.

**Table 284.—Capital Employed in the Miscellaneous Non-Metal Mining Industries in Canada, 1933 and 1934**

	1933	1934
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:—		
(a) Present value of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	3,698,898	2,715,240
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	87,684	103,130
(c) Inventory value of finished products on hand.....	171,520	186,763
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	244,634	286,709
<b>Total.....</b>	<b>4,202,736</b>	<b>3,291,842</b>

**Table 285.—Employees, Salaries and Wages in the Miscellaneous Non-Metal Mining Industries, 1933 and 1934**

	1933				1934			
	Number of employees			Salaries and wages	Number of employees			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	34	10	44	62,364	36	9	45	79,333
Wage-earners.....	253	.....	253	179,635	348	.....	348	292,429
<b>Total.....</b>	<b>287</b>	<b>10</b>	<b>297</b>	<b>241,999</b>	<b>384</b>	<b>9</b>	<b>393</b>	<b>371,762</b>



Table 286.—Wage-Earners, by Months, 1932-1934

Month	1932	1933	1934
January.....	80	89	239
February.....	87	94	253
March.....	98	117	209
April.....	166	156	243
May.....	229	175	446
June.....	226	234	498
July.....	197	344	460
August.....	151	378	431
September.....	157	369	402
October.....	175	363	340
November.....	165	322	286
December.....	91	318	283
<b>Average.....</b>	<b>147</b>	<b>253</b>	<b>348</b>

Table 287.—Production of Miscellaneous Non-Metallic Minerals in Canada, 1933 and 1934

Item	Unit of measure	1933		1934	
		Quantity	Value	Quantity	Value
			\$		\$
Actinolite.....	ton			30	365
Barytes.....	ton	20	60		
Bituminous sands.....	ton	466	1,662	862	3,449
Fluorspar.....	ton	73	1,064	150	2,100
Graphite.....	xx		18,367		71,424
Magnesian dolomite.....	xx		360,128		382,927
Magnesium sulphate.....	ton	120	3,360	42	1,100
Mineral waters.....	Imp. gal.	38,818	5,441	97,440	17,738
Peat.....	ton	1,131	3,449	1,878	7,343
Phosphate (a).....	ton	2,214	5,475	81	683
Silica brick.....	M	636	23,185	2,528	85,945
Sodium carbonate.....	ton	559	5,773	244	1,920
Sodium sulphate.....	ton	50,080	485,416	66,821	587,986
Sulphur (x).....	ton	57,373	510,299	51,537	515,502
<b>Total.....</b>	<b>xx</b>		<b>1,423,679</b>		<b>1,678,482</b>

(a) In 1934, production represents apatite mined in Quebec, while production in 1933 includes both Quebec apatite and sedimentary rock phosphate mined in British Columbia.

(x) Includes sulphur content of pyrites concentrates at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid making.

### ACTINOLITE

Actinolite production in Canada has been restricted to the townships of Elzevir and Kaladar in Hastings and Addington counties, Ontario. In 1934 actinolite shipments amounted to 30 tons with a value of \$365; the mineral in 1934 was mined near Kaladar, Ontario, by the Actinolite Mining Company; the product of this company is marketed in the ground state and contains a relatively high percentage of added mica flake. Actinolite is used chiefly in the manufacture of roofing materials.

Table 288.—Production of Actinolite in Canada, 1925-1934

(For production from 1897 to 1924, see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	40	500	1930.....	34	437
1926.....	80	1,000	1931.....	35	456
1927.....	86	1,075	1932.....		
1928.....	70	875	1933.....		
1929.....	30	375	1934.....	30	365

BARYTES

Deposits of barytes at Five Islands, Colchester county, and Brookfield, Hants county, Nova Scotia, were first operated between 1865 and 1870. These deposits have produced about 5,000 tons of barytes. The McKellar Island deposit in Thunder Bay District, Ontario, in the course of its operations produced several thousand tons of this mineral. Large deposits of barytes at Lake Ainslie, Cape Breton Island, were opened up in 1894. Between 1900 and 1903 the Cap Rouge deposit in North Cheticamp district was operated. In 1918 a deposit in Langmuir township, Ontario, was active and a mill for grinding and preparing barytes completed. Development work was done on the Bellow mine in North Burgess township, Ontario, in 1918. A deposit near Tionaga station was also operated in 1923 and 200 tons of barytes shipped.

Barytes production in Canada during past years came largely from deposits in Nova Scotia, Quebec and Ontario and in recent years more particularly from deposits in the Lake Ainslie district, Nova Scotia. No shipments were reported in Canada during 1934. The Department of Mines, Ottawa, state that "the much stricter specifications of modern industry render it improbable that there will develop any important market for run-of-mine ore, and future development will require the provision of some type of cleaning and grinding equipment to prepare the baryte in the form and of the purity required by modern industry; there being no lithopone or barium chemicals industry in Canada, no demand exists at present for crude ore; there seems little prospect, therefore, of any immediate revival of this industry." In this regard it is interesting to note that Canada Night Hawk Mines Ltd. recently reported the milling of crude barytes at its property located near Connaught, Ontario; the product was not shipped and the property was later reported as inactive.

"The Mineral Industry" refers to barytes as follows: "A new process has been suggested for the purification of crude barytes . . . by this process, barytes and salt are heated together in a tank-type furnace and the melt is discharged into water. The purified and finely divided barytes, most of which is minus 300 mesh, is recovered from the resulting brine by settling. Flotation of barytes has been accomplished successfully by the United States Bureau of Mines and several other research organizations. As acid-bleaching methods are expensive, the flotation process may provide a means of producing a fairly good product that will sell at prices considerably lower than those now demanded for high-grade water-ground and bleached material."

Table 289.—Production of Barytes in Canada, 1925-1934

(For the years 1885 to 1924, see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	91	2,259	1930.....	66	1,484
1926.....	105	2,307	1931.....	16	363
1927.....	56	1,268	1932.....		
1928.....	127	2,847	1933.....	20	60
1929.....	105	2,341	1934.....		

Table 290.—Imports of Blanc Fixe, Lithopone and Barytes into Canada, 1931-1934

Year	Lithopone		Barytes		Blanc Fixe	
	Tons	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
1931.....	6,931	560,037	3,372,600	32,712	1,596,173	34,483
1932.....	8,055	585,148	2,583,400	22,989	932,168	20,932
1933.....	5,694	406,598	3,174,700	28,255	552,801	11,390
1934.....	7,265	510,558	3,113,800	26,397	968,201	21,638

Of the 1934 barytes imports, 1,523,500 pounds came from Germany, 1,011,400 pounds from the United States and 49,000 pounds from the United Kingdom.

August, 1935, quotations in Canada for barytes No. 1 white, car lots to \$34.50 per ton; off colour, car lots to \$28.00 per ton. Blanc fixe, dry, car lots, to \$70.00 per ton; less car lots to \$80.00 per ton; pulp, car lots to \$40.00 per ton, less car lots, to \$50.00 per ton. Barytes, United

States August quotations, f.o.b. mines, California crude, \$6.00 per ton; Missouri, per ton, water-ground and floated, bleached, \$23.00 car lots, f.o.b. works. Crude ore minimum 95 per cent  $\text{BaSO}_4$ , less than 1 per cent iron, \$5.50; 1 per cent iron and 93 per cent  $\text{BaSO}_4$ , \$5.00; 90 per cent  $\text{BaSO}_4$ , \$4.50 f.o.b. mines.

Table 291.—Barytes and Blanc Fixe Used by the Canadian Paints, Pigments and Varnishes Industry in Canada, 1931-1934

Year	Barytes		Blanc Fixe	
	Pounds	Value	Pounds	Value
1931.....	2,304,119	\$ 39,361	146,025	\$ 12,915
1932.....	2,064,303	35,138	23,353	817
1933.....	2,062,957	33,578	47,793	1,471
1934.....	2,393,330	44,690	93,918	2,481

Table 292.—World Production of Barium Minerals

(Supplied by *Imperial Institute*)

(Long tons)

Producing country and description	1932	1933	1934
<b>BRITISH EMPIRE</b>			
United Kingdom—			
Barytes, unground.....	35,713	39,943	37,719
Witherite, unground.....	6,258	5,111	10,412
Barytes—			
Ground, bleached.....	1,881	7,623	5,548
Ground, unbleached.....	12,787	13,943	20,315
Southern Rhodesia.....			13
Canada (sales).....		18	
India.....	2,957	5,651	3,813
Australia.....	2,005	2,090	2,492
<b>FOREIGN COUNTRIES</b>			
Austria.....	271	1,014	1,009
France.....	10,200	(a)	(a)
Germany—			
Baden.....	(a)	(a)	19,370
Bavaria.....	5,761	4,081	8,253
Prussia.....	100,553	141,199	321,164
Saxony.....	2,408	128	476
Italy.....	21,516	23,074	31,896
Spain (b).....	8,612	4,163	(a)
Algeria.....	876	10	
Egypt.....			49
United States.....	119,261	130,716	150,261
Brazil.....	1,210	877	(a)
Korea.....	6,465	4,891	5,841

Barytes is also produced in U.S.S.R. (Russia).

(a) Information not available.

(b) In addition 40 cubic metres were produced in quarries during 1932, and 75 cubic metres during 1933.

## BITUMINOUS SANDS

Production of bituminous sands in Canada in 1934 amounted to 862 tons valued at \$3,449 as compared with an output of 466 tons at \$1,662 in 1933. The material as produced in Canada comes entirely from the Fort McMurray district of Northern Alberta. The following information relating to these sands has been taken from an article by J. M. McClave and which recently appeared in the "Canadian Mining Journal"—"The Alberta sands were noted by Peter Pond in 1788 and by Sir Alexander Mackenzie in 1793. They have been exhaustively studied and mapped, with some shafting and core-drilling by S. C. Ells of the Dominion Mines Branch, the most complete of whose excellent reports is Mines Branch No. 632 . . . the mining of these sands presents no serious problem; it can be done by power shovels or drag line, though the simplest and cheapest method will doubtless be by shale planers. . . . The real problem has been the extraction of oil from the sands after mining. There are three ways in which oil can be recovered

(a) by distillation, (b) by solution with organic solvents, and (c) by digestion with warm water. . . Designs are now being prepared for the first commercial unit (warm water method), to be installed on an oil-sand deposit near Waterways (Fort McMurray). . . . This first plant will be followed as soon as it has proved itself by other and larger units, all portable, until a total capacity of about 3,000 tons (2,100 barrels) per day is reached. . . . The oil content of the Alberta sands has been estimated at some 100 billion barrels."

The total value of petroleum, asphalt and their products imported into Canada in 1934 amounted to \$41,326,516 as compared with a value of \$31,046,337 in 1933. Included in the 1934 imports were 100,305 cwt. of solid asphalt valued at \$114,951 and 1,072,327,455 gallons of crude petroleum in its natural state 7900 specific gravity or heavier at 60 degrees temperature; this was appraised at \$31,907,176.

**Table 293.—Production of Bituminous Sands in Canada, 1925-1934\***

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	1,148	4,504	1930.....	2,067	8,208
1926.....	528	2,112	1931.....	1,015	4,000
1927.....	2,706	10,824	1932.....	343	1,372
1928.....	94	374	1933.....	466	1,662
1929.....	989	3,956	1934.....	862	3,449

\* Production came entirely from the province of Alberta.

## FLUORSPAR

Canadian mine shipments of fluorspar in 1934 amounted to 150 tons valued at \$2,100 as compared with 73 tons worth \$1,064 in 1933 and 32 tons at \$464 in 1932. Production in all of these years came from the Madoc area, Hastings county, Ontario. The mineral has also been commercially mined in British Columbia by the Consolidated Mining and Smelting Company of Canada, Ltd.

Fluorspar is used chiefly as a flux in the steel industry while considerable quantities are also consumed in the manufacture of glass, enamel and vitrolite, hydro-fluoric acid and derivatives, foundry castings and cement.

Imports of fluorspar into Canada in 1934 amounted to 144,396 cwt. valued at \$56,628 as compared with 44,388 cwt. at \$21,165 and of the 1933 imports 22,443 cwt. came from the United Kingdom, 6,160 cwt. from the United States and 1,942 cwt. from Germany.

August, 1935, Canadian quotations for fluorspar ranged up to \$33.00 per ton according to grade. United States per net ton, 85 per cent  $\text{CaF}_2$ , and not over 5 per cent  $\text{SiO}_2$ , Kentucky and Illinois, in bulk, f.o.b. mines, washed gravel, \$13 for all rail movement, \$14 for barge movement. Ground fluorspar, f.o.b. Illinois mines, 95 to 98 per cent  $\text{CaF}_2$  and not over  $2\frac{1}{2}$  per cent  $\text{SiO}_2$ , \$35 in bulk; \$37 in bags or barrels; foreign fluorspar, gravel, 85-5, \$21 to \$21.50 per gross ton, duty paid, Baltimore or Philadelphia.

**Table 294.—Production of Fluorspar in Canada, by Provinces, 1925-1934**

(For the years 1905 to 1924, see Mineral Production of Canada, 1928)

	Ontario		British Columbia		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1925.....	12	200	3,874	19,034	3,886	19,234
1926-1928.....						
1929.....	70	1,120	17,800	267,000	17,870	268,120
1930.....	80	1,240			80	1,240
1931.....	40	620			40	620
1932.....	32	464			32	464
1933.....	73	1,064			73	1,064
1934.....	150	2,100			150	2,100



Table 295.—Fluorspar Used in Canadian Steel Furnaces and Glass Industry, 1930-1934

Year	Glass industry		Steel furnaces	
	Short ton	Value	Short ton	Value
		\$		\$
1930.....	179	6,458	6,486	92,743
1931.....	96	4,815	4,960	66,471
1932.....	125	4,989	2,253	27,939
1933.....	115	7,803	2,949	31,657
1934.....	119	4,472	4,555	55,643

Table 296.—World Production of Fluorspar

(Supplied by Imperial Institute)

(Long tons)

Producing country	1932	1933	1934
<b>BRITISH EMPIRE</b>			
United Kingdom.....	15,427	28,058	34,216
Union of South Africa.....	1,197	463	1,371
Canada.....	29	65	134
Australia.....	1,260	985	1,737
Newfoundland (c).....			2,400
<b>FOREIGN COUNTRIES</b>			
France.....	15,000	(a)	(a)
Germany—			
Anhalt.....	(a)	(a)	7,241
Baden.....	(a)	(a)	6,424
Bavaria.....	21,569	25,948	29,193
Prussia.....	7,671	10,485	21,215
Saxony.....	1,274	3,614	6,424
Italy.....	6,348	7,592	(a)
Norway.....	562	499	662
Spain (b).....	6,402	3,130	(a)
Mexico.....	151	(a)	(a)
United States.....	15,000	53,000	78,000
Argentina.....	10	197	(a)
China (estimated).....	7,000	7,000	7,000
Korea.....	7,457	8,933	11,908

Fluorspar is also produced in U.S.S.R. (Russia).

(a) Information not available.

(b) In addition 160 cubic metres were produced from quarries during 1932 and 120 cubic metres during 1933.

(c) Exports for year ended June 30.

## GRAPHITE

In 1934 production of Canadian graphite was valued at \$71,424 as compared with \$18,367 in 1933; this represents an increase in value of 289 per cent. Production in 1934, as for several years past, came chiefly from the Black Donald mine, Renfrew county, Ontario; relatively small shipments were also made from the province of Quebec. Steady operations were maintained throughout the year at the Black Donald mine and various grades of refined graphite were shipped; it is interesting to note that the product of this company is now reported as being successfully employed in the manufacture of pencils.

Recent trends in industrial consumption of graphite indicate that the use of Madagascar flake for the manufacture of crucibles is increasing; Ceylon graphite was at one time used almost exclusively for this purpose. The reported success in milling of the Ceylon and Canadian mineral for pencils may eventually prove of considerable economic importance to producers in these countries; Mexican graphite was employed largely for pencil manufacture during past years.

Artificial or manufactured graphite is now being employed in the manufacture of electrodes, dry batteries, lubricants, and various other products.

The world consumption of graphite has been estimated at approximately 20 per cent for crucibles, 40 per cent for foundry work, 15 per cent for paints, 7 per cent for electrical conductors, 7 per cent for lubricants, 5 per cent for electric batteries, 4 per cent for crayons and 2 per cent for miscellaneous purposes.

Canadian quotations for graphite, August, 1935—100 pound lots—ranged from 15 cents to 40 cents per pound. United States—per pound, f.o.b. New York, Ceylon lump  $6\frac{1}{2}$  to  $7\frac{1}{2}$  cents; carbon lump, 4 to 6 cents; chip, 5 to 6 cents; dust, 3 to 4 cents. Madagasear flake, 6 to  $7\frac{1}{2}$  cents. No. 1 flake,  $9\frac{1}{2}$  to 17 cents. Crude amorphous graphite, \$12 to \$23 per ton according to grade.

**Table 297.—Production of Graphite in Canada, by Provinces, 1925-1934**

(For production from 1886 to 1924, see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1925.....	359	30,900	2,210	127,803	2,569	158,703
1926.....	326	29,516	2,401	105,344	2,727	194,860
1927.....	34	2,043	1,705	109,613	1,829	111,656
1928.....	50	4,668	1,047	52,373	1,097	57,041
1929.....	173	12,652	1,288	90,522	1,461	103,174
1930.....	197	9,850	1,338	86,542	1,535	96,392
1931.....			548	32,149	548	32,149
1932.....			346	18,483	346	18,483
1933.....	43	2,222	362	16,145	405	18,367
1934.....	129	6,426	1,389	64,998	1,518	71,424

**Table 298.—Production in Canada, Imports and Exports of Graphite, 1932-1934**

	1932		1933		1934	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Ore milled.....	1,424		1,234		2,038	
Production.....	346	18,483	405	18,367	1,518	71,424
IMPORTS—						
Crucibles, plumbago.....		29,909		26,521		36,363
Plumbago, not ground or otherwise manufactured.....		1,869		4,729		2,989
Plumbago, ground and manufactures of, n.o.p.....		70,565		69,003		103,652
EXPORTS—						
Graphite or plumbago, crude or refined..	907	41,146	987	40,115	1,935	90,129
Carbon and graphite electrodes.....		217,732		305,607		564,432

**Table 299.—Graphite Used in Specified Canadian Industries, 1931-1934**

Year	Paints, pigments and varnishes		Polishes and dressings		Iron and steel and their products	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
1931.....	184,742	6,761	119,297	6,794	248,294	17,194
1932.....	87,960	3,837	118,027	5,838	142,176	10,755
1933.....	93,740	3,706	114,541	6,224	223,504	12,235
1934.....	110,582	4,643	121,694	6,853	296,624	18,859

Table 300.—World Production of Graphite, 1932-1934

(Supplied by Imperial Institute)

(Long tons)

Country	1932	1933	1934	Country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES—Con.</b>			
Canada (sales).....	309	362	1,355	Italy.....	2,898	3,149	3,846
Australia.....	70	30	6	Norway.....	661	1,951	2,245
Ceylon (exports).....	6,100	9,559	11,569	Japan.....	487	835	(a)
Union of South Africa.....	49	68	62	Madagascar.....	2,691	3,518	8,343
India.....	5		337	Morocco (French zone).....	236		
				Mexico.....	2,013	2,643	3,827
<b>FOREIGN COUNTRIES</b>							
Austria (crude).....	10,431	14,537	17,858	Korea—			
Czechoslovakia.....	907	120	3,447	Flake.....	{ 18,548 }	1,906	2,394
Germany (crude).....	20,479	19,443	17,258	Other.....		20,412	28,406

NOTE.—Graphite is also produced in U.S.S.R. (Russia) and the United States.

(a) Information not available.

## MAGNESITIC-DOLOMITE AND MAGNESITE

Production of calcined and dead-burned magnesitic-dolomite in Canada during 1934 amounted in value to \$382,927 as compared with \$360,128 in 1933 or an increase of 6.3 per cent. The production of these materials in Canada is confined to Argenteuil county, Quebec, the deposits occurring some sixty miles west of Montreal and north of the Ottawa river. Steady operations were maintained during 1934 in this area by the International Magnesite Company, Ltd., and Canadian Refractories Ltd. The latter company crush and grind the crude rock to about 100 mesh after which it is burned in rotary kilns to an inert state.

"Deposits of earthy hydromagnesite occur in British Columbia near Atlin and Clinton, and large deposits of silicious magnesite occur in the vicinity of Cranbrook. The reported successful application of flotation methods to the removing of silica and other impurities from magnesite is a development of importance as regards the silicious magnesite deposits.

"The deposits of magnesitic-dolomite in Argenteuil county, Quebec, are ample to supply magnesia products for domestic requirements for many years and also to support a large export trade. No other deposits of magnesitic-dolomite or of commercial magnesite are known to occur in the eastern part of North America."<sup>(1)</sup>

Magnesia products are utilized principally in manufacture of refractories such as the lining for steel furnaces; it is also used to a lesser extent as a refractory cement. Floors and floor tiles are made from caustic-calcined magnesia and a new development in the industry is the production of refractory brick from dead-burned Canadian magnesitic-dolomite.

"... Supplementary to the efforts to produce basic refractory materials from Grenville (Quebec) magnesitic-dolomite, which was mentioned last year as an outstanding Canadian achievement, a plastic refractory has been developed which is claimed to be superior to all other basic refractory plastics for use in metallurgy and kraft smelters. . . . It has also been reported by the manufacturers that the basic refractory brick made from Grenville magnesitic-dolomite, in addition to the good account it has been giving of itself for metallurgical purposes, has been proving itself highly resistant to the attack of coals having a rather corrosive action."<sup>(2)</sup>

Canadian quotations for calcined magnesite, August, 1935, ranged \$40—\$50 per ton. United States—per ton f.o.b. California dead-burned, \$25. Artificial periclase, 94 per cent, MgO \$65; 90 per cent, \$35. Caustic, 95 per cent MgO, white color, \$40. Washington—dead-burned grain magnesite, \$22.

<sup>(1)</sup> Extract—Bulletin 760—Department of Mines, Ottawa.<sup>(2)</sup> Extract—Journal of Canadian Ceramics Society, 1935.

**Table 301.—Production of Magnesite\* in Canada, 1925-1934**

(For the years 1908 to 1924, see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	5,576	122,325	1930.....	13,336	336,162
1926.....	4,571	137,431	1931.....	11,411	295,579
1927.....	7,337	230,309	1932.....	†	262,860
1928.....	13,195	346,990	1933.....	†	360,128
1929.....	18,809	491,170	1934.....	†	382,927

\* Magnesitic-dolomite.

† Owing to the limited number of firms, the data relating to quantity are not published.

**Table 302.—Production in Canada, Imports and Exports of Magnesite\*, 1932-1934**

	1932		1933		1934	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Crude, mined.....	3,123		29,937		30,187	
Crude, calcined or treated.....	17,853		24,837		29,363	
PRODUCTION—Calcined and dead-burned....	(d)	262,860	(d)	360,128	(d)	382,927
IMPORTS—						
Magnesia pipe covering.....		64,924		35,062		45,759
Magnesite (crude rock).....					(cwt. 4)	35
Magnesite firebrick.....		71,077		246,855		390,664
Magnesite, dead-burned, sintered, caustic-calcined or plastic magnesia.....	1,065	28,625	1,403	43,229	472	26,740
EXPORTS—						
Magnesite, calcined or dead-burned.....	1,194	33,103	2,320	63,056	1,997	56,670

\* Including magnesitic-dolomite.

(d) Not available for publication.

Imports of magnesia (magnesium oxide) in 1934 totalled 390,001 pounds valued at \$34,462 as compared with 128,220 pounds at \$22,971 in 1933.

**Table 303.—World Production of Magnesite, 1932-1934**

(Supplied by Imperial Institute)

(Long tons)

Country and description	1932	1933	1934	Country and description	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES—Con.</b>			
Union of South Africa—				Korea—			
Crude magnesite.....	1,396	1,471	1,641	Crude.....	(a)	(a)	3,118
Canada—			(a)	Italy—			
Crude magnesite.....	2,788	26,729		Crude magnesite.....	453	2,152	(a)
India—			14,075	Yugoslavia (Serbia only)—			
Crude magnesite.....	13,864	15,206		Crude magnesite.....	16,084	14,371	24,690
Australia—			15,897	Calcined magnesite.....	7,633	5,561	10,312
Crude magnesite.....	5,391	9,720		Norway—			
Southern Rhodesia—				Crude.....	1,290	1,975	2,461
Crude.....	13			Calcined magnesite (c).....	512	579	659
<b>FOREIGN COUNTRIES</b>				Magnesia bricks (c).....	537	483	660
Austria—				U.S.S.R. (Russia)—			
Crude magnesite.....	132,286	161,736	254,301	Crude magnesite.....	(a)	361,000	474,000
Caustic magnesia (c).....	30,412	23,462	35,247	United States—			
Dead-burned magnesia (c).....	28,298	63,260	63,704	Crude magnesite.....	34,341	96,596	90,154
Bricks (c).....	15,283	24,970	28,325	Caustic (sales) (c).....	3,013	7,269	6,721
Czechoslovakia—			23,151	Dead-burned (sales) (c).....	13,246	38,940	34,406
Calcined magnesite (b)...	13,014	18,988		Turkey—			
Greece—			(a)	Crude magnesite.....	305	936	(a)
Crude magnesite.....	43,993	44,013	(a)	Manchoukuo—			
Caustic magnesia (c).....	9,047	16,039	(a)	Crude magnesite.....	54,511	70,249	(a)
Dead-burned magnesia (c).....	1,605	2,605	(a)	Germany (Prussia)—			
				Crude.....	(a)	(a)	10,836

(a) Information not available.

(b) Exports less imports.

(c) Derived from crude shown, and not additional.



**MAGNESIUM SULPHATE (EPSOM SALTS—NATURAL)**

Production of natural magnesium sulphate in Canada during 1934 totalled 42 tons valued at \$1,100 as compared with an output of 120 tons worth \$3,360 in 1933. Production for back years represents salts recovered from Basque Lake, British Columbia, and which were treated in an experimental plant at Ashcroft, B.C. The mineral also occurs in association with sodium sulphate in deposits in Saskatchewan. Magnesium sulphate has a medicinal value under the name of Epsom salts and it is used in the finishing of cotton fabrics and for weighting paper, silk and leather.

It is interesting to note that a new works for the manufacture of Epsom salts at Mithapur, near Port Okha, Kathiawad, India, was opened in May, 1935.

Canadian quotations, August, 1935, for magnesium sulphate B.P. barrels, ranged  $2\frac{1}{2}$  cents to 3 cents per pound; technical, bags, per ton, \$25.

Imports of magnesium sulphate or Epsom salts totalled 4,599,518 pounds valued at \$48,459 in 1934 as compared with 4,269,852 pounds at \$49,868 in 1933; the material during both years came chiefly from Germany and the United States.

**Table 304.—Magnesium Sulphate Used in Canadian Pharmaceutical Preparations and Tanning, 1931-1934**

Year	Pharmaceutical preparations		Tanning*	
	Pounds	Value	Pounds	Value
		\$		\$
1931.....	553,291	21,252	158,040	1,858
1932.....	622,459	28,073	181,814	2,418
1933.....	851,355	24,629	396,424	4,467
1934.....	816,830	33,793	228,281	4,789

\* Data not entirely complete.

**MANGANESE, BOG**

Bog manganese consists mainly of oxide of manganese and water with usually some oxide of iron and often silica, alumina and baryta. Shipments of bog manganese from Dawson Settlement, Albert County, New Brunswick, during 1931 amounted to 77 tons valued at \$462. Some development work in 1934 was reported on a bog manganese deposit located at North Renous, New Brunswick, and a trial shipment of the material may be made in 1935. No commercial shipments of bog manganese have been made since 1931. The mineral is utilized chiefly in the ceramic industry.

Manganiferous ores are utilized chiefly in the production of iron and steel, whereas the consumption in the ceramic and other industries is relatively small.

Imports into Canada in 1934 of manganese oxide totalled 619,069 cwt. valued at \$234,236 as compared with 686,842 cwt. worth \$293,910 in 1933.

**MINERAL WATERS**

A record of all the natural mineral waters produced in Canada and sold to the general public for medicinal purposes since 1888 has been compiled. In that year 124,850 gallons were produced and during the following ten years production varied between 424,600 gallons and 767,460 gallons. Only the value of shipments were recorded from 1899 to 1920; the high mark for the industry was reached in 1911 when the production was valued at \$223,758.

Shipments of natural mineral waters from Canadian springs totalled 97,440 imperial gallons valued at \$17,738 in 1934 compared with 38,818 imperial gallons worth \$5,441 in the preceding year. Production during both years originated in Ontario and Quebec. Some of the more prominent Canadian mineral waters possessing special therapeutic or hygienic properties include the following: in Quebec the Abenakis springs on the St. François river in Yamaska county; Pottou springs in Brome county and the Coulombia spring at L'Epiphanie. In Ontario, saline

sulphur and gas springs occur at Caledonia Springs and at Carlsbad Springs near Ottawa; the waters range from alkaline to strongly saline. St. Catharines, near Niagara, is one of the oldest Canadian mineral water resorts and sulphur waters are found at the Preston mineral springs in Waterloo county. The most famous of all Canadian springs is undoubtedly the group of hot sulphur springs at Banff, Alberta. In British Columbia the Harrison Hot springs in the Fraser Valley and the Halcyon Hot springs on Arrow Lake are noted for their curative properties.

**Table 305.—Production of Mineral Waters in Canada, 1925-1934**

(For the years 1888 to 1924, see Mineral Production of Canada, 1928)

Year	Imperial gal.	Value	Year	Imperial gal.	Value
		\$			\$
1925.....	190,134	28,413	1930.....	227,141	24,481
1926.....	215,356	29,721	1931.....	217,408	13,234
1927.....	303,530	14,624	1932.....	76,714	7,170
1928.....	269,045	33,498	1933.....	38,818	5,441
1929.....	321,905	16,139	1934.....	97,440	17,738

**Table 306.—Production in Canada, Imports and Exports of Mineral Waters, 1932-1934**

	1932		1933		1934	
	Imp. gal.	Value	Imp. gal.	Value	Imp. gal.	Value
		\$		\$		\$
PRODUCTION, by provinces—						
Quebec.....	15,506	4,697	9,024	3,094	75,665	16,116
Ontario.....	61,208	2,473	29,794	2,347	21,775	1,622
<b>Total.....</b>	<b>76,714</b>	<b>7,170</b>	<b>38,818</b>	<b>5,441</b>	<b>97,440</b>	<b>17,738</b>
IMPORTS—Mineral and aerated waters.....		110,040		77,552		87,618
EXPORTS—Mineral and aerated waters.....		7,361		5,572		5,322

**Table 307.—Sales of Natural Mineral Waters (x) by the Canadian Aerated Waters Industry, 1930-1934**

Years	Value
	\$
1930.....	178,348
1931.....	140,730
1932.....	92,066
1933.....	77,125
1934.....	52,113

(x) Whether fortified or not.

## PHOSPHATE

The existence of the extensive Lièvre river deposits of crystalline phosphate lime or apatite was first noted in 1829. However, the first commercial shipments of this mineral in Canada were made between 1870 and 1877 from North Burgess township, Ontario, to a superphosphate plant at Brockville. An active market was open in Europe for raw phosphate for fertilizer purposes and this added impetus to the mining of phosphate in Ontario and Quebec. From 1878 to 1892 inclusive, the industry in Canada was at its highest point, and 296,695 tons were produced. Exports during this 15-year period totalled 281,329 tons of which quantity Great Britain received approximately 86 per cent; the United States, 8 per cent; Germany, 5 per cent; and France, Denmark, Spain and Holland, the remainder. The maximum shipment of 31,753 tons was made in 1890. Since 1899, however, the annual production has exceeded the 1,500 ton mark only once.

The discovery and opening up in the United States of the large phosphate deposits in Florida in the nineties and later of those in Tennessee, the western states and Africa, caused a sharp falling-off in prices for phosphate and resulted in the closing of the large Canadian mines.

The production of Canadian phosphate since 1895 has been mainly obtained as a by-product in the mining of mica. Activity in the phosphate industry in Canada has been practically negligible for a number of years.

Shipments of Canadian mined phosphate during 1934 totalled 81 tons valued at \$683 as compared with 2,214 tons worth \$5,475 in 1933. The 1934 output consisted only of apatite mined in the province of Quebec, whereas, the production in 1933 included rock or sedimentary phosphate mined at Fernie and Crowsnest, British Columbia, by the Consolidated Mining and Smelting Company of Canada, Ltd. The apatite production in Quebec was utilized in an electro-chemical plant while the sedimentary phosphate of British Columbia was employed in the manufacture of fertilizer at Trail, British Columbia. The Crowsnest phosphate property of Consolidated Mining and Smelting Company remained inactive throughout 1934.

"The Mineral Industry" reports: "The world's production of phosphate rock in 1934 amounted to approximately 9,000,000 metric tons, an increase of 7 per cent over the 1933 figure. In 1934, Algeria, Egypt, Morocco and Tunisia produced approximately 46 per cent of the world's phosphate; the United States produced approximately 32 per cent; and Russia produced approximately 9 per cent. . . . The laboratory work of the Bureau of Chemistry and Soils, United States Department of Agriculture, on the preparation of calcined phosphate by heating silica-containing phosphate rock in the presence of water vapour was continued in 1934; as shown by pot tests, the plant-food value of the phosphorus in properly prepared calcined phosphate is as high as that of the phosphorus in superphosphate and dicalcium phosphate. . . ."

United States quotations, September, 1935, for phosphate per long ton, f.o.b. mines: Florida pebble, for export 77 to 76 per cent, \$7.25; 75 per cent, \$6.50; 68 per cent, \$4.50. Tennessee, ground lime phosphate, 85 per cent through 300 mesh, 34-30 per cent  $P_2O_5$ , \$8.25 per short ton, bags extra.

Table 308.—Production of Phosphate in Canada, by Provinces, 1928-1934

Year	Quebec		British Columbia		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1928.....	91	1,126	550	7,150	641	8,276
1929.....	40	800	1,145	4,580	1,185	5,380
1930.....	40	760			40	760
1931.....						
1932.....	1,316	12,333			1,316	12,333
1933.....	105	805	2,109	4,670	2,214	5,475
1934.....	81	683			81	683

Table 309.—Imports of Phosphate and Phosphate Products, 1932-1934

	1932		1933		1934	
	Tons	Value	Tons	Value	Tons	Value
Imports—		\$		\$		\$
Phosphate rock.....	71,433	346,907	18,351	74,527	31,775	165,240
Acid phosphate (not medicinal).....	1,387	226,136	1,241	192,213	1,257	172,279
Phosphorus and compounds, n.o.p.....	160	32,888	656	45,515	115	29,474
Superphosphate or acid phosphate of lime	60,699	532,799	54,437	503,474	79,286	775,578
Soda phosphate.....	3,555	202,476	2,949	156,204	3,986	195,751

Table 310.—Phosphate Rock and Superphosphate Used in the Manufacture of Canadian Fertilizers, 1931-1934

Years	Superphosphate		Phosphate rock	
	Short tons	Value	Short tons	Value
		\$		\$
1931.....	51,639	595,789	48,373	395,547
1932.....	36,005	366,462	41,114	316,518
1933.....	59,443	657,123	21,961	164,614
1934.....	73,182	839,980	48,007	396,133

Table 311.—World Production of Phosphate Rock

(Supplied by Imperial Institute)

(Long tons)

Producing country	1932	1933	1934	Producing country	1932	1933	1934
<b>BRITISH EMPIRE</b>				<b>FOREIGN COUNTRIES—Con.</b>			
Tanganyika.....			205	U.S.S.R. (Russia) (d)....			
Seychelles (exports).....	13,989	12,113	11,871	Algeria.....			
Union of South Africa.....	1,164	1,163	76	Egypt.....	344,256	433,673	431,016
Canada.....	1,175	1,977	72	Madagascar.....	7,012	13,000	8,208
India.....	121	37	59	Morocco (French).....	988,162	1,048,822	1,171,150
Christmas Island.....	84,197	91,280	128,010	Tunis.....	1,651,000	1,780,600	1,738,000
Australia.....	869	96	207	Netherland West Indies			
Nauru Island.....	418,180	363,680	418,950	(exports).....	63,390	84,199	99,038
Ocean Island.....	196,875	185,575	211,250	United States.....	1,739,197	2,309,269	2,871,099
Total.....	717,000	656,000	771,000	French Indo-China.....	400		4,000
<b>FOREIGN COUNTRIES</b>				China.....	8,000	(a)	(n)
Belgium (b).....	25,402	24,733	(a)	Japan.....	18,461	34,193	(n)
Estonia.....	1,115	8,809	10,441	Netherlands East Indies..	2,681	7,821	4,934
France.....	81,400	70,000	78,000	Philippine Islands (c)....	817	3,048	(n)
Germany (Prussia).....	(a)	(a)	723	Angaur Island (exports)...	54,347	73,250	63,783
Poland.....	(a)	6,250	(a)	Makatea.....	118,745	77,797	80,700
Spain.....	9,822	14,278	(a)	New Caledonia.....	1,000	6,000	2,000
	100,000	200,000	376,000	Total.....	5,800,000	6,700,000	7,509,000
	560,288	578,470	523,804	World's total.....	6,500,000	7,400,000	8,309,000

(a) Information not available.

(b) In addition phosphatic chalk was produced as follows:—

1932.....	51,740 long tons
1933.....	59,840 "

(c) Including guano.

(d) Apatite concentrate. In addition a quantity of low grade phosphate rock is produced.



## POTASH

Natural potash salts are not yet mined or recovered on an extensive commercial scale in Canada. Potash occurs in small quantities in rock salt strata at Malagash, Cumberland county N.S., and at Gautreau, Westmoreland county, N.B. A search for beds of economic importance has been made and results so far obtained have been sufficiently promising to warrant future work. Potassium chloride so far opened up at Malagash occurs in a number of definite bands in the salt mass in the form of crystalline beds of pink and yellowish green sylvite in the matrix of halite. Small shipments of potash-bearing salt have been made recently from the Malagash deposit; this salt was employed as a fertilizer.

A review of the current position of the United States as a potash producer appearing in "Engineering and Mining Journal," New York, states that on the discovery of sylvite, potassium chloride in New Mexico, in 1925, sufficient financial interest was aroused to bring about a new era in American potash production by 1932. To-day private enterprise has developed the deposits in the Carlsbad area for a production of more than one million tons of crude salts annually. . . . The United States Potash Company has two shafts about 1,000 feet deep. The refinery can produce 400 tons of refined muriate per day. The Potash Company of America has one shaft completed to a depth of 1,100 feet, a concentrating plant for the separation of sylvite from halite by ore dressing methods will use a process developed co-operatively with the United States Bureau of Mines.

According to the "Chemical Trade Journal and Chemical Engineer," London, German sales of potash in 1934 increased by 30.2 per cent to 1,220,272 metric tons of pure potash; of the 1934 sales 70.4 per cent were taken by domestic consumers while export sales advanced from 23.6 per cent to 29.6 per cent; the average value of sales fell substantially last year and has now reached a low record for many years. Under the increasing competition of Spanish and American producers, export prices in 1934 declined by another 32 per cent, following a fall of around 40 per cent from 1929 to the end of 1933. It is also reported that the Franco-German Potash Cartel have made considerable progress towards the exploitation of the potash deposits which they possess in Catalonia in Spain; wells are being sunk at the Fordina and the Minerva mines, but the crude salts from both mines will be dealt with at one concentration plant.

Palestine Potash Limited which began to produce bromine in 1931 from the Dead Sea is now reported to be supplying 74 per cent of the total consumption of the United Kingdom market; in 1933 an extension of the area of evaporating pans and of the refinery was undertaken and has now been completed in order to raise capacity to 25,000—30,000 tons of potash per annum. The company intends, in due course, to construct or co-operate with others in the construction of an aerial ropeway some 19 miles in length from the north end of the Dead Sea to Jerusalem, whence the products will be transported by rail to Jaffa, Haifa and Port Said.

Imports of kainite, or German potash salts and German mineral potash during 1934 totalled 68,349 cwt. valued at \$17,112 as compared with 83,783 cwt. at \$71,340 in 1933. Crude muriate of potash imports in 1934 amounted to 454,777 cwt. valued at \$489,999 as against 280,359 cwt. worth \$497,890 in 1933. Imports of crude sulphate of potash amounted to 33,947 cwt. valued at \$41,496 in 1934 as compared with 48,936 cwt. at \$103,202 in 1933.

Natro-Alunite.—Natro-alunite occurs at Easy Cove in the Kyuquot section, Quatsino mining division, British Columbia. Small shipments of this mineral have been made from the deposit; the property has been inactive since 1927 when an endeavour was made to develop a trade demand for this product, utilizing its potash content as a fertilizer. For historical tables showing production from this deposit see annual report on Mineral Production of Canada for 1930.

Table 312—Potash Salts Used in the Manufacture of Canadian Mixed Fertilizers, 1933 and 1934

	1933		1934	
	Tons	Cost at works	Tons	Cost at works
		\$		\$
Kainite and potash manure salts.....	4,914	92,422	5,822	103,781
Muriate of potash.....	8,320	322,439	10,283	362,460
Sulphate of potash.....	1,515	63,184	1,979	76,474

Table 313.—World Production of Potash

(Supplied by Imperial Institute)

(Long tons)

Producing country and description	1932	1933	1934	K <sub>2</sub> O content or equivalent		
				1932	1933	1934
BRITISH EMPIRE						
Palestine—						
Chloride, 80% KCl.....	9,000	11,461	14,013	5,686	7,230	8,840
Carnallite.....	10,000	(a)	(a)	5,000	(a)	(a)
India—						
Nitrate (estimated).....	9,000	9,900	9,000	4,300	4,800	4,300
Total (estimated).....				9,300	12,000	13,100
FOREIGN COUNTRIES						
France (c)—						
K <sub>2</sub> O equivalent—						
Sylvinite, etc.:						
12–16%.....	109,158	131,015	118,810	321,314	321,353	372,946
18–22%.....	385,573	497,692	463,180			
30–40%.....	94,553	122,277	168,903			
50% and over.....	336,677	284,039	323,583			
Germany—						
Kainite, sylvinite, etc.....	5,688,310	6,614,188	8,656,471	797,314	945,654	(b)
Carnallite, etc.....	625,896	632,298	808,384	60,278	64,254	1,200,854
Italy—						
Leucite.....	43,000			(a)		
Alunite.....	700	526	(a)	70	50	(a)
Poland—						
Kainite.....	44,108	61,549	84,811	4,900	57,387	10,200
Sylvite.....	249,996	232,870	210,528	74,400		50,500
Langbeinit.....			1,447			300
Spain—						
Chlorides, etc.....	99,776	238,660	(a)	53,945	89,674	137,369
Nitrified earth.....	738	500	(a)	(a)	(a)	(a)
U.S.S.R. (Russia) (d)—						
Chloride, 85% KCl.....	(a)	34,962	149,697	(a)	30,500	93,500
“ 98% KCl.....	(a)	1,322	7,864			
Mixed 65% KCl.....	(a)	21,808	102,211			
Egypt—						
Crude salts.....	8	4		(a)	(a)	
United States—						
Crude salts.....	127,786	297,420	246,189	55,348	128,016	128,877
Korea—						
Alunite (impure).....	16,062	26,790	55,439	(a)	(a)	(a)
Total.....				1,370,000	1,640,000	2,000,000
World's total.....				1,380,000	1,650,000	2,000,000

(a) Information not available.

(b) Sales.

(c) Crude salts mined were as follows—1932—1,889,721 long tons.

1933—2,162,000 "

1934—2,021,942 "

(d) Sylvinite (22% KCl) mined was—1933—298,306

1934—985,780

## PYRITES (Sulphur)

Census returns for 1871 record a production of 2,800 tons of pyrites in Canada, made up of 2,300 tons from Quebec deposits and 500 tons from Ontario. However, it is only since 1886 that a continuous official record of pyrites production is available. Customs' records for the period 1881 to 1885 inclusive, show exports of 120,126 tons of pyrites to the United States. The 1886 output of pyrites was 42,906 tons, all of which was obtained from the Albert and Crown mines, Sherbrooke county, Quebec. In 1889, the production totalled 72,225 tons; shipments ranged from 27,687 tons to 158,566 tons during the following 24 years. The war years, 1914–1918, brought about an increased demand for sulphuric acid and a consequent advance in the production of pyrites. Shipments during this period reached a grand total of 1.6 million tons or approximately 46 per cent of the total Canadian production from 1886 to 1927.

It has been the practice of the Bureau in past years to report export shipments of pyrites in terms of the sulphur content of the pyrites. In view of the fact that there is now an important production of sulphur in the form of sulphuric acid made from waste bessemer gases, it has been decided to modify the method of reporting production to show the total sulphur content of the pyrites shipped and in bessemer gases used in the manufacture of sulphuric acid.

The sulphur content of pyrites shipped and sulphur recovered from non-ferrous smelter gas amounted in 1934 to 51,537 tons valued at \$515,502 as compared with 57,373 tons worth \$510,299 in 1933. Production during both years came from the provinces of Quebec, Ontario and British Columbia.

Sulphur employed in the manufacture of sulphuric acid was recovered from salvaged smelter gas in Ontario and British Columbia. In the former province, Canadian Industries Limited continued the operation of its acid plant at Copper Cliff, using sulphur gases from the International Nickel Company's smelter, while in British Columbia the Consolidated Mining and Smelting Company of Canada, Ltd., manufactured sulphuric acid through the treatment of by-product gases at the Trail metallurgical plants; this company announced early in 1935 that the new sulphur dioxide recovery process, recently developed, was about ready for the next step, which will consist of building a commercial plant and that plans and estimates for this unit were being prepared, it is reported elemental sulphur will be produced in this plant.

In Boischatel township, Quebec, Aldermac Mines Limited produced both copper and iron pyrites concentrates, the copper concentrates going to the Noranda smelter and the sulphur concentrates to the chemical industry. Iron pyrites concentrates continued to be produced at Eustis, Quebec, by the Consolidated Copper and Sulphur Co. Ltd.; these were exported to the United States. At Britannia Beach in British Columbia the Britannia Mining and Smelting Company Limited shipped pyrites concentrates to a Canadian plant for the manufacture of sulphuric acid.

"Canadian Chemistry and Metallurgy" gives the following information relating to the recovery of sulphur dioxide in England: "The Billingham process now uses a liquor containing a mixture of salts in their large-scale experiment. This solution will absorb 6 per cent of its weight of sulphur dioxide from 6.5 per cent of gas with 98 per cent absorption of the sulphur dioxide in the gas, and on heating to 100 deg. C. it yields practically pure sulphur dioxide. . . . The process has other possibilities beside the production of sulphur from metallurgical gases. In the first place sulphur from anhydrite becomes a practical possibility, as the I.G. and I.C.I. have both produced sulphur dioxide from anhydrite by heating with clay and carbon. The second probable development would be in the method of handling pyrites. Ore may be split into its important constituents at the mine or at importing centres. All these possibilities deserve attention and are of interest to Canadian mining; but from the national viewpoint, this research is most significant to the smelter and paper industries."

It is interesting to note that a Canadian chemical works is now using sulphite liquor obtained from a Canadian pulp and paper plant and it is believed that this latter plant is the first of its kind to evaporate sulphite liquor commercially in Canada.

Canadian quotations for sulphur, August, 1935—sulphur ground, 100 pounds \$2.50—\$2.75; car lots, Montreal, per ton, \$27.00 to \$28.00; roll 100 pounds, \$3.50 to \$3.75. Pyrites per long ton unit of sulphur, C.I.F., United States ports, guaranteed 48 per cent sulphur; Spanish, 12 to 12½ cents, nominal.

Table 314.—Production of Pyrites† in Canada, 1925-1934

(For the years 1886 to 1924, see Mineral Production of Canada, 1928)

Year	Pyrites	Sulphur content	Value	Year	Pyrites	Sulphur content	Value
	Tons	Tons	\$		Tons	Tons	\$
1925.....	15,605	7,587	58,899	1930.....		37,730	314,835
1926.....	17,845	8,975	63,899	1931.....		50,107	429,457
1927.....	50,833	25,229	198,388	1932.....		53,172	470,014
1928.....	68,836	38,589	321,033	1933.....		57,373	510,299
1929.....		42,781	350,843	1934.....		51,537	515,502

† Since 1928 includes sulphur content of pyrites at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid making and also elemental sulphur produced at Trail, B.C. since 1933.

**Table 315.—Production in Canada, Imports and Exports of Pyrites with Sulphur Content, including Sulphur Contained in Sulphuric Acid Made from Smelter Gases, 1933 and 1934**

—	Pyrites†			Smelter gas		Total sulphur	
	Sales	Sulphur content		Sulphur content		Tons	Value
	Tons	Tons	Value	Tons	Value		
1933			\$		\$		\$
Quebec.....	39,320	19,167	146,261			19,167	146,261
Ontario.....				8,196	81,960	8,196	81,960
British Columbia.....	19,284	9,011	72,088	20,999	209,990	30,010	282,078
Canada.....	58,604	28,178	218,349	29,195	291,950	57,373	510,299
1934							
Quebec.....	9,868	4,908	50,398			4,908	50,398
Ontario.....				14,598	145,980	14,598	145,980
British Columbia.....	*27,288	(a) 593	4,744	31,438	314,380	32,031	319,124
Canada.....	37,156	5,501	55,142	46,036	460,360	51,537	515,502

IMPORTS—	1933		1934	
	Tons	\$	Tons	\$
	Brimstone or sulphur, crude or in roll or flour.....	140,810	2,529,920	157,697
Sulphuric acid.....	58	8,493	82	9,938

EXPORTS—	1933		1934	
	Tons	\$	Tons	\$
	Sulphur contained in pyrites.....	15,347	121,280	9,821
Sulphuric acid.....	1,013	17,552	953	13,272

\* Includes 26,089 tons shipped for fluxing only.

† Includes iron pyrites concentrates made from copper ores.

(a) Sulphur content of pyrites used for acid manufacture only.

**Table 316.—Sulphur (x) Used in Canadian Chemicals and Allied Products and Wood Paper-Pulp Industries, 1931-1934**

—	Chemicals and allied products		Wood paper-pulp	
	Pounds	Value	Tons	Value
		\$		\$
1931.....	32,823,534	371,413	129,402	3,118,471
1932.....	21,207,500	228,805	105,521	2,495,137
1933.....	26,703,964	300,564	121,400	2,828,686
1934.....	37,439,226	405,428	127,541	2,932,928

(x) Does not include use of sulphur recovered from smelter gases.



Table 317.—World Production of Pyrites\* (including Cupreous Pyrites)

(Supplied by Imperial Institute)

(Long tons)

Producing country	1932	1933	1934	Estimated sulphur content		
				1932	1933	1934
BRITISH EMPIRE						
United Kingdom.....	992	1,132	2,145	(a)	(a)	(a)
Southern Rhodesia.....	268	10,905	11,528	100	4,400	4,600
Union of South Africa.....	3,382	3,606	15,518	1,500	1,600	6,900
Canada (c).....	46,464	52,325	(a)	23,175	25,159	(a)
Cyprus.....	161,172	211,494	199,472	80,586	105,807	99,736
Australia.....	274	1,498	12,030	(a)	(a)	(a)
Total.....	213,000	281,000	(a)			
FOREIGN COUNTRIES						
Bulgaria.....			20			9
Czechoslovakia.....	15,393	15,182	17,637	6,465	6,377	7,408
Finland (e).....	35,668	37,201	70,043	16,407	17,112	32,220
France.....	187,707	165,762	152,663	85,675	74,700	68,000
Germany.....	172,449	186,652	226,513	74,154	80,287	97,500
Greece.....	85,397	181,529	(a)	41,502	88,331	(a)
Italy.....	508,796	721,129	799,565	233,944	330,421	366,000
Norway.....	715,538	850,921	945,722	313,951	376,692	418,009
Poland.....		61	(a)		(a)	(a)
Portugal.....	234,116	207,333	215,937	110,000	100,000	100,000
Roumania.....	5,543	13,800	3,939	2,300	6,364	1,700
Spain.....	2,091,701	2,183,866	(a)	1,200,000	1,300,000	(a)
Sweden.....	70,404	84,932	98,984	27,521	32,960	39,461
Yugoslavia.....	15,470	17,489	22,177	6,400	7,300	10,000
U.S.S.R. (Russia).....	(a)	372,200	375,900	(a)	(a)	(a)
Algeria.....	20,825	15,872	13,425	9,576	7,364	8,200
United States (h).....	189,703	284,311	432,524	66,432	107,778	167,645
Japan.....	714,606	888,865	1,040,565	290,000	(a)	(a)
Korea.....	7,017	14,289	39,392	(a)	(a)	(a)
"Munchoukwo".....	3,563	(a)	(a)	1,300	(a)	(a)
Total.....	(d) 5,100,000	6,290,000	(a)			
World's total.....	(d) 5,300,000	6,500,000	(a)			

\* See also Sulphur (page 369).

(a) Information not available.

(b) Includes by-product pyrite from zinc operations in Wisconsin and New York, and pyrite and pyrrhotite concentrates from copper operations in Tennessee.

(c) Includes pyrite ore, also concentrates made from copper ores.

(d) Excluding U.S.S.R. (Russia).

(e) Pyrite concentrate only.

## SULPHURIC ACID

Production of sulphuric acid in Canada during 1934 at 205,325 short tons was the highest reported for any year and exceeded the 148,142 tons of 1933 by 38.6 per cent and the 136,846 tons of 1932 by 50 per cent. The improvement over other years was accounted for by an increased output at Trail, B.C., for use in making fertilizers and at Copper Cliff in Ontario where nitre cake is made for use in the nickel smelter at that point.

Sales of sulphuric acid by the producers during 1934 totalled 80,329 tons worth \$1,082,498 and stocks on hand on December 31 amounted to 15,488 tons. The remainder of the output was used in the producers' own works.

An estimate of the Canadian consumption of sulphuric acid may be made by adding the production of 205,325 tons to the imports of 32 tons and deducting the exports of 953 tons. This calculation shows that the apparent consumption in 1934 totalled 204,404 tons.

**Table 318.—Production, Imports, Exports and Apparent Consumption of Sulphuric Acid in Canada, 1923-1934**

(Short tons)

Years	Pro- duction	Imports	Exports	Apparent con- sumption(x)
1923.....	87,150	291	12,203	75,238
1924.....	71,091	47	7,678	64,360
1925.....	83,396	51	19,179	64,268
1926.....	108,229	53	28,136	80,146
1927.....	98,470	53	17,407	81,116
1928.....	96,227	54	13,329	82,952
1929.....	110,748	111	8,397	102,462
1930.....	107,352	150	571	106,931
1931.....	119,540	80	996	118,624
1932.....	136,846	62	721	136,187
1933.....	148,142	58	1,013	147,187
1934.....	205,325	82	953	204,454

(x) No allowance made for changes in stocks on hand.

**SILICA BRICK**

Production of silica brick in Canada during 1934 totalled 2,528 thousand valued at \$85,945 as compared with 636 thousand worth \$23,185 in 1933. The output in 1934 as for 1933 came from the plants of the Dominion Steel and Coal Corporation, Sydney, Nova Scotia, and the Algoma Steel Corporation, Sault Ste. Marie, Ontario. The brick manufactured by both of these companies are processed from crushed silica rock and are utilized as a refractory in furnace construction.

Imports of silica brick containing not less than 90 per cent silica were evaluated at \$210,190 in 1934 as compared with \$147,901 in 1933.

**Table 319.—Production of Silica Brick in Canada, 1925-1934**

Year	M	Value	Year	M	Value
		\$			\$
1925.....	Not a	available	1930.....	2,418	97,379
1926.....	2,665	130,702	1931.....	900	35,746
1927.....	1,791	79,527	1932.....	93	4,304
1928.....	3,224	155,502	1933.....	636	23,185
1929.....	3,951	173,581	1934.....	2,528	85,945

**SODIUM CARBONATE (NATURAL)**

Sales in 1934 of natural sodium carbonate produced from Canadian deposits totalled 244 tons valued at \$1,920 as compared with 559 tons worth \$5,773 in 1933. The 1934 shipments were made from the property of the B. C. Sodium Syndicate located on a small lake near Cherry Creek in the Kamloops mining division of British Columbia. The British Columbia Department of Mines reported that experimental work on this product and also on a sodium-sulphate deposit in an adjoining lake was continued in 1934 and considerable interest has been attracted to the possibilities of erecting a soda ash and sulphate plant at this point. Equipment is being enlarged and an increase in production was expected in 1935.

Imports of soda ash or barilla into Canada in 1934 totalled 2,311,498 pounds valued at \$32,258 as compared with 1,616,483 pounds worth \$23,256 in 1933. Bicarbonate of soda imports in 1934 amounted to 11,918,011 pounds valued at \$205,058.

Sodium carbonate, or soda ash, has many industrial uses, being employed in the manufacture of glass, soap, and in the purification of oils, etc.

Table 320.—Production\* of Sodium Carbonate (Natural) in Canada, 1925-1934

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	1,120	8,140	1930.....	364	4,550
1926.....	595	5,370	1931.....	712	7,351
1927.....	805	9,995	1932.....	495	5,450
1928.....	519	4,922	1933.....	559	5,773
1929.....	600	8,100	1934.....	244	1,920

\* Output confined to British Columbia.

Table 321.—Consumption of Soda Ash in the Canadian Chemicals and Allied Products Industries and Manufactures\* of Non-Metallic Minerals, 1931-1934

Year	Chemical industry		Manufactures of Non-metallic minerals	
	Pounds	Value	Pounds	Value
		\$		\$
1931.....	12,439,458	201,654	47,763,713	694,806
1932.....	11,421,879	193,422	43,545,840	698,884
1933.....	12,221,928	191,639	38,336,000	505,152
1934.....	21,879,170	327,214	49,260,000	644,655

\* Includes coke and gas, glass and petroleum refining.

## SODIUM SULPHATE

### (Glauber's Salt and Salt Cake)

Natural sodium sulphate occurs in deposits of considerable magnitude in Western Canada. In 1934, as for some years past, the entire Canadian production came from the province of Saskatchewan. The output in 1934 totalled 66,821 tons valued at \$587,986 as compared with 50,080 tons worth \$485,416 in 1933 and the quantity and value of the 1934 production represent all time high records for this particular industry.

Sodium sulphate finds its principal use in the pulp and paper industry for the manufacture of "kraft paper" by the sulphate process, in the manufacture of glass, in the dyes industry, in the smelting of nickel-copper ores, and as one of the raw materials in the manufacture of sodium carbonate.

A recent report by the Department of Mines, Ottawa, states that: "There are several new developments in Western Canada in the sodium sulphate industry, a company is erecting a dehydrating plant near Oban, Saskatchewan, and plans to use material obtained from Whiteshore Lake; at the central part of Whiteshore lake another company has erected a 50-ton dehydrating plant using a direct rotary drier and Alberta interests have taken up leases on Muskiki lake, 60 miles west of Saskatoon, Saskatchewan, they propose using a modification of the solution and crystallization process. . . . The investigation of Western Canada sodium sulphate deposits was started by the Mines Branch in 1921 and over 120,000,000 tons of hydrous salts were proven up in the few deposits examined in detail."

Imports of sulphate of soda (salt cake) into Canada during 1934 totalled 21,154,815 pounds valued at \$123,980 as compared with 5,191,036 pounds worth \$34,371 in 1933. Imports of Glauber's salts in 1934 totalled 1,266,665 pounds valued at \$8,853.

Table 322.—Production of Natural Sodium Sulphate in Canada\* 1925-1934

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1925.....	3,876	19,380	1930.....	31,571	293,847
1926.....	6,775	13,550	1931.....	44,957	421,097
1927.....	5,659	11,319	1932.....	22,466	271,736
1928.....	8,016	68,804	1933.....	50,080	485,416
1929.....	5,018	64,112	1934.....	66,821	587,986

\* Produced entirely in Saskatchewan.

Table 323.—Salt Cake Used in the Manufacture of Canadian Wood Paper-Pulp and in the Acids, Alkalies and Salts Industry, 1931-1934

Year	Acids, alkalies and salts industry		Wood paper-pulp	
	Tons	Value	Tons	Value
		\$		\$
1931.....	15,602	221,748	24,758	503,560
1932.....	94	1,811	24,301	489,343
1933*.....	9,968	146,201	29,563	580,251
1934.....	26,075	368,576	34,559	655,905

\* Includes 39 tons valued at \$4,879 used in medicinal and pharmaceutical preparations. In addition to the consumption listed above, there is a relatively large quantity of natural sodium sulphate employed in the manufacture of nitre cake for use in the nickel-copper mining and smelting industry.



## CHAPTER NINE

## CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS

Including Cement, Clay and Clay Products (Brick, Drain, Tile, Kaolin, Sewer Pipe, Structural Tile, Stoneware and Pottery made from Domestic Clays, Fireclay, Firebrick, Fireclay Blocks and Shapes, Imported-Clay Products), Lime, Sand and Gravel, Sand-Lime Brick, Slate and Stone.

Increases in Canadian population, national development and general industry during the years immediately preceding the commencement of the world economic crisis in 1929 were distinctly reflected by expansion in production of clay products and other structural materials. Economic factors, international in scope, and restrictive in nature, as largely existing since 1929 have unfortunately resulted in almost continuous recessions in the outputs of these particular materials. During the twenty-two years from 1907 to 1929 the valuation of these commodities increased from \$12,863,049 to \$58,534,834. In 1930 the value had fallen to \$53,727,465, later declining to \$16,696,687 in 1933. Evidence of recovery in the building trades and construction since 1933 is apparent in an increase in the value of production of structural materials to \$19,286,761 in 1934.

Contracts awarded for building in Canada in 1912 as reported by MacLean Building Review were valued at \$463,083,000. In 1913 contracts awarded totalled \$384,157,000 which was followed in the succeeding year by a decrease to \$241,952,000. During the war years (1915-1918) construction was largely neglected and the value remained below the one hundred million dollar mark. A revival of building was experienced during the immediate post war period, the value of contracts awarded rising to an all-time high record of \$576,651,800 in 1929. During the years of the recent economic depression the value declined to \$97,289,800 in 1933 and it is encouraging to note the distinct improvement in construction activities as indicated in an increase to \$125,811,500 in the value of construction contracts awarded in 1934. These figures, when compared with data relating to production of non-metallic minerals, emphasize the intimate relationship existing between the construction and structural materials industries.

Table 324.—Value of Construction Contracts in Canada, 1932-1934

(Supplied by *Engineering and Contract Record*—Toronto)

	1932	1933	1934
	\$	\$	\$
Maritimes.....	9,339,500	7,218,700	9,968,600
Central Canada.....	101,817,100	75,112,600	97,493,800
Total Eastern Canada.....	111,156,600	82,331,300	107,462,400
Prairies.....	13,156,900	5,739,100	8,957,600
British Columbia.....	8,658,900	9,219,400	9,391,500
Total Western Canada.....	21,715,800	14,958,500	18,349,100
Total Canada.....	132,872,400	97,289,800	125,811,500

Table 325.—Value of Clay Products and Other Structural Materials Produced in Canada, by Provinces, 1931-1934

Province	1931	1932	1933	1934
	\$	\$	\$	\$
Nova Scotia.....	970,933	432,075	378,320	511,028
New Brunswick.....	630,542	779,492	644,570	669,726
Quebec.....	18,104,022	8,062,951	5,747,715	6,115,682
Ontario.....	15,225,817	8,827,968	7,340,086	8,988,681
Manitoba.....	2,534,749	1,259,733	667,012	761,742
Saskatchewan.....	562,964	176,681	111,938	280,030
Alberta.....	2,185,834	1,039,093	654,334	843,629
British Columbia.....	3,943,429	1,820,290	1,152,712	1,136,245
Canada.....	44,158,295	22,398,283	16,696,687	19,286,761

Table 326.—Production, Imports, Exports, and Apparent Consumption of Clay Products and Other Structural Materials in Canada, 1932-1934

Item		Production	Imports	Exports	Apparent consumption
		\$	\$	\$	\$
Cement, Portland.....	1932	6,930,721	164,975	38,921	6,956,775
	1933	4,536,935	142,739	47,369	4,532,305
	1934	5,667,946	149,715	55,181	5,662,480
Clay and clay products.....	1932	3,650,218	5,405,750	196,494	8,859,474
	1933	2,262,835	4,961,265	141,552	7,082,548
	1934	2,680,410	5,935,805	186,359	8,429,856
Lime.....	1932	2,394,537	6,241	198,329	2,212,449
	1933	2,432,306	4,444	192,029	2,244,721
	1934	2,745,797	5,118	151,983	2,598,932
*Sand and gravel.....	1932	4,480,596	211,546	33,620	4,658,522
	1933	4,464,285	232,611	15,801	4,681,095
	1934	4,035,477	283,088	17,079	4,301,486
Slate.....	1932	3,750	(a) 57,931	.....	61,681
	1933	3,750	(a) 30,567	.....	34,317
	1934	4,802	(a) 40,966	.....	45,768
Stone.....	1932	4,938,461	328,521	124,807	5,142,175
	1933	2,996,576	243,930	91,340	3,149,166
	1934	4,152,329	447,658	104,969	4,495,018
<b>Total.....</b>	<b>1932</b>	<b>22,398,283</b>	<b>6,074,964</b>	<b>582,171</b>	<b>27,891,076</b>
	<b>1933</b>	<b>16,696,687</b>	<b>5,515,556</b>	<b>488,091</b>	<b>21,724,152</b>
	<b>1934</b>	<b>19,286,761</b>	<b>6,762,350</b>	<b>515,571</b>	<b>25,533,540</b>

\* Sand and gravel imports include silica sand for glass and carborundum manufacture and for use in steel plants. This silica sand was valued at \$162,869 in 1932, \$160,131 in 1933 and \$226,188 in 1934.

† Includes cement manufactures.

(a) Includes slate manufactures.

## CEMENT

Shipments from Canadian cement plants during 1934 totalled 3,783,226 barrels valued at \$5,667,946 as compared with 3,007,432 barrels worth \$4,536,935 in 1933, the value of the 1934 sales representing an increase of 24.9 per cent over those of the preceding year.

Cement was produced in 1934 at plants located in Quebec, Ontario, Manitoba, Alberta and British Columbia and increases in both quantity and value of cement sales over 1933 were recorded in all of these provinces. The cement mills of Quebec and Ontario are now contributing by far the greater part of Canada's cement production.

The increase in output in 1934 was reflected in the pronounced improvement experienced in employment throughout the cement industry; for the year under review a total of 860 persons were employed and the industry distributed \$1,009,686 in salaries and wages. These figures represent increases of 16.2 per cent in employees and 29.2 per cent in salaries and wages as compared with 1933. Limestone consumed in 1934 amounted to 806,546 tons, an increase of 30.9 per cent over the preceding year. Coal used by the industry totalled 69,853 tons of Canadian and 60,877 tons of foreign as against 48,905 tons of Canadian and 46,955 tons of foreign in 1933.

Both wet and dry processes were employed and 41 rotary kilns, with a total daily capacity of 43,722 tons, were utilized. Selling prices, f.o.b. works, in 1934 were \$2.36 high and \$1.25 low as compared with a high and low of \$2.55 and \$1.25 respectively in 1933.

Exports of cement in 1934 totalled 70,046 barrels valued at \$55,181 as compared with 52,531 barrels worth \$47,369 in 1933. Overseas shipments of Canadian cement in 1934 went to various countries, including British Guiana, Trinidad, Newfoundland, and Australia.

"A feature about concrete construction is that, for the most part, concrete is manufactured at the site of the work, although in recent years there has been a noted tendency toward the use of pre-mixed or transit-mixed concrete which requires no job mixing but simply placing in the forms. In either case the material is a fully Canadian commodity in which there is no foreign element, either of labour or material. Even the formwork is Canadian, making use of Canadian lumber set up in place by local workmen. Many large and important buildings, bridges, and

other structures and many miles of roads in Canada have been built of concrete in recent years. So well established, indeed, has concrete become that there is never any question of its stability, strength and longevity. Canadian engineers have kept to the forefront in the assimilation and application of the knowledge that research and practical application are making known about concrete (and cement), and Canadian contractors have shown initiative and enterprise in the handling of concrete under all sorts of conditions, including severe winter weather. Concrete has thus become definitely fixed as a Canadian structural material through the co-operative efforts of cement manufacturers, aggregate producers, steel reinforcing manufacturers, lumber manufacturers, engineers and contractors.

"Last year, for the first time, cement bound macadam roads became a factor in the road construction programme of Canada, and although the mileage built was small, there is evidence that the interest in the cement bound macadam type of pavement will greatly increase. It has many merits that make it highly suitable for low-cost highways and is now being adopted in the United States by a rapidly increasing number of road authorities."<sup>(1)</sup>

It was announced by the British Technical Press in June, 1935, that negotiations for the projected formation of a central propaganda organization for the cement industry were nearing completion. It was understood that an annual subscription related to output will be paid into a common fund by all members adhering to the cement agreement. This agreement embraces practically all the cement manufacturers of Great Britain and Northern Ireland.

(1) Engineering and Contract Record—Toronto.

**Table 327.—Capital Employed in the Cement Industry in Canada, 1933 and 1934**

	1933	1934
	\$	\$
Capital employed as represented by:		
(a) Present value of land, buildings, plant, machinery and tools (estimated value if rented)...	49,207,078	48,113,855
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand .....	1,080,568	1,052,187
(c) Inventory value of finished products on hand .....	1,199,073	1,175,361
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.) .....	2,916,600	3,071,597
<b>Total .....</b>	<b>\$4,403,379</b>	<b>\$3,413,000</b>

**Table 328.—Employees, Salaries and Wages in the Cement Industry in Canada, 1933 and 1934**

Class	1933		1934	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
		\$		\$
SALARIED EMPLOYEES .....	85	160,680	84	161,118
WAGE-EARNERS .....	655	621,066	776	848,568
<b>Total .....</b>	<b>740</b>	<b>781,746</b>	<b>860</b>	<b>1,009,686</b>

**Table 329.—Wage-Earners on 15th of Each Month or Nearest Representative Date, 1933 and 1934**

Month	1933	1934
January .....	618	556
February .....	609	565
March .....	606	561
April .....	628	685
May .....	482	846
June .....	538	885
July .....	632	965
August .....	815	883
September .....	787	861
October .....	798	865
November .....	716	844
December .....	584	789

Table 330.—Production and Apparent Consumption of Cement in Canada, 1925-1934

Year	Sold or used		Apparent consumption
	Barrels	Value	Barrels
		\$	
1925.....	8,116,597	14,046,704	7,140,531
1926.....	8,707,021	13,013,283	8,442,203
1927.....	10,065,865	14,391,947	9,835,525
1928.....	11,023,928	16,739,163	10,790,650
1929.....	12,284,081	19,337,235	12,105,950
1930.....	11,032,538	17,713,067	10,977,238
1931.....	10,161,658	15,826,243	10,085,986
1932.....	4,498,721	6,930,721	4,466,738
1933.....	3,007,432	4,536,935	2,974,020
1934.....	3,783,226	5,667,946	3,727,521

Table 331.—Output, Sales, Imports, Exports and Consumption of Cement in Canada, 1932-1934

	1932		1933		1934	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
OUTPUT.....	4,643,675		2,410,518		3,484,233	
SOLD OR USED.....	4,498,721	6,930,721	3,007,432	4,536,935	3,783,226	5,667,946
STOCKS, DEC. 31.....	2,431,881		1,830,928		1,562,501	
IMPORTS—						
Portland cement.....	21,350	58,092	19,119	37,768	14,341	45,548
Manufactures.....		6,883		4,971		4,197
EXPORTS PORTLAND CEMENT.....	53,333	38,921	52,531	47,399	70,046	55,181
APPARENT CONSUMPTION.....	4,466,738		2,974,020		3,727,521	

1 barrel=350 pounds.

Table 332.—Producers Sales of Cement in Canada, by Provinces, 1932-1934

Province	1932		1933		1934	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
Quebec.....	2,210,584	3,155,702	1,517,555	2,128,900	1,613,641	2,294,847
Ontario.....	1,599,342	2,288,975	1,095,845	1,587,812	1,702,128	2,403,590
Manitoba.....	242,112	549,594	129,540	295,351	181,166	411,247
Alberta.....	193,571	399,922	149,206	299,530	163,946	326,253
British Columbia.....	253,112	536,528	115,286	225,342	122,345	232,009
<b>Canada.....</b>	<b>4,498,721</b>	<b>6,930,721</b>	<b>3,007,432</b>	<b>4,536,935</b>	<b>3,783,226</b>	<b>5,667,946</b>



Table 333.—Kilns Used by Canadian Cement Industry, 1930-1934

Year	Rotary	Vertical	Total daily capacity
	No.	No.	Barrels
1930.....	57		37,522
1931.....	43	1	42,422
1932.....	47		43,822
1933.....	41		43,622
1934.....	41		43,922

Table 334.—Limestone and Gypsum Used in Canadian Cement Plants, 1930-1934

Year	Limestone	Gypsum
	Tons	Tons
1930.....	2,925,399	74,227
1931.....	2,489,147	56,677
1932.....	1,141,376	27,538
1933.....	616,364	13,319
1934.....	806,546	19,172

### THE CEMENT PRODUCTS INDUSTRY

Owing to continued dullness in the building and construction trades during 1934 the production of cement products in Canada declined to \$1,042,258, the lowest value reported since the Bureau commenced to gather annual figures in 1919. Corresponding output figures for earlier years were: 1933—\$1,596,998; 1932—\$1,771,297; 1931—\$3,807,188; 1930—\$3,718,704; and 1929—\$4,419,417, the record for the industry.

Quite a number of factories were idle throughout 1934 and others operated for only a few days. Only 88 establishments were included in the compilations for 1934 as compared with 83 in 1933; 54 were in Ontario, 22 in Quebec, 6 in British Columbia, 2 in Saskatchewan, and 1 in each of Nova Scotia, New Brunswick, Manitoba, and Alberta. Works in Ontario accounted for 66 per cent of the total output and factories in Quebec accounted for 29 per cent.

Table 335.—Products Made, by Provinces, 1934

Products	Quebec	Ontario	British Columbia	Other provinces	Canada
	\$	\$	\$	\$	\$
Cement bricks.....	6,304	7,645			13,949
Hollow building blocks.....	50,737	179,814	125	1,225	231,901
Cement drain pipe, sewer pipe, water pipe and culvert tile	47,819	119,086	8,731	26,709	202,345
Artificial stone.....	53,007	32,314	1,190		86,511
Cement posts, poles, etc.....		6,610			6,610
Cement laundry tubs.....		17,115	4,070		21,185
Cinder blocks.....	4,175	72,509			76,684
Stucco.....	300	8,215	4,000	3,347	15,862
All other products.....	134,974	243,868	2,490	5,879	387,211
<b>Total</b> .....	<b>297,316</b>	<b>687,176</b>	<b>20,606</b>	<b>37,160</b>	<b>1,042,258</b>

## CLAY AND CLAY PRODUCTS

The Clay and Clay Products Industry in Canada is classified into two distinct divisions:— (1) production from domestic clays which includes the production of refractories, building brick, structural tile, floor tile, roofing tile, drain tile, sewer pipe, and pottery, and (2) production from imported clays which includes the manufacture of porcelain insulators, refractories, earthenware, pottery and ceramic floor and wall tile. There were 158 plants representing a total capital investment of \$27,208,242 operating in the domestic and imported clay products industries in Canada during 1934. These two industries provided employment for 2,285 persons during the year; their earnings totalled \$1,935,731 and the combined sales in 1934 totalled \$4,603,628 as compared with \$3,467,887 in 1933.

## 1. PRODUCTION FROM DOMESTIC CLAYS

The value of products made from domestic clay and sold in 1934 totalled \$2,680,410 as against a value of \$2,262,835 in 1933; the 1934 value represents an increase of 18.5 per cent over that for the preceding year and is consistent with an indicated uptrend in construction. Gains over 1933 were particularly pronounced for building brick and various structural tile, shipments of the former totalling 86,072 thousand evaluated at \$1,383,929 as compared with 67,700 thousand at \$1,124,517 in the preceding year and it is especially encouraging to note that increases in total sales of building brick were recorded for each of the various provinces within the Dominion.

Of the total value of the domestic clay products production in Canada, in 1934, Ontario produced 47 per cent; Quebec, 23.6 per cent; Alberta, 9.2 per cent; British Columbia, 7.3 per cent, and the other provinces, in the order of the value of sales, were Nova Scotia, Saskatchewan, New Brunswick and Manitoba.

"A recent Canadian development of considerable interest is the establishment of the fact that materials exist in Canada which will serve as bleaching clays. In the final stages of the production of oils, both mineral and vegetable, it is necessary to subject the oils to a bleaching process. This is accomplished by filtering the oil through earthy materials that have the power to remove the colouring matter present. In previous years it has been necessary for the Canadian oil refining industry to import bleaching materials. . . . Some years ago the Chemistry Division of the Mines Branch, Department of Mines, Ottawa, carried on considerable work to determine the bleaching power of a variety of Canadian clays and bentonites. During the course of the investigation it was found that an acid treatment of some of the materials under investigation produced a marked increase in their bleaching power. More recently the National Research Council of Canada, and the Department of Ceramics of the University of Saskatchewan, launched upon an intensive investigation into the possibilities of Canadian materials for bleaching purposes. This work has now progressed to a point where it may confidently be stated that from sources in Canada materials may be supplied that are equal, if not superior, to the best imported materials for the bleaching of both mineral and vegetable oils. The sources of the best materials now known are in the Western Provinces. . . ." (Abstract from "Outstanding Developments in Ceramics in 1934."—Journal of Canadian Ceramics Society, 1935).

"It is hardly necessary to point out that, since clay is cheaper than oil or fat, the use of colloidal clay in soap-making is a definite economy and at the same time improves the quality of the soap. It may therefore safely claim to be regarded more as a genuine constituent than as a mere filler, still less as an adulterant under which stigma it was placed by Watt in the old days. The colloidal clay of to-day, as prepared by the best methods, is quite a different material and is not only finding increased application in toilet and other soaps, but also cosmetics and toilet preparations generally. . . ."—(The Chemical Age, London).

"Deposits of high-grade, white-burning clays occur on Mattagami, Abitibi and Missinaibi rivers in North ern Ontario. Some of these clays may be classed as ball clays and others as china clays. Ball clays of high bond strength occur in extensive deposits in Southern Saskatchewan, about 60 miles south of Moose Jaw. . . . There is a large steady demand for various grades of china clay in Canada, for use in the manufacture of paper and rubber as well as in the ceramic industry. Ball clays are used in the ceramic industry as a bonding clay in the manufacture of porcelain and similar compounded bodies. The only place where china clay has been produced commercially in Canada is near St. Remi d'Amherst, Quebec." (Abstracted from Report No. 760—Mines Branch, Department of Mines, Ottawa).

For a classification and the uses of clays consult the annual report on the mineral production of Canada for the year 1932.

In this section all tables show data for the domestic clay products industry only.

**Table 336.—Capital Employed in the Clay Products Industry in Canada, by Provinces, 1933 and 1934**

Industry and province	1933 Capital employed as represented by					1934 Capital employed as represented by				
	Present value of land, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total	Present value of land, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total
By INDUSTRIES—	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
*Brick and Tile—										
N. Scotia..	590,908	80,894	102,033	5,937	779,772	592,764	69,147	99,213	12,925	774,050
N. Bruns.	171,039	5,560	20,453	11,706	209,718	178,785	3,164	24,162	17,870	223,981
Quebec....	6,164,804	103,073	398,249	350,066	7,025,232	6,272,812	49,965	449,898	283,793	7,056,468
Ontario....	9,337,816	175,074	911,828	1,437,224	11,861,942	9,323,026	138,660	861,885	1,158,644	11,483,115
Manitoba..	123,301	1,756	37,230	44,406	206,693	123,301	947	23,625	42,256	190,129
S. chewan..	858,138	5,887	59,036	59,760	982,821	858,138	1,503	28,872	59,989	918,502
Alberta....	1,372,599	29,094	183,233	181,432	1,766,358	1,349,624	38,700	161,669	170,291	1,720,284
British C..	674,530	10,914	159,708	82,469	927,621	666,862	10,013	142,631	53,884	873,390
Total for Canada..	19,294,095	412,252	1,871,770	2,182,060	23,760,177	18,729,522	312,159	1,791,955	1,799,649	22,633,285
Stoneware and pottery—										
Total for Canada..	296,819	26,576	70,374	57,934	451,703	249,117	35,420	64,019	64,906	413,522
By PROVINCES—										
Total for clay products—										
N. Scotia..	590,908	80,894	102,033	5,937	779,772	592,764	69,147	99,213	12,926	774,050
N. Bruns.	181,805	7,883	27,406	21,193	238,287	188,574	5,507	29,761	31,857	255,199
Quebec....	6,164,804	103,073	398,249	350,066	7,025,232	6,272,812	49,965	449,898	283,793	7,056,468
Ontario....	9,338,816	176,024	921,928	1,466,174	11,902,942	9,378,186	145,560	872,225	1,193,309	11,599,290
Manitoba..	123,301	1,756	37,230	44,406	206,693	123,301	947	23,625	42,256	190,129
S. chewan..	858,138	5,887	59,036	59,760	982,821	858,138	1,503	28,872	59,989	918,502
Alberta....	1,602,352	52,097	233,917	200,116	2,088,482	1,528,492	64,577	206,697	186,105	1,985,871
British C..	680,730	11,214	162,345	83,342	937,631	673,062	10,313	145,683	54,884	883,942
Canada..	19,590,914	438,828	1,942,144	2,239,994	24,211,880	18,978,639	347,579	1,855,974	1,864,615	23,016,807

\* Clay, sewer pipe, firebrick, firebrick products and other clays included under Brick and Tile.

**Table 337.—Employees, Salaries and Wages in the Clay Products Industry in Canada, by Provinces, 1933 and 1934**

Province	*Average number of employees			Salaries and wages		
	Salaries employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
1933						
Nova Scotia..	8	68	76	17,569	29,967	47,536
New Brunswick..	9	23	32	11,036	12,536	23,572
Quebec....	52	237	289	93,712	151,123	244,835
Ontario....	118	508	626	221,295	299,837	521,132
Manitoba..	5	5	10	9,900	1,611	11,511
Saskatchewan..	9	22	31	17,447	13,588	31,035
Alberta....	20	105	125	40,846	90,599	131,445
British Columbia..	18	105	123	29,161	61,666	90,827
Canada..	239	1,073	1,312	440,968	660,927	1,101,893
1934						
Nova Scotia..	9	83	92	18,714	49,280	67,994
New Brunswick..	8	45	53	9,402	23,644	33,046
Quebec....	47	305	352	93,235	193,701	286,936
Ontario....	102	629	731	177,561	410,187	587,748
Manitoba..	5	2	7	9,800	177	9,977
Saskatchewan..	8	26	34	15,324	19,497	34,821
Alberta....	20	147	167	41,536	100,587	142,123
British Columbia..	16	120	136	24,150	76,182	100,332
Canada..	215	1,357	1,572	389,722	879,255	1,268,977

\* See note page 26.







Table 341.—Production of Building Brick in Canada, by Provinces, 1932-1934

		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
1932									
Soft mud process	Face.....	M 160		300	5,716				12
		\$ 2,008		3,000	103,390				184
	Common.....	M 540	1,269	18	6,525	1,337	660	697	1,755
Stiff mud process (wire cut)	Face.....	\$ 6,780	18,180	912	98,828	18,166	6,929	8,345	24,232
		M 347	487	13,180	15,315	320	115	277	156
	Common.....	\$ 6,754	13,628	300,649	323,077	7,472	3,127	6,386	3,663
Dry press	Face.....	M 2,229	520	28,063	7,816	416	220	989	500
		\$ 31,206	7,949	448,470	122,905	6,861	2,256	11,648	7,627
	Common.....	M		319	4,667		6	310	220
Fancy or ornamental brick	Face.....	\$		9,563	97,897		138	3,876	8,073
		M			1,522			2,726	
	Common.....	\$			24,070			22,692	
Sewer brick	Face.....	M		89	36				
		\$		4,447	1,790				
	Common.....	M			638				5
Total	Face.....	\$			12,071				85
		M							
	Common.....	\$							
1933									
Soft mud process	Face.....	M 60			2,292		11		119
		\$ 900			38,360		333		2,144
	Common.....	M 480	678	1,241	6,796	1,091	23		2,080
Stiff mud process (wire cut)	Face.....	\$ 5,680	9,992	9,862	87,644	16,035	369		27,187
		M 422	118	7,234	11,660	70	17	64	17
	Common.....	\$ 10,233	3,676	153,990	240,738	1,653	624	1,078	345
Dry press	Face.....	M 1,671	411	17,483	3,191		62	711	365
		\$ 20,046	6,972	270,483	46,337		641	6,542	5,477
	Common.....	M		601	3,392		8	476	157
Fancy or ornamental brick	Face.....	\$		18,166	72,194		185	4,557	6,150
		M			1,834			2,082	
	Common.....	\$			29,357			15,020	
Sewer brick	Face.....	M			6			624	
		\$			387			7,437	
	Common.....	M			242				1
Total	Face.....	\$			3,683				10
		M							
	Common.....	\$							
1934									
Soft mud process	Face.....	M 40		1,000	3,514	350			
		\$ 600		7,000	64,642	4,005			
	Common.....	M 500	1,500	1,580	7,193	1,634	20	763	1,066
Stiff mud process (wire cut)	Face.....	\$ 5,000	19,399	13,349	96,776	25,334	323	9,178	14,224
		M 545	267	7,637	15,060	160	12	87	32
	Common.....	\$ 11,863	6,846	157,078	311,490	4,224	382	1,601	857
Dry press	Face.....	M 2,695	141	18,404	6,876		173	829	1,199
		\$ 32,924	2,239	267,622	97,323		1,936	6,189	15,898
	Common.....	M		610	4,836		47	374	138
Fancy or ornamental brick	Face.....	\$		15,951	103,718		1,290	3,857	5,576
		M			2,046		13	3,828	553
	Common.....	\$			33,177		243	26,937	6,259
Sewer brick	Face.....	M			14			1,700	
		\$			835				
	Common.....	M			307				
Total	Face.....	\$			5,992				
		M							
	Common.....	\$							

Table 342.—Production of Building Brick in Canada, 1925-1934

		Soft mud process		Stiff mud process (wire cut)		Dry press		Fancy or orna- mental brick	Sewer brick	Total
		Face	Common	Face	Common	Face	Common			
1925	M	27,701	51,214	93,903	116,105	37,201	22,053	524	2,485	351,186
	\$	521,739	753,970	1,883,856	1,635,257	800,504	270,135	26,320	52,382	5,941,163
1926	M	28,285	78,158	101,028	94,046	30,423	19,450	462	6,546	338,318
	\$	556,573	1,145,490	2,146,362	1,624,055	651,236	260,598	24,057	117,194	6,325,565
1927	M	16,196	70,554	95,480	150,222	39,753	14,617	620	10,997	6,325,565
	\$	325,966	1,091,274	2,024,064	2,239,180	833,570	187,062	29,372	210,643	6,941,131
1928	M	17,532	93,280	101,717	144,404	36,587	24,294	599	2,888	421,301
	\$	349,847	1,328,981	2,247,472	2,182,307	748,301	337,096	28,763	59,010	7,284,777
1929	M	26,624	77,390	114,093	179,840	38,591	26,131	187	4,765	438,630
	\$	538,096	1,195,511	2,469,417	2,509,451	813,461	368,039	12,795	96,585	8,003,355
1930	M	11,350	56,487	99,284	105,225	29,434	16,915	339	804	319,833
	\$	247,220	861,805	2,135,871	1,480,965	604,197	208,495	27,649	15,239	5,381,501
1931	M	5,476	41,177	77,135	81,930	20,149	8,688	335	2,353	237,143
	\$	116,316	619,357	1,752,947	1,205,464	423,357	107,213	20,773	43,692	4,288,119
1932	M	6,188	12,801	30,197	40,753	5,522	4,248	125	643	100,177
	\$	108,582	182,372	604,756	638,922	119,547	46,762	6,237	12,156	1,779,334
1933	M	2,482	12,389	19,602	23,894	4,544	3,916	630	243	67,700
	\$	41,737	156,769	412,367	356,498	101,252	44,377	7,824	3,693	1,124,517
1934	M	4,904	14,256	23,800	30,317	6,005	6,440	43	307	86,072
	\$	76,247	183,585	494,341	424,131	130,392	66,616	2,625	5,992	1,383,929

Table 343.—Production of Paving Brick in Canada, 1923-1934

(For years 1897 to 1922 see previous reports)

Year	Quantity	Value
	M	\$
1923-1925		
1926	122	5,015
1927	50	2,106
1928	338	4,464
1929	97	3,844
1930	9	297
1931	19	682
1932	6	155
1933	1	42
1934	10	382

Table 344.—Production of Structural Tile in Canada, by Provinces, 1932-1934

Province	Hollow blocks (including fireproofing and load-bearing tile)		Roofing tile		Floor tile (quarries)	
	Tons	Value	No.	Value	Sq. ft.	Value
1932		\$		\$		\$
Nova Scotia	3,162	30,208				
New Brunswick	134	1,120				
Quebec	20,170	193,335				
Ontario	18,941	144,471	48,939	3,900	94,316	21,502
Manitoba	1,167	11,965				
Saskatchewan	1,322	11,781				
Alberta	2,106	17,055				
British Columbia	1,116	11,737				
Canada	48,118	421,672	48,939	3,900	94,316	21,502
1933						
Nova Scotia	1,759	17,590				
New Brunswick	65	631				
Quebec	7,676	66,197				
Ontario	8,196	60,438	20,469	1,136	81,808	12,490
Manitoba	44	532				
Saskatchewan	201	2,210				
Alberta	628	5,637			9,687	1,807
British Columbia	8,178	6,824				
Canada	26,747	160,059	20,469	1,136	91,495	14,297
1934						
Nova Scotia	1,068	10,955				
New Brunswick	151	1,276				
Quebec	13,668	107,675				
Ontario	13,576	102,243	44,115	1,852	77,604	16,886
Manitoba	158	1,941				
Saskatchewan	4	45				
Alberta	1,436	10,438			2,752	605
British Columbia	1,075	9,549				
Canada	31,136	244,122	44,115	1,852	80,356	17,491

Table 345.—Production of Sewer Pipe, Copings, Flue Linings, etc., in Canada, 1925-1934

(For the years 1888 to 1924 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	73,791	1,440,269	1930.....		1,721,815
1926.....	75,996	1,480,776	1931.....		1,508,803
1927.....	77,262	1,475,875	1932.....		813,224
1928.....		1,723,644	1933.....		354,458
1929.....		2,005,887	1934.....		436,433

Table 346.—Production of Drain Tile in Canada, 1925-1934

(For the years 1891 to 1924 see Mineral Production of Canada, 1928)

Year	Quantity	Value	Year	Quantity	Value
	M	\$		M	\$
1925.....	14,552	401,503	1930.....	25,291	687,070
1926.....	14,258	396,018	1931.....	12,518	328,410
1927.....	22,259	598,098	1932.....	7,385	186,670
1928.....	22,629	656,054	1933.....	10,057	222,829
1929.....	25,000	720,316	1934.....	7,325	180,553

Table 347.—Production of Drain Tile and Sewer Pipe, in Canada, by Provinces, 1933 and 1934

Province	1933				1934			
	Drain tile		†Sewer pipe		Drain tile		†Sewer pipe	
	M	\$	Tons	\$	M	\$	Tons	\$
Nova Scotia.....	107	3,237		67,519	96	3,179		91,724
New Brunswick.....	1	64			3	142		
Quebec.....	533	15,420		45,890	540	14,191		48,952
Ontario.....	8,746	179,015		185,048	6,017	137,699		226,005
Manitoba.....	46	2,716			41	2,412		
Saskatchewan.....	22	1,249		35,793	48	2,144		47,763
Alberta.....	603	21,128		20,208	580	20,786		21,989
British Columbia.....								
<b>Canada.....</b>	<b>10,057</b>	<b>222,829</b>		<b>354,458</b>	<b>7,325</b>	<b>180,553</b>		<b>436,433</b>

† Includes copings, flue linings, etc.

Table 348.—Production of Pottery from Domestic Clays in Canada, 1925-1934

(For the years 1886 to 1924 see Mineral Production of Canada, 1928)

Year	Value	Year	Value
	\$		\$
1925.....	267,255	1930.....	294,866
1926.....	320,135	1931.....	257,125
1927.....	307,057	1932.....	244,861
1928.....	350,093	1933.....	202,500
1929.....	323,194	1934.....	223,733

Table 349.—Production of Kaolin and Fireclay in Canada, 1925-1934

Year	Kaolin		Fireclay		Year	Kaolin		Fireclay	
	Quantity	Value	Quantity	Value		Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$		Tons	\$	Tons	\$
1925.....			623	6,544	1930.....			2,870	25,975
1926.....			2,513	23,258	1931.....			1,233	14,857
1927.....	24	120	5,070	35,961	1932.....			990	11,826
1928.....	5	25	5,123	35,284	1933.....			1,421	11,273
1929.....			5,041	35,226	1934.....	48	504	1,043	12,598

Table 350.—Production of Firebrick and Fireclay Blocks and Shapes in Canada, from Domestic Clays, 1925-1934

(For the years 1907 to 1924 see Mineral Production of Canada, 1928)

Year	Firebrick		Fireclay blocks and shapes	Year	Firebrick		Fireclay blocks and shapes
	Quantity	Value	Value		Quantity	Value	Value
	M	\$	\$		M	\$	\$
1925.....	6,197	305,332	36,567	1930.....	3,789	177,608	147,309
1926.....	4,195	192,276	54,064	1931.....	2,248	107,597	83,039
1927.....	5,388	246,266	100,659	1932.....	1,580	71,757	75,209
1928.....	4,910	234,460	105,091	1933.....	1,547	73,226	80,625
1929.....	5,196	251,043	130,411	1934.....	2,109	101,219	62,388

Table 351.—Production of Refractories, in Canada, from Domestic Clays, by Provinces, 1933 and 1934

Province	1933					1934				
	Fireclay		Firebrick		Fireclay blocks and shapes	Fireclay		Firebrick		Fireclay blocks and shapes
	Quantity	Value	Quantity	Value	Value	Quantity	Value	Quantity	Value	Value
	Tons	\$	M	\$	\$	Tons	\$	M	\$	\$
Nova Scotia.....	22	220			75	24	230			367
New Brunswick.....	4	157				15	601			
Ontario.....					90					
Saskatchewan.....	371	2,902	391	19,705	64,381	441	3,322	558	28,537	52,276
Alberta.....			12	596		50	708	13	882	
British Columbia.....	1,024	7,994	1,144	53,015	16,079	513	7,737	1,538	71,800	9,745
Canada.....	1,421	11,273	1,547	73,226	80,625	1,043	12,598	2,109	101,219	62,388

Table 352.—Fullers' Earth Used in Canada in the Manufacture of Soaps and Washing Compounds and in the Petroleum Products Industry, 1930-1934

Year	Petroleum products industry		Soaps and washing compounds	
	Pounds (x)	Value	Pounds	Value
		\$		\$
1930.....	20,102,387	241,793	Data not available	
1931.....	16,157,582	201,361	492,174	6,264
1932.....	19,642,179	258,934	507,807	7,444
1933.....	22,811,655	314,515	588,434	8,501
1934.....	18,588,514	239,357	508,316	6,562

(x) Includes all clay.



Table 353.—Clay Used in the Manufacture of Paper in Canada, 1930-1934

Year	Tons	Value
		\$
1930.....	13,024	218,423
1931.....	11,484	173,060
1932.....	14,432	205,008
1933.....	20,048	267,014
1934.....	27,550	357,286

In 1933 the Canadian rubber industry consumed 1,391 tons of clays and earths valued at \$32,361 and it is interesting to note that refractories, including brick, fireclay, etc., purchased in 1934 by operators engaged in the mining, smelting and refining in Canada of non-ferrous ores were evaluated at \$816,140.

Table 354.—Imports into Canada and Exports of Clay and Clay Products, 1933 and 1934

	1933		1934	
	Quantity	Value	Quantity	Value
		\$		\$
<b>IMPORTS—</b>				
Building brick..... ton	470	3,975	1,514	16,673
Building blocks..... xx		2,682		1,794
Clays—China..... cwt.	509,068	210,067	654,999	250,705
Fire..... cwt.	593,894	101,916	909,972	139,317
Pipe..... xx		1,222		77
Other clays, n.o.p..... xx		192,401		196,294
Zirconium silicate..... xx		687		2,029
Zirconium oxide..... xx		6,751		7,827
Drain tile, unglazed..... xx		231		251
Drain, sewer pipe and earthenware fittings therefor, chimney linings or vents, chimney tops or inverted blocks, glazed or unglazed..... xx		10,294		9,799
Tiles or blocks of earthenware or stone prepared for mosaic flooring..... xx		17,943		39,778
Tiles, earthenware, for roofing purposes..... xx		5,360		2,172
Tiles, earthenware, n.o.p..... xx		84,234		92,835
Insulators, electric, porcelain..... xx		55,960		62,510
Pottery and chinaware..... xx		2,858,562		3,064,124
Brick, fire, other, valued at not less than \$100 per M, rectangular shaped; the dimensions of each not to exceed 125 cubic inches for use exclusively in the construction or repair of a furnace, kiln, etc..... xx		68,725		86,039
Brick, fire, n.o.p., for use exclusively in the construction or repair of a furnace, kiln, or other equipment of a manufacturing establishment..... xx		370,952		667,471
Firebrick, n.o.p..... xx		34,489		47,517
Firebrick, chrome..... xx		38,431		39,184
Magnesite brick..... xx		246,855		396,604
Silica brick (containing not less than 90 per cent silica)..... xx		147,901		210,190
Paving brick..... ton	797	4,866	1,775	12,035
Artificial teeth, not mounted..... xx		285,274		276,594
Baths, bathtubs, basins, laundry tubs, etc., of earthenware, cement or clay, n.o.p..... xx		114,057		115,355
Ceramic insulator cores, not further manufactured than burned and glazed, printed or decorated or not, and without fittings, when imported by manufacturers of spark plugs for use exclusively in the manufacture of spark plugs, in their own factories (from December 2, 1933)..... xx		1,539		109,915
Crucibles, clay or sand..... xx		36,703		42,142
Other manufactures of clay..... xx		50,188		56,514
<b>Total..... xx</b>		<b>4,961,265</b>		<b>5,935,405</b>
<b>EXPORTS—</b>				
Building brick..... M	383	6,789	549	10,287
Clay—Unmanufactured..... cwt.	9,769	1,522	7,619	1,688
Manufactures..... xx		11,010		14,900
Earthenware..... xx		26,965		33,762
Porcelain insulators..... xx		95,200		125,742
<b>Total..... xx</b>		<b>141,552</b>		<b>186,359</b>

Table 355.—World's Production of China Clay, 1932-1934

(Taken from the Imperial Institute's publication "The Mineral Industry of the British Empire and Foreign Countries, 1932-1934")

(Long tons)

Producing country and description	1932	1933	1934
<b>BRITISH EMPIRE</b>			
United Kingdom.....	508,850	596,609	690,129
Union of South Africa.....			389
Canada.....			43
India.....	13,486	21,935	20,562
Unfederated Malay States.....	186	36	143
Australia.....	5,110	8,477	8,786
<b>FOREIGN COUNTRIES</b>			
Belgium (e).....	9,566	13,651	(a)
Bulgaria.....	2,791	2,617	(a)
Czechoslovakia (estimated).....	350,000	350,000	350,000
Denmark—Crude.....	29,300	34,300	42,400
Washed and pressed.....	8,500	8,600	11,200
Dried.....	800	700	700
France.....	98,800	(a)	(a)
Germany—			
Bavaria.....	373,720	467,455	677,287
Prussia.....	8,352	11,961	61,793
Saxony—Crude.....	106,706	42,002	35,940
Washed.....	27,640	32,904	43,054
Sand.....	(a)	(a)	10,114
Italy—Crude.....	30,203	20,873	(a)
Washed and ground (c).....	8,206	4,009	(a)
Kaolinic earth.....	800	1,600	(a)
Portugal.....	6,763	9,416	11,644
Roumania (d).....	8,128	10,212	(a)
Spain (g).....	1,152	1,545	(a)
Sweden.....	1,389	1,878	(a)
Algeria.....	1,800	(a)	(a)
United States (f).....	308,030	367,172	(a)
Japan (estimated).....	400,000	400,000	400,000
Korea.....	11,821	24,536	(a)
Netherlands East Indies.....	120	229	(a)

China clay is also produced in Austria, U.S.S.R. (Russia) and China.

(a) Information not available.

(c) Derived from crude and stocks.

(d) Converted from cubic metres at the rate of 1 cubic metre=2 long tons.

(e) "Furite" and kaolin.

(f) Sales of china clay and paper clay.

(g) 3,940 cubic metres of kaolinic sand were also produced in quarries during 1932.

**IMPORTED CLAY PRODUCTS**

In continuance of the custom followed in previous mineral production reports, a short review of the imported-clay products industry is given herewith.

A number of factories in Canada manufacture ceramic products from clays which they import chiefly from England and the United States. Refractories, sanitary earthenware, porcelain insulators, floor and wall tile and pottery are the principal commodities made in these works. The refractories include rigid fire brick stove linings, special shapes, plastic firebrick and high-temperature cements; sanitary earthenware includes bathtubs, water closets, etc.; and pottery includes Rockinghamware such as teapots, bowls, etc., and art pottery such as lampstands, small vases and novelties. A new plant at Hamilton, Ont., started to make porcelain tableware towards the end of 1934 but no report was submitted by this company for the period in which they were in operation.

In 1934 there were 19 factories in operation in this industry as compared with 18 in 1933 and output advanced 59 per cent to \$1,923,218 from \$1,205,052 in the previous year. Capital employed was about the same at \$4,161,435 but the number of workers increased to 713 from 556 and salaries and wages rose correspondingly to \$672,754 from \$471,742. Materials for manufacturing cost \$515,465 in 1934 as against \$288,379 in 1933.

Table 356.—Products Made in the Imported-Clay Products Industry\*, 1933 and 1934

Products	1933 Selling value at works	1934 Selling value at works
	\$	\$
Firebrick and stove linings—Rigid.....	220,484	266,809
Plastic.....	19,215	47,936
Porcelain insulators, sanitary ware, sewer pipe, floor and wall tile, tanks, pottery, etc.....	965,353	1,608,473
<b>Total.....</b>	<b>1,205,052</b>	<b>1,923,218</b>

\* This industry is confined to Ontario and Quebec.

### LIME

Sales of lime by Canadian producers in 1934, including both quick and hydrated, and inclusive of lime used by producers, amounted to 368,113 short tons valued at \$2,745,797 as compared with 323,540 short tons worth \$2,432,306 in 1933. The 1934 output represents an increase over 1933 of 13.8 per cent in quantity and 12.9 per cent in value. The tonnage produced in 1934 is the largest since 1930 and the pronounced increase in sales especially for building purposes reflects the increasing activities in the various spheres of construction.

The consumption of lime for chemical purposes is a factor of increasing importance in the Canadian lime industry as evidenced by a tonnage of 229,906 reported as sold or used for chemical processes in 1934, this quantity comprises 62.4 per cent of the total lime sales and includes 94,216 tons for pulp and paper mills, 26,170 tons for the cyaniding of ores in the gold mining industry, 17,140 tons for use in iron and steel mills and 92,380 tons for sugar refining, glass manufacture, etc.

Ontario and Quebec are the two most important lime producing provinces and of the total tonnage recorded for 1934 the former province contributed 191,041 or 51.9 per cent and Quebec 108,690 tons or 29.5 per cent. Quick lime at 308,122 tons and hydrated at 59,991 tons constituted 83.7 per cent and 16.3 per cent respectively of the total lime output in 1934.

Producers received in 1934 an average of \$7.26 per ton for quicklime and \$8.46 per ton for hydrated lime as compared with \$7.30 for quicklime and \$9.14 for hydrated in the preceding year.

In 1934 the Canadian lime industries employed \$8,497,895 in capital, paid \$535,492 in salaries and wages to 737 employees and consumed fuel and electricity to the value of \$606,335. The value for fuel and electricity included \$173,350 for Canadian bituminous coal, \$194,568 for imported bituminous coal and \$113,220 for wood.

"The value of hydrated lime for use as a finishing plaster depends in large measure on that property, variously called plasticity, workability or fatness which allows it to spread readily under the trowel without tearing or rolling, to give smooth uniform surface. In this respect magnesian or dolomitic hydrates are usually superior to those high in calcium although the latter, other things being equal, are superior when slaked with an excess of water and used without being dried. The possibility of improving the properties of hydrated high-calcium lime to render it as valuable as dolomitic material for plaster finishing has long been of interest to owners of small lime plants, and indeed to those of many larger ones to whom dolomitic stone is not readily available. Attempts have been made by various investigators to improve hydrated lime through the addition of chemicals to the limestone, to the quicklime or to the dry hydrate. Though certain improvements have been reported, no treatment of this kind, as far as the authors are aware, is being used commercially. It was considered that an ideal admixture would be a material which would precipitate an artificial gel around the lime particles. This suggested the possibility of using aluminium sulphate.—Qualitative trials made in the laboratory indicated that the proposal was technically feasible. It appeared, however, that an amount approaching 10 per cent of the weight of a high-calcium hydrate would be necessary in many cases to give sufficient improvement—owing, however, to the receipt of repeated inquiries by this laboratory from manufacturers interested in the improvement of their product and a considerable reduction in the market price of aluminium sulphate, the matter was re-opened, and accurate experimental results were obtained."(a)

(a) Abstract from a paper by A. F. Gill and T. H. Way of the National Research Laboratories, Ottawa.

Table 357.—Capital Employed in the Lime Industry in Canada, by Provinces, 1933 and 1934

Province	1933					1934				
	Capital employed as represented by					Capital employed as represented by				
	Present value of land, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total	Present value of land, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
New Brunswick*	174,559	17,046	8,146	32,299	232,050	159,090	13,050	8,750	25,180	205,980
Quebec.....	1,801,908	99,525	7,472	175,164	2,081,069	1,632,410	101,464	14,961	182,179	1,931,014
Ontario.....	3,351,631	88,561	8,057	57,885	3,506,134	3,150,352	102,892	4,302	62,705	3,320,251
Manitoba.....	2,193,403	56,140	40,602	11,995	2,302,110	2,170,735	44,792	44,685	3,000	2,263,212
Alberta.....	147,001	5,155	2,286	29,605	184,247	159,183	5,143	2,242	29,015	195,583
British Columbia..	442,127	33,845	26,331	109,099	611,402	377,776	33,006	28,225	142,848	581,855
<b>Canada.....</b>	<b>8,110,629</b>	<b>300,272</b>	<b>92,894</b>	<b>416,247</b>	<b>8,920,042</b>	<b>7,649,456</b>	<b>300,347</b>	<b>103,165</b>	<b>441,927</b>	<b>8,497,895</b>

\* Includes data for 2 firms in Nova Scotia.

Table 358.—Employees, Salaries and Wages in the Lime Industry in Canada, by Provinces, 1933 and 1934

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
<b>1933</b>						
New Brunswick†.....	11	73	84	18,641	52,414	71,055
Quebec.....	19	218	237	23,629	117,944	141,573
Ontario.....	16	173	189	23,262	112,076	135,338
Manitoba.....	5	88	93	8,614	53,025	61,639
Alberta.....	3	12	15	4,350	11,624	15,974
British Columbia.....	11	67	78	7,365	47,889	55,254
<b>Canada.....</b>	<b>65</b>	<b>631</b>	<b>696</b>	<b>85,861</b>	<b>394,972</b>	<b>480,833</b>
<b>1934</b>						
New Brunswick†.....	6	69	75	11,068	52,105	63,173
Quebec.....	21	251	272	26,666	148,559	175,225
Ontario.....	17	198	215	23,379	142,918	166,297
Manitoba.....	5	63	68	8,280	51,061	59,341
Alberta.....	3	17	20	4,600	15,465	20,065
British Columbia.....	10	77	87	8,990	42,401	51,391
<b>Canada.....</b>	<b>62</b>	<b>675</b>	<b>737</b>	<b>82,963</b>	<b>452,509</b>	<b>535,492</b>

\* See note page 26.

† Includes data for 2 firms in Nova Scotia.

Table 359.—Number of Wage-Earners on Pay Roll or Time Record on the 15th of Each Month or Nearest Representative Date, 1932-1934

Month	1932		1933		1934	
	Quarry	Kiln	Quarry	Kiln	Quarry	Kiln
January.....	193	330	202	274	247	337
February.....	199	348	185	247	259	339
March.....	230	375	239	265	252	332
April.....	254	406	218	326	259	360
May.....	283	381	305	367	337	442
June.....	259	376	337	380	337	440
July.....	292	393	361	408	311	425
August.....	281	345	350	375	279	390
September.....	265	346	339	366	311	399
October.....	246	385	323	390	330	418
November.....	223	348	288	350	263	396
December.....	196	260	273	308	233	341



**Table 360.—Production of Lime in Canada, 1925-1934**

(For the years 1886 to 1924 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	358,979	3,387,652	1930.....	490,802	4,038,698
1926.....	413,991	3,781,484	1931.....	344,785	2,764,415
1927.....	444,753	3,923,388	1932.....	320,650	2,394,537
1928.....	508,889	4,534,568	1933.....	323,540	2,432,306
1929.....	674,087	5,908,619	1934.....	308,113	2,745,797

**Table 361.—Production of Lime in Canada, by Provinces, 1932-1934**

Province		Quicklime		Hydrated lime		Total	
		Sold or used		Sold or used		Sold or used	
		Tons	Value	Tons	Value	Tons	Value
			\$		\$		\$
Nova Scotia.....	1932	6,075	30,954	458	4,580	6,533	35,534
	1933	3,325	24,270	589	5,890	3,911	30,160
	1934	8,298	63,630	622	4,324	8,920	67,954
New Brunswick.....	1932	5,547	59,064	6,025	50,120	11,572	109,184
	1933	8,059	68,446	8,790	66,340	16,849	134,786
	1934	8,949	76,132	6,803	50,277	15,752	126,409
Quebec.....	1932	76,983	493,787	16,830	94,114	93,813	587,901
	1933	89,740	539,603	20,594	107,955	110,331	647,558
	1934	85,106	510,614	23,584	121,370	108,690	631,984
Ontario.....	1932	143,185	1,018,007	23,518	255,223	166,703	1,273,230
	1933	126,460	1,006,906	19,733	220,291	146,193	1,227,197
	1934	168,700	1,287,251	22,281	249,038	191,011	1,536,289
Manitoba.....	1932	16,047	116,369	3,188	55,741	18,235	172,110
	1933	14,793	110,957	3,239	56,683	18,032	167,640
	1934	12,988	100,958	3,580	62,650	16,568	163,608
Alberta.....	1932	6,529	55,336	113	1,241	6,642	56,577
	1933	7,403	61,061	98	976	7,501	62,037
	1934	7,300	64,143	155	1,554	7,455	65,697
British Columbia.....	1932	14,902	141,998	2,250	18,003	17,152	160,001
	1933	18,147	144,479	2,570	18,449	20,717	162,928
	1934	16,721	135,528	2,966	18,328	19,687	153,856
Canada.....	1932	268,268	1,915,515	52,382	479,622	320,650	2,394,537
	1933	267,927	1,955,722	55,613	476,584	323,540	2,432,306
	1934	308,132	2,238,256	59,991	507,541	368,113	2,745,797

**Table 362.—Production of Lime in Canada, 1933 and 1934, Showing Purposes for which Sold or Used**

Purposes for which sold or used	1933				1934			
	Quicklime		Hydrated lime		Quicklime		Hydrated lime	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Building Trades—								
Finishing lime.....	3,467	23,340	17,318	222,387	6,515	49,888	18,297	243,005
Masons' lime.....	9,667	82,595	3,697	35,838	14,223	108,575	4,985	45,553
Sand-lime brick.....	1,846	12,413	387	3,675	3,570	24,173	760	5,751
Agricultural.....	33,016	248,027	2,833	25,304	68,354	511,057	3,865	27,995
Chemical—								
Smelters.....	7,241	59,155	735	6,161	5,466	39,298	747	5,026
Iron and steel mills.....	13,179	92,703	8	79	17,132	125,796	8	72
Cyanide mills.....	20,655	147,395	28	223	24,088	174,852	2,082	12,718
Pulp and paper mills.....	68,340	431,472	24,463	134,971	71,568	439,709	22,748	119,409
Glass works.....	5,735	56,738			2,220	16,472	109	510
Sugar refineries.....	12,994	106,503	25	215	8,111	89,213	119	1,985
Tinneries.....	2,650	17,960	415	3,562	2,900	19,939	407	3,253
Fertilizer.....	(a)	(a)	(a)	(a)	22	154	152	1,368
Insecticide.....	(a)	(a)	(a)	(a)	725	5,075	819	6,178
Other chemical works.....	76,633	584,339	2,573	23,464	69,371	529,753	1,115	8,166
Dealers (uses unspecified).....	12,086	89,340	2,852	19,391	13,409	101,190	3,744	26,042
Other consumers.....	382	3,166	179	1,314	442	3,152	43	510
<b>Total.....</b>	<b>267,927</b>	<b>1,955,722</b>	<b>55,613</b>	<b>476,584</b>	<b>308,122</b>	<b>2,238,256</b>	<b>59,991</b>	<b>507,541</b>

**Table 363.—Lime Sold or Used for Chemical and Other Purposes and Value of Contracts Awarded in Canada, 1930-1934**

Year	Lime sold or used for chemical purposes		Lime sold or used for building or other non-chemical purposes		Value of construction contracts awarded in Canada (a)
	Tons	Value	Tons	Value	Value
		\$		\$	\$
1930.....	351,443	2,596,112	139,359	1,442,586	456,999,600
1931.....	231,837	1,637,319	112,948	1,127,096	315,482,000
1932.....	255,472	1,758,898	65,178	635,639	132,972,400
1933.....	235,810	1,664,946	87,730	767,360	97,269,803
1934.....	229,906	1,598,906	138,207	1,146,891	125,811,500

(a) Compiled by McLean Building Reports Ltd.

**Table 364.—Imports into Canada and Exports of Lime and Various Lime Compounds, 1933 and 1934**

	1933		1934	
	Quantity	Value	Quantity	Value
		\$		\$
<b>IMPORTS—</b>				
Lime.....Cwt.	5,448	4,444	6,543	5,118
Calcium chloride in packages of not less than 25 pounds.....lb.	5,788,390	56,758	6,634,500	66,957
Calcium chloride in packages of less than 25 pounds.....lb.	479	158	460	107
Calcium chloride not in solution for road treating purposes.....lb.	28,095,700	319,683	44,940,900	480,623
Calcium arsenate.....lb.	287,420	17,426	165,077	9,123
Chloride of lime and hypochlorite of lime in packages of not less than 25 pounds.....lb.	4,346,500	68,681	4,585,300	75,500
Chloride of lime and hypochlorite of lime in packages of less than 25 pounds.....lb.	61,899	8,020	57,293	6,048
<b>EXPORTS—</b>				
Lime.....cwt.	207,786	192,029	213,491	151,983
Acetate of lime.....cwt.	8,958	20,252	30,754	53,245

### SAND AND GRAVEL

Production statistics for the sand and gravel industry in Canada were first collected in 1912. Prior to that year the only data available consist of Customs' records of sand and gravel exported. In 1886 exportations amounted to 124,865 tons; twenty-four years later exports had risen to 624,824 tons appraised at \$407,974. During 1912, production was valued at \$1,512,099 and wages paid to the 875 pit employees totalled \$527,425. It was not until 1916 that tonnage statements were obtained from the operators in this industry; the total for that year amounted to 8,156,207 tons at \$1,838,320. Since 1918, the annual production has exceeded the 10-million ton mark. The highest market valuation per ton for this material was received in 1920, when 11,530,795 tons were sold for \$4,201,067. From 1927 to 1931, during a period of intensive construction, each annual output was in excess of 21,000,000 tons, there was, however, a pronounced decline to 14,469,942 tons in 1932 and 11,738,823 tons in 1933, recessions that reflected widespread restriction in building activities.

Sand and gravel production in Canada during 1934 amounted to 14,854,159 short tons valued at \$4,035,477 as compared with 11,738,823 short tons worth \$4,464,285 in 1933 and represents a 26.5 per cent increase in quantity and 9.6 per cent decrease in value.

Increases over the preceding year in the tonnage of shipments were recorded for New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan and Alberta, and of the total quantity produced Quebec contributed 24.7 per cent and Ontario 53.1 per cent. Of the total shipments of sand and gravel in 1934, 686,631 tons of "sand" valued at \$209,002 were reported for building purposes, including concrete, roads, etc.; 1,454,618 tons of "sand and gravel" worth \$266,292 were utilized as railway ballast and 12,418,408 tons valued at \$3,411,751 were consumed in concrete, highway construction, etc. "Sand and gravel" used for railway ballasting in 1934 showed increases of 159 per cent in quantity and 141 per cent in value over 1933 while the same

material employed in the making of concrete and construction of roads realized a 24.7 per cent increase in tonnage but declined 12.7 per cent in value as compared with the corresponding shipments in the preceding year.

Imports of sand and gravel (n.o.p.) into Canada in 1934 totalled 61,136 tons valued at \$56,900 as compared with 89,017 tons worth \$72,480 in 1933. Silica sand imported for glass and carborundum manufacture and for use in steel foundries, filtration plants, sand blasting, etc., totalled 96,165 tons appraised at \$226,188 and of these imports the United States contributed 92.7 per cent while almost the entire balance came from Belgium. Imports of silex or crystallized quartz, ground or unground, amounted to 2,323 tons valued at \$53,430 as against 4,370 tons at \$82,823 in 1933.

Exports of sand and gravel in 1934 totalled 88,011 tons worth \$17,079 as compared with 102,174 tons appraised at \$15,801 in the preceding year.

The annual survey of the Canadian sand and gravel industry determined 794 active shippers in 1934; excluding statistics regarding sand and gravel operations of railway companies, the fixed and current assets of operators in this industry amounted to \$4,377,551. The industry as a whole distributed \$1,236,819 in salaries and wages to 1,911 employees and consumed fuel and electricity evaluated at \$155,194.

Every province in Canada, with the exception of New Brunswick and Prince Edward Island, is producing some grade of moulding sand. For several years past the Mines Branch, Department of Mines, Ottawa, has been conducting a general investigation into "Natural Bonded Moulding Sands of Canada" with particular reference to available data concerning all known deposits. Outstanding features shown by this investigation are the large number of deposits from which supplies have been used for local foundries and the probability of replacing some imported material with Canadian sands. The Department of Mines, Ottawa, reports that Canadian producers of silica sand are steadily improving their position and each year sees an increasing use of their products, also the use of Canadian sand for sand blasting is increasing and the prospects are promising for a still further use of Canadian material for this purpose.

"Moulding sands are of two general classes—those without and those with natural bonding material, which may consist of clay or loam. The former frequently comes from glass-sand deposits and may contain 98 per cent to 99 per cent silica. Sands without natural bond being more refractory are required for steel moulding; refractory clay or other suitable bond is, however, added before use. . . . The silica minerals employed for filtration and clarification comprise ordinary sand, diatomaceous earth, and tripoli. In the filtration of water the sand acts as a support for an organic bacterial jelly which forms in the sand bed after contact with water for a week or two. This jelly causes the removal of sediment and suspended matter and reduces the bacterial count of the water. Grain size of filter sand is important, also a quite high silica content, and the specification frequently includes a maximum of acid-soluble matter and lime and magnesium carbonates. . . . The two well-known commercial varieties of vitreous silica, transparent and opaque or translucent, are of about equal chemical purity, a silica content of approximately 99.8 per cent being the usual standard. The usual raw materials for vitreous silica are quartz crystal for the transparent and high quality glass sand for the non-transparent varieties. Transparent ware is usually made to-day in electric vacuum furnaces from selected rock crystal, after crushing and washing in acid and water; present products range, in the opaque ware, from tubing measuring a fraction of a millimeter internally, to pots holding 150 gallons and pipes 2 feet or more in diameter. . . . Glass for optical purposes, tableware and plate glass, require silica sand of very high purity, 98.5 per cent to 99.8 per cent of silica with a minimum of ferric oxide and usually to somewhat rigid screen specifications; glass sand is usually produced from soft, easily crushed sandstone of high purity. The soluble glasses of which sodium silicate or waterglass is a familiar example are important; the usual process for the manufacture of sodium silicate is by the interaction of high-grade sand with soda ash; the sand specifications are similar to those applying to regular commercial glasses, a low alumina content being important in order that the resulting silicate shall be readily soluble. . . . Enamels are essentially opaque glasses, and the purity requirements for silica used in their composition are very similar to those for glass manufacture, but very finely ground silica is employed, and flint and chalcedonic quartz seem to possess advantages here. . . . The requirements for sand in sand-lime brick manufacture are not rigid, size being more important than extreme chemical purity, sufficient of the sand having to be in fine condition to form the calcium monosilicate bond; most of the sand acts simply as



the aggregate forming the body of the brick. Silica in the form of sand or crushed quartz, usually the former on account of cheapness, serves as the source of silicon in manufacturing silicon carbide for abrasive and refractory use. The sand must contain 99.0 per cent to 99.5 per cent of silica and of possible impurities, iron is particularly objectionable; a good grade of glass sand is generally used. Crushed quartzite is generally used as a source of silicon in the manufacture of ferro-silicon alloys; the requirements of quality for the quartzite are very much the same as for silica brick, but in this case the percentage of iron is unimportant . . . ; silica brick are usually made from quartzite analyzing 97 per cent to 98 per cent of silica with a small amount of lime as bond; hard, strong rock, having angular grains cemented by interstitial quartz, capable of resisting somewhat severe temperature changes without injury, and with the impurities well distributed in the interstices, is usually required." (Abstracts from a paper by W. W. Winship, as published in the "Oil, Paint and Drug Reporter").

**Table 365.—Capital Employed in the Sand and Gravel Industry in Canada, by Provinces, 1933 and 1934**

Province	1933					1934				
	Capital employed as represented by					Capital employed as represented by				
	Present value of land, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total	Present value of land, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	400				400					
New Brunswick.....	47,457	686		1,187	49,330					
Quebec.....	249,642	3,300	800	6,703	260,445	257,134	2,900	3,180	7,056	270,270
Ontario.....	3,928,524	12,139	81,612	257,559	4,279,834	1,970,191	33,711	109,194	377,686	2,490,782
Manitoba.....	593,604	3,833	36,267	183,953	817,657	567,058	1,985	32,576	173,798	775,417
Saskatchewan.....	1,200				1,200					
Alberta.....	5,500				5,500	1,100				1,100
British Columbia.....	756,440	3,460	5,737	23,110	788,747	812,612	5,264	5,726	16,380	839,982
<b>Canada.....</b>	<b>5,582,767</b>	<b>23,418</b>	<b>124,416</b>	<b>472,512</b>	<b>6,203,113</b>	<b>3,606,095</b>	<b>43,860</b>	<b>150,676</b>	<b>574,920</b>	<b>4,377,551</b>

**Table 366.—Employees, Salaries and Wages in the Sand and Gravel Industry, by Provinces, 1933 and 1934**

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
<b>1933</b>						
Nova Scotia.....		1,003	1,003		100,784	100,784
New Brunswick.....	1	259	260	378	203,273	203,651
Quebec.....	7	851	858	12,091	430,102	442,193
Ontario.....	31	329	360	62,555	170,635	233,190
Manitoba.....	10	118	128	14,033	83,007	97,040
Saskatchewan.....		11	11		3,389	3,389
Alberta.....		41	41		35,394	35,394
British Columbia.....	12	53	65	17,704	35,734	53,438
<b>Canada.....</b>	<b>61</b>	<b>2,665</b>	<b>2,726</b>	<b>106,761</b>	<b>1,062,318</b>	<b>1,169,079</b>
<b>1934</b>						
Nova Scotia.....		170	170		101,443	101,443
New Brunswick.....		286	286		207,202	207,202
Quebec.....	12	917	929	13,655	522,606	536,261
Ontario.....	25	208	233	30,582	170,004	200,586
Manitoba.....	10	48	58	14,509	25,109	39,618
Saskatchewan.....		100	100		62,364	62,364
Alberta.....		78	78		35,564	35,564
British Columbia.....	13	64	77	16,969	36,782	53,751
<b>Canada.....</b>	<b>60</b>	<b>1,851</b>	<b>1,911</b>	<b>75,745</b>	<b>1,161,074</b>	<b>1,236,819</b>

\* See note on page 26.



Table 367.—Number of Wage-Earners, by Months, 1932-1934

Month	1932	1933	1934
January.....	310	112	122
February.....	306	108	122
March.....	301	131	387
April.....	771	402	596
May.....	3,130	5,646	3,128
June.....	3,713	6,172	3,895
July.....	3,737	6,275	4,167
August.....	3,816	6,381	4,219
September.....	3,388	3,087	2,418
October.....	715	762	940
November.....	530	586	400
December.....	329	363	316

Table 368.—Production of Sand and Gravel in Canada, 1925-1934

(For the years 1886 to 1924 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	11,018,647	3,223,410	1930.....	28,547,511	8,344,913
1926.....	17,112,798	4,941,434	1931.....	21,748,586	6,651,165
1927.....	22,952,819	6,055,801	1932.....	14,469,942	4,480,596
1928.....	28,102,917	5,809,431	1933.....	11,738,823	4,464,285
1929.....	27,846,945	7,317,814	1934.....	14,854,159	4,035,477

Table 369.—Production in Canada, Imports and Exports of Sand and Gravel, 1932-1934

Kind	1932			1933			1934		
	Washed or screened	Bank or pit-run	Total value	Washed or screened	Bank or pit-run	Total value	Washed or screened	Bank or pit-run	Total value
	Tons	Tons	\$	Tons	Tons	\$	Tons	Tons	\$
<b>PRODUCTION—</b>									
Sand—									
Moulding sand.....	178	8,315	5,365	3,444	4,273	9,635	1,951	11,278	13,415
Building sand and sand for concrete, roadwork, etc.....	1,930,323	437,981	745,091	347,410	425,002	218,559	360,576	328,065	209,002
Core sand.....	100	600	1,125	325	.....	325	405	3,030	2,345
Other sand (including blast and engine sands).....	2,204	41,584	13,474	216	33,177	6,086	2,072	44,012	10,046
<b>Sand and Gravel—</b>									
Sand and gravel for railway ballast.....	23,363	2,073,861	324,648	72,338	489,200	110,440	95,566	1,359,052	266,292
Sand and gravel for concrete roads, etc.....	5,399,762	4,204,351	3,181,105	6,367,489	3,590,343	3,907,911	4,723,770	7,694,638	3,411,751
Crushed gravel.....	319,160	28,160	209,798	359,395	43,211	211,320	79,578	152,176	122,626
<b>Total.....</b>	<b>7,675,690</b>	<b>6,794,852</b>	<b>4,480,596</b>	<b>7,150,617</b>	<b>4,588,206</b>	<b>4,464,285</b>	<b>5,263,918</b>	<b>9,590,241</b>	<b>4,035,477</b>
<b>IMPORTS—</b>									
Sand, silica, for glass and carborandum manufacture, etc.....	59,176	162,869	64,114	160,131	.....	.....	96,165	.....	226,188
Sand and gravel, n.o.p.	36,387	48,677	89,017	72,480	.....	.....	61,136	.....	56,900
<b>Total.....</b>	<b>95,563</b>	<b>211,546</b>	<b>153,131</b>	<b>232,611</b>	.....	.....	<b>157,301</b>	.....	<b>283,088</b>
<b>EXPORTS.....</b>	<b>177,710</b>	<b>33,620</b>	<b>102,174</b>	<b>15,801</b>	.....	.....	<b>88,011</b>	.....	<b>17,079</b>

NOTE.—Production includes all classes of sand and gravel other than natural silica sand or silica sand manufactured from quartz or silica rock; production of these is recorded under quartz.

Table 370.—Production of Sand and Gravel in Canada, by Railway Operators, 1932-1934

Kind	1932		1933		1934	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Sand—						
Moulding sand.....			203	300		
Building sand and sand for concrete, roads, etc.....	2,359	636	10,120	2,092	202	41
Other sand (including blast, core and engine sands).....	35,051	7,419	29,247	5,509	40,634	6,174
Sand and gravel—						
Sand and gravel for railway ballast.....	2,356,715	312,689	472,921	79,371	1,275,448	213,591
Sand and gravel for concrete, roads, etc.....	103,834	23,213	215,739	35,348	296,301	49,149
Crushed gravel.....					1,755	325
<b>Total.....</b>	<b>2,197,959</b>	<b>343,957</b>	<b>728,238</b>	<b>122,620</b>	<b>1,614,340</b>	<b>269,280</b>

Table 371.—Production of Sand and Gravel in Canada, by Operators Other than Railways, 1932-1934

Kind	1932			1933			1934		
	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value
	Tons	Tons	\$	Tons	Tons	\$	Tons	Tons	\$
Sand—									
Moulding sand.....	178	8,315	5,355	3,444	4,070	9,335	1,951	11,278	13,415
Building sand and sand for concrete, roads, etc.....	1,930,323	435,622	744,455	347,410	417,882	216,467	360,576	325,853	208,961
Core sand.....	100	600	1,125	325		325	405	3,030	2,345
Other sand (including blast, and engine sands).....	2,204	6,533	6,055	216	3,930	577	2,072	3,378	3,872
Sand and gravel—									
Sand and gravel for railway ballast.....	23,363	17,146	11,959	72,338	16,279	31,078	95,566	83,604	52,701
Sand and gravel for concrete, roads, etc.....	5,399,762	4,100,517	3,157,892	6,367,489	3,374,604	3,872,563	4,723,770	7,398,337	3,362,602
Crushed gravel.....	319,160	28,160	209,798	359,395	43,211	211,320	79,578	150,421	122,301
<b>Total.....</b>	<b>7,675,090</b>	<b>4,596,893</b>	<b>4,136,639</b>	<b>7,150,617</b>	<b>3,859,976</b>	<b>4,341,665</b>	<b>5,263,918</b>	<b>7,975,901</b>	<b>3,766,197</b>

Table 372.—Production of Sand for Building and Concrete, Roads, Etc., and Sand and Gravel for Railway Ballast and for Concrete, Roads, Etc., 1930-1934

Year	SAND		SAND AND GRAVEL			
	For building, concrete, roads, etc.		For railway ballast		For concrete roads, etc.	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1930.....	3,443,185	1,399,044	6,752,420	961,462	17,409,590	5,569,202
1931.....	3,189,248	1,069,210	3,593,451	459,531	14,352,283	4,784,298
1932.....	2,368,304	745,091	2,097,224	324,648	9,604,113	3,181,105
1933.....	775,412	218,559	561,538	110,449	9,957,832	3,907,911
1934.....	686,631	239,002	1,454,618	266,292	12,418,408	3,411,751

NOTE.—For consumption of silica and silica sands see table 246, chapter 8.

Table 373.—Production of Sand and Gravel in Canada, by Provinces, 1932-1934

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
<b>1932</b>								
Sand—								
Moulding sand.....tons	34		144	7,864	417			34
\$	78		62	4,389	620			206
Building sand and sand for concrete, roadwork, etc.....tons	191,523	12,191	699,504	1,434,751	16,968	8	3,784	9,575
\$	42,567	8,310	228,278	456,039	5,615	14	1,547	2,721
Core sand.....tons				700				
\$				1,125				
Other sand (including blast sand, engine sand, etc.).....tons		581	7,025	4,485	202	15,319	6,129	10,047
\$		155	6,144	850	42	3,120	1,305	1,798
Sand and gravel—								
Sand and gravel for railway ballast.....tons	12,881	48,148	1,131,464	363,278	28,111	345,572	89,859	77,911
\$	2,000	6,804	173,155	40,963	3,989	63,428	15,493	18,816
Sand and gravel for concrete, roads, etc.....tons	219,040	507,089	1,504,281	5,021,478	378,328	1,942	627,270	1,344,716
\$	92,032	431,910	392,602	1,383,177	174,163	380	225,117	481,724
Crushed gravel.....tons		1,161	115,730	161,891	16,283		7,025	45,230
\$		60	93,635	84,696	4,545		6,503	20,339
<b>Total.....tons</b>	<b>423,487</b>	<b>569,150</b>	<b>3,438,128</b>	<b>6,991,447</b>	<b>440,309</b>	<b>362,841</b>	<b>734,067</b>	<b>1,487,513</b>
<b>                                  \$</b>	<b>136,677</b>	<b>447,239</b>	<b>893,896</b>	<b>1,971,239</b>	<b>188,974</b>	<b>66,942</b>	<b>250,025</b>	<b>525,694</b>
<b>1933</b>								
Sand—								
Moulding sand.....tons			45	7,560	91			21
\$			40	9,332	137			126
Building sand and sand for concrete, roadwork, etc.....tons		3,480	649,720	92,181	24,308	744		4,979
\$		2,626	180,172	20,625	6,437	1,378		1,321
Core sand.....tons				325				
\$				325				
Other sand (including blast sand, engine sand, etc.).....tons		729	3,332	5,197	756	12,571	3,611	7,197
\$		176	630	942	112	2,428	597	1,201
Sand and gravel—								
Sand and gravel for railway ballast.....tons	31,441	50,661	60,696	279,637	16,123	76,425	15,753	30,802
\$	5,633	10,238	12,684	59,748	2,702	11,213	2,248	5,983
Sand and gravel for concrete, roads, etc.....tons	250,787	442,091	2,378,290	5,456,486	243,901	14,660	261,758	909,859
\$	120,398	318,457	622,766	2,340,730	97,665	4,712	82,732	320,451
Crushed gravel.....tons			264,149	126,608	3,035			8,814
\$			126,137	79,528	1,775			3,880
<b>Total.....tons</b>	<b>282,228</b>	<b>496,961</b>	<b>3,356,232</b>	<b>5,967,994</b>	<b>288,214</b>	<b>194,400</b>	<b>281,122</b>	<b>961,672</b>
<b>                                  \$</b>	<b>126,631</b>	<b>331,497</b>	<b>912,429</b>	<b>2,517,230</b>	<b>108,828</b>	<b>19,731</b>	<b>85,577</b>	<b>332,962</b>
<b>1934</b>								
Sand—								
Moulding sand.....tons				12,908	321			
\$				12,998	417			
Building sand and sand for concrete, roadwork, etc.....tons	1,350		510,205	145,703	20,294	2,768	1,222	5,089
\$	230		144,060	56,386	8,335	205	490	1,336
Core sand.....tons			252	1,306	1,877			
\$			126	1,524	695			
Other sand (including blast sand, engine sand, etc.).....tons		520	8,471	4,813		20,979	6,450	4,851
\$		167	4,729	710		2,377	1,195	868
Sand and gravel—								
Sand and gravel for railway ballast.....tons	41,726	141,304	230,989	651,516	98,791	166,149	34,259	89,884
\$	7,728	22,603	45,916	130,624	16,161	19,861	5,402	18,059
Sand and gravel for concrete, roads, etc.....tons	213,496	426,240	2,750,006	7,046,018	181,727	343,679	608,301	848,941
\$	106,671	299,468	692,500	1,610,934	55,898	140,590	189,821	309,869
Crushed gravel.....tons			172,659	18,695	31,016			9,384
\$			93,123	8,513	15,980			5,010
<b>Total.....tons</b>	<b>256,572</b>	<b>568,064</b>	<b>3,672,582</b>	<b>7,880,959</b>	<b>334,026</b>	<b>533,575</b>	<b>650,232</b>	<b>958,149</b>
<b>                                  \$</b>	<b>114,597</b>	<b>372,238</b>	<b>980,454</b>	<b>1,821,689</b>	<b>95,426</b>	<b>169,033</b>	<b>196,898</b>	<b>335,142</b>

## SAND-LIME BRICK

On account of its association with other building materials data regarding the production of sand-lime brick are included in this report. Statistics relating to sand-lime brick are not included in the totals for structural materials industries as both the sand and lime used have been so recorded; production of sand-lime brick is regarded as a manufacturing operation and therefore is shown in the report on the *Manufactures of the Non-Metallic Minerals*, issued annually by the Bureau.

Only 6 factories in Canada manufactured sand-lime brick during 1934; 4 of these were located in Ontario and 2 were in Quebec. These works, representing a capital of \$781,444, employed an average of 78 workers throughout the year and paid out \$65,996 for salaries and wages and \$51,316 for raw materials.

Production of sand-lime building brick was reported at 12,744 M valued at \$135,588 a gain of 49 per cent in quantity and 48 per cent in value from the 1933 output which, however, was the lowest on record for the industry. Some sand-lime hollow building blocks, cinder blocks, and ready-mixed concrete were also made by the concerns in this group bringing the total output value to \$174,069 in 1934 as compared with \$116,367 in 1933 and \$153,716 in 1932.

Building operations in Canada showed some improvement in 1934 over the preceding year but were still very much below the normal level of pre-depression years. Likewise, the production of sand-lime building bricks was much below the average of earlier years. In 1920 production amounted to 39,264 M at \$693,641; in 1925 to 68,869 M at \$854,055; in 1928 to 82,271 M at \$1,038,510; in 1930 to 52,770 M at \$567,022, and in 1931 to 46,003 M at \$469,783.

Table 374.—Production of Sand-Lime Brick in Canada, 1930-1934

Year	Ontario		Other provinces		Canada	
	Quantity	Selling value at works	Quantity	Selling value at works	Quantity	Selling value at works
	M	\$	M	\$	M	\$
1930.....	41,576	424,178	11,194	142,844	52,770	567,022
1931.....	34,400	313,189	11,603	156,594	46,003	469,783
1932.....	6,823	78,398	3,996	53,042	10,819	131,440
1933.....	6,922	69,784	1,619	21,684	8,541	91,468
1934.....	10,585	107,528	2,159	28,060	12,744	135,588

## SLATE

Slate deposits located along the south shore of the St. Lawrence river in Quebec, were operated for the first time in 1854. Production from these deposits reached a maximum in point of value in 1889 when 6,935 tons valued at \$119,160 were shipped. These shipments consisted of roofing slates, mantels and slabs. Quarrying operations were carried on at the Quebec deposits up to 1923, in which year 1,836 tons of crushed green and red slate were shipped for use in the manufacture of roofing material.

No slate was produced in Canada from 1923 to 1929, each year since 1930 there has been a production of the material and in 1934 shipments of slate were made from quarries located at Ste. Hénédine, Dorchester county, Quebec; Madoc, Hastings county, Ontario and Sooke Lake, British Columbia.

Table 375.—Production of Slate in Canada, 1923-1934

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	1,836	17,289	1932.....	250	3,750
1924-1929.....			1933.....	250	3,750
1930.....	150	3,000	1934.....	738	4,802
1931.....	250	5,000			

NOTE.—For years 1886 to 1922 see previous reports. For imports and exports of slate see table 387.



## THE STONE INDUSTRY IN CANADA

Including (1) the Stone Quarrying Industry and (2) the Monumental and Ornamental Stone Industry

The stone industry in Canada comprises two main divisions: (1) The Stone Quarrying Industry, including quarries and dressing works operated in conjunction with quarries, and (2) The Monumental and Ornamental Stone Industry, comprising the operations of firms having no quarries but who operate dressing works where stone for building and monumental purposes is cut, polished or otherwise finished. In the Census of Industry, statistics on the stone quarrying industry are included under mining, while statistics of the monumental and ornamental stone industry are included under manufacturing. For convenience this report carries data for both of these industries.

The two industries are treated separately in the following review.

## (1) PRIMARY PRODUCTION—The Stone Quarrying Industry

Statistics of the stone industry as set forth in the general tables of this report have been confined to quarrying operations and to the production of dressed stone when this operation is carried on in conjunction with the quarrying. The kinds of stone quarried in Canada include granite (trap rock, syenite and other igneous rock), limestone, marble, sandstone, and slate. Stone of almost every known variety occurs in Canada; rocks of the igneous areas of British Columbia, Manitoba, Ontario, Quebec and the Maritime Provinces exhibit a wide range of physical characteristics, some varieties being especially noted for their richness of colour and beauty of crystallization. The sedimentary rocks, including limestones, sandstones and marbles are widely distributed throughout Canada. The products from quarries operating in these formations not only yield high class structural and decorative materials but provide the chemical and other allied industries with many of their growing requirements.

Shipments of limestone, granite, sandstone and marble from Canadian quarries during 1934 amounted to 4,077,016 short tons valued at \$4,152,329 as compared with an output of 2,939,574 short tons worth \$2,996,576 in 1933. The 1934 sales represent increases of 38.7 per cent in tonnage and 38.6 per cent in value over those of the preceding year. Production in 1934 comprised 3,747,779 tons of limestone, 200,285 tons of granite, 115,169 tons of sandstone, and 13,783 tons of marble. In addition to this production 738 tons of slate were produced, 806,546 tons of limestone used in cement manufacture and approximately 600,000 tons of limestone consumed in the Canadian lime industry.

Increases in value of sales over 1933 were recorded for each variety of stone produced and all tonnages shipped were greater with the exception of granite. The improvement in the stone industry as a whole during 1934 was realized in Eastern Canada and more particularly in Ontario where, compared with 1933, increases of 96.2 per cent in quantity and 56.8 per cent in value of sales were attained. The almost general uptrend in construction and industrial activities was reflected in the pronounced increase in shipments of stone for building purposes, chemical processes, highway construction, railroad ballasting and cement manufacture.

Capital employed in 1934 by the Canadian primary stone industry totalled \$12,983,836; the industry provided employment for 2,087 persons, distributed \$1,499,272 in salaries and wages, and consumed fuel and electricity amounting in value to \$311,516.

The combined value of all varieties of stone imported during 1934 totalled \$797,963 as compared with \$94,180 in 1933; the value of stone exports was also greater, increasing from \$94,180 in 1933 to \$109,916 in 1934.

"As a result of research conducted in the laboratories of the Mines Branch, Department of Mines, Ottawa, which proved that certain large deposits of argillaceous dolomite in the Niagara Peninsula were of suitable composition for the manufacture of rock wool, an industry to manufacture this commodity has been established in Canada. In September, 1934, Spun Rock Wools Ltd., Thorold, Ontario, began production of a long-fibred rock wool made by a method entirely different from that used in any other rock wool or slag wool plant. Two other Canadian companies expect to commence production of rock wool during 1935. In the agricultural limestone field a trend toward the use of pulverized dolomite in place of high-calcium limestone is noted.

This is due to the wider realization that magnesia as well as lime is required for the best growth of many crops and has resulted in the opening up of several small dolomite quarries. Limestones of great variety of chemical composition and physical characteristics are available in Canada and are being extensively quarried for the numerous uses to which limestone is put. . . . The principal quarries from which limestone for building purposes is obtained are in the following localities: St. Marc des Carrières, Quebec (grey limestone); Montreal (grey limestone); Queenston, Ontario (silver grey, buff and variegated grey and buff); Longford, Ontario (buff); Tyndall, Manitoba, (mottled grey, mottled buff and mottled variegated). Quarries producing small quantities of building stone for local use are situated near Quebec city and at Hull, in Quebec; and at Ottawa and Kingston in Ontario. Waste material is utilized for crushed stone, rubble, riprap, flagging, chemical and metallurgical use and for lime manufacture. . . . The principal centre of marble production in Canada is at Philipsburg, Quebec, where clouded grey marbles, some of which are lined and tinted with green and pink, are quarried; black marble is also produced here. A limestone quarried at St. Marc des Carrières, Quebec, takes a good polish and yields a dark brownish grey marble. In Ontario, black marble is quarried at St. Albert; at Longford two varieties of very fine-grained faintly mottled, buff marble and also a mottled brown marble are produced; at Bancroft a number of varieties of handsome marble are available, the most striking of which is clouded grey breccia in which the bond is of a rich chocolate colour. In Manitoba, mottled gold-and-buff and mottled purplish red marbles are available in a quarry at Fisher Branch, 100 miles north of Winnipeg and rose-coloured and mottled red marbles occur in quarries north of The Pas. In British Columbia, white and bluish grey marble is produced 8 miles north of Kootenay Lake. . . .

"A large proportion of the granite produced in Canada is used for foundations for highways, for permanent ballasting of railway road beds, and for heavy aggregate in large concrete structures. . . . The province of Quebec furnishes the largest proportion of granite for building purposes, the Stanstead, Scotstown and St. Sebastien districts being the biggest producers of this class of stone. Granite for monumental purposes is produced in the Maritime Provinces as well as in Quebec, Ontario, Manitoba and British Columbia." (Abstracts from a report issued by the Department of Mines, Ottawa).

Canadian sandstone has been utilized extensively in the construction of many important public buildings in the Dominion; the rock occurs in Canada in a variety of colours including white, reddish brown, purple (bands), yellow and grey; shipment of sandstone were made in 1934 from quarries located in Nova Scotia, New Brunswick, Quebec and Ontario.

Table 376.—Capital Employed in the Stone Quarrying Industry in Canada, by Provinces, 1933 and 1934

Province	1933					1934				
	Capital employed as represented by					Capital employed as represented by				
	Present value of land buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total	Present value of land buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia	691,637	23,803	7,919	3,758	727,117	650,486	20,394	11,500	3,473	685,853
New Brunswick	155,535	15,851	10,353	24,364	206,103	142,855	10,342	7,015	34,991	195,203
Quebec	4,413,874	328,572	184,390	847,555	5,774,391	4,313,765	365,464	121,019	708,635	5,508,883
Ontario	6,759,665	226,124	264,099	323,005	7,602,893	4,756,566	142,507	138,128	399,547	5,436,748
Manitoba	541,470	39,111		54,562	635,143	457,198	40,399		49,644	547,241
Alberta	12,000			800	12,800					
British Columbia	542,901	34,721	17,664	204,465	799,751	533,479	34,740	15,041	26,648	609,908
<b>Canada</b>	<b>13,147,882</b>	<b>668,182</b>	<b>484,425</b>	<b>1,458,599</b>	<b>15,758,186</b>	<b>10,854,349</b>	<b>613,846</b>	<b>292,763</b>	<b>1,222,938</b>	<b>12,963,936</b>

Table 377.—Employees, Salaries and Wages in the Stone Industry in Canada, by Provinces, 1933 and 1934

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
<b>1933</b>						
Nova Scotia.....	7	68	75	7,460	43,841	51,301
New Brunswick.....	9	75	84	8,612	45,056	53,668
Quebec.....	81	1,060	1,141	99,944	524,634	624,578
Ontario.....	72	346	418	132,307	216,889	349,196
Manitoba.....	19	64	83	42,733	28,388	71,121
Alberta.....		3	3		3,392	3,392
British Columbia.....	11	70	81	20,513	77,007	97,520
<b>Canada</b> .....	<b>199</b>	<b>1,686</b>	<b>1,885</b>	<b>311,569</b>	<b>939,207</b>	<b>1,250,776</b>
<b>1934</b>						
Nova Scotia.....	4	84	88	6,560	61,956	68,516
New Brunswick.....	9	92	101	9,298	71,311	80,609
Quebec.....	103	1,068	1,171	108,443	615,166	723,609
Ontario.....	75	540	615	138,089	303,576	441,665
Manitoba.....	14	20	34	37,325	15,352	52,677
Alberta.....						
British Columbia.....	12	66	78	17,370	54,826	72,196
<b>Canada</b> .....	<b>217</b>	<b>1,870</b>	<b>2,087</b>	<b>317,085</b>	<b>1,182,187</b>	<b>1,499,272</b>

\* See note page 26.

Table 378.—Number of Wage-Earners in Primary Stone Industries, by Months, 1932-1934

Month	1932	1933	1934	Month	1932	1933	1934
January.....	1,605	689	671	July.....	3,011	2,319	3,172
February.....	1,640	839	676	August.....	3,087	2,245	2,951
March.....	1,702	899	845	September.....	2,852	2,374	2,703
April.....	1,907	1,157	1,169	October.....	2,608	2,358	2,306
May.....	2,564	1,823	2,065	November.....	1,918	1,853	1,874
June.....	2,901	2,175	2,893	December.....	1,237	1,246	1,115

Table 379.—Production of Granite\* in Canada, 1925-1934

(For the years 1886 to 1924 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	971,718	2,014,535	1930.....	1,851,132	3,379,951
1926.....	1,064,423	1,574,627	1931.....	1,190,887	2,763,050
1927.....	730,049	1,383,557	1932.....	490,822	1,110,582
1928.....	1,195,810	2,366,946	1933.....	256,723	679,585
1929.....	1,728,165	3,080,815	1934.....	200,285	781,739

\* Includes all igneous rock.

Table 380.—Production of Limestone and Sandstone in Canada, 1925-1934

(For the years 1886 to 1924 see Mineral Production of Canada, 1928)

Year	Limestone		Sandstone		Year	Limestone		Sandstone	
	Tons	Value	Tons	Value		Tons	Value	Tons	Value
		\$		\$			\$		\$
1925.....	4,643,853	5,049,563	87,502	145,767	1930.....	7,732,675	8,075,618	384,610	769,060
1926.....	5,283,745	5,657,328	44,127	112,347	1931.....	6,262,430	6,305,538	924,101	1,332,883
1927.....	6,438,379	7,145,917	132,799	232,793	1932.....	3,687,241	3,227,715	509,480	340,458
1928.....	6,949,420	7,267,437	100,951	223,236	1933.....	2,572,911	2,142,516	99,043	108,502
1929.....	7,720,840	8,172,681	159,407	398,974	1934.....	3,747,779	3,157,832	115,169	143,283

Table 381.—Production of Marble in Canada, 1925-1934

(For the years 1886 to 1924 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1925.....	3,046	254,922	1930.....	26,089	809,582
1926.....	5,295	521,572	1931.....	20,442	668,713
1927.....	5,209	503,037	1932.....	12,379	250,706
1928.....	7,753	414,682	1933.....	10,897	65,913
1929.....	14,012	414,062	1934.....	13,783	69,475

Table 382.—Production (Sales) of Stone from Canadian Quarries, by Kinds and by Provinces, 1933 and 1934

Province	Granite	Limestone*	Marble	Sandstone	Total
1933					
Nova Scotia.....	tons 8,145	21,514		11,790	41,449
	\$ 30,675	43,911		16,043	96,629
New Brunswick.....	tons 1,792	14,262		660	16,714
	\$ 82,771	41,994		6,695	131,370
Quebec.....	tons 131,837	1,129,248	7,983	73,425	1,342,493
	\$ 498,207	940,019	42,283	58,231	1,418,740
Ontario.....	tons 19,650	1,222,752	2,614	8,890	1,253,906
	\$ 39,433	910,419	21,083	12,333	993,268
Manitoba.....	tons 332	32,858			33,190
	\$ 2,987	71,240			74,227
Alberta.....	tons	1,472		78	1,550
	\$	4,317		4,509	8,817
British Columbia.....	tons 94,967	150,805	300	4,200	250,272
	\$ 109,512	130,706	2,547	10,760	253,525
Canada.....	tons 256,723	2,572,911	10,897	99,043	2,939,574
	\$ 679,585	2,142,516	65,913	108,562	2,996,576
1934					
Nova Scotia.....	tons 325	105,620		17,123	123,068
	\$ 12,500	135,962		23,055	171,347
New Brunswick.....	tons 5,984	30,356		1,578	37,918
	\$ 76,793	78,441		5,948	161,182
Quebec.....	tons 69,428	1,034,058	9,302	86,364	1,199,152
	\$ 482,477	953,815	47,503	85,822	1,575,617
Ontario.....	tons 75,526	2,370,339	4,331	10,104	2,460,300
	\$ 128,386	1,788,107	20,556	28,458	1,965,507
Manitoba.....	tons 213	42,914			43,127
	\$ 2,702	50,843			53,545
Alberta.....	tons	2,737			2,737
	\$	8,104			8,104
British Columbia.....	tons 48,809	161,755	150		210,714
	\$ 73,081	142,560	1,416		217,057
Canada.....	tons 200,285	3,747,779	13,783	115,169	4,077,016
	\$ 781,739	3,157,832	69,475	143,283	4,152,329

NOTE.—In addition to the above production there was produced 250 tons of slate valued at \$3,750 in 1933 and 738 tons at \$4,802 in 1934; also not included in the limestone statistics are 616,364 tons of limestone consumed in the cement industry in 1933 and 806,546 tons in 1934. Limestone used in the Canadian lime industry is also not included; it is estimated that approximately 600,000 tons of limestone was burned in the manufacture of lime in 1934.

\*Production of limestone in Quebec includes marl used as fertilizer.



Table 383.—Production\* of Stone in Canada, by Provinces, Showing Purposes for Which Used, 1933

Item	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—								
Rough..... tons		167	14,975	13,205	461		730	29,538
..... \$		723	34,127	28,073	1,319		4,380	68,622
Dressed..... tons		140	7,848	1,223	1,272	78	200	10,761
..... \$		5,600	206,911	6,541	39,678	4,500	9,000	272,230
Monumental and ornamental—								
Rough..... tons	230	367	3,038	324			352	4,311
..... \$	3,100	18,742	25,794	11,764			3,597	62,997
Dressed..... tons	415	449	1,047	13			685	3,209
..... \$	21,075	58,865	113,988	404			24,187	218,519
Flagstone..... tons		19	24	823				866
..... \$		675	61	1,685				2,421
Curbstone..... tons		202	1,027	30				1,259
..... \$		2,363	4,099	9				6,471
Paving blocks..... tons		161	1,370	80			30	1,641
..... \$		1,840	8,736	500			200	11,276
Lining open-hearth furnaces..... tons					240			240
..... \$					450			450
Chemical—								
Flux in iron and steel plants..... tons			887	19,456	725			21,068
..... \$			1,180	11,674	1,106			13,960
Flux in smelters..... tons				46,792			27,314	74,106
..... \$				36,496			22,402	58,898
Glass factories..... tons			50			771		821
..... \$			375			1,157		1,532
Pulp and paper mills..... tons	4,584	3,892	56,780	32,427	9,259		25,228	132,170
..... \$	7,451	5,051	46,843	28,686	9,469		35,010	132,510
Sugar refineries..... tons				14,636	9,421			24,057
..... \$				10,950	10,833			21,813
Other chemical uses..... tons	35		25	63,005				63,065
..... \$	542		162	68,235				68,939
Whiting..... tons								
..... \$								
Asphalt filler..... tons	178		24,469	133				24,780
..... \$	808		70,362	914				72,084
Dusting coal mines..... tons						487		487
..... \$						1,948		1,948
Agricultural purposes..... tons	6,717	10,350	47,894	13,385			291	78,639
..... \$	19,510	30,649	43,172	9,323			1,428	110,680
Poultry grit..... tons		20	62	1,208	486	214	174	2,164
..... \$		204	465	5,183	709	1,212	1,260	9,633
Stucco dash..... tons			966	2,346			61	3,373
..... \$			5,632	14,463			428	20,523
Terraazo flooring..... tons			238					238
..... \$			1,675					1,675
Rubble and riprap..... tons	85	350	82,685	4,454	1,295		85,847	174,716
..... \$	127	140	61,749	2,186	944		71,371	136,519
Concrete aggregate..... tons			717,586	263,864				981,450
..... \$			477,420	204,768				682,188
Crushed stone..... tons	29,205		352,053	729,671	10,031		92,029	1,212,989
..... \$	44,016		325,297	526,562	9,719		62,910	969,501
Road metal..... tons		597	28,869	46,831			17,327	93,624
..... \$		518	19,692	14,822			17,327	52,359
Railroad ballast..... tons								
..... \$								
Total..... tons	41,149	16,711	1,342,193	1,233,996	33,190	1,550	250,279	2,939,574
..... \$	96,629	131,370	1,418,710	983,268	74,227	8,817	233,525	2,996,576
Per cent of total..... Quantity	1.41	0.57	45.67	42.06	1.13	0.05	8.51	100.00
..... Value	3.22	4.38	48.35	32.81	2.46	0.30	8.46	100.00

\* See footnote to table 382.

\* Sales or shipments from quarries.

Table 384.—Production\* of Stone in Canada, by Provinces, Showing Purposes for Which Used, 1934

Item	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—								
Rough..... tons	8	14	12,867	14,522	460		733	28,604
\$	70	164	32,563	56,386	1,306		3,696	94,485
Dressed..... tons		920	21,975	1,014	150		2	24,061
\$		5,503	376,606	6,774	6,430		300	395,610
Monumental and ornamental—								
Rough..... tons	175	312	3,477	209	213		213	4,659
\$	2,300	5,017	25,921	5,553	2,703		2,482	43,975
Dressed..... tons	150	473	3,320	6			745	4,700
\$	10,000	62,317	171,682	176			28,210	272,391
Flagstone..... tons			47	547			20	614
\$			47	3,745			16	3,908
Curbstone..... tons		68	276				1	345
\$		578	1,066				1	1,645
Paving blocks..... tons		125	4,931	72			32	5,160
\$		1,000	42,411	405			199	44,015
Lining open-hearth furnaces..... tons					602			602
\$					1,129			1,129
Chemical—								
Flux in iron and steel plants..... tons			3,488	86,352	1,789			91,629
\$			9,507	52,020	2,866			64,399
Flux in smelters..... tons			625	112,496		360	32,246	145,733
\$			563	84,909		549	28,595	112,616
Glass factories..... tons			1,450			1,021		2,471
\$			9,419			1,531		10,950
Pulp and paper mills..... tons	4,615	3,807	74,670	29,809	10,575		26,521	149,997
\$	8,507	5,502	61,057	26,181	10,649		32,466	144,362
Sugar refineries..... tons		50	12,026	6,623				19,299
\$		185	9,470	7,620				17,275
Other chemical uses..... tons			2,810	76,773	371		500	80,451
\$			2,067	93,167	575		2,018	97,827
Whiting..... tons								
Asphalt filler..... tons	237	318	19,005	1,076				20,636
\$	948	1,273	30,867	4,861				43,949
Dusting coal mines..... tons						658		658
\$						2,632		2,632
Agricultural purposes..... tons	2,958	19,348	38,383	20,702			173	81,564
\$	8,367	60,958	59,282	12,827			692	142,126
Rock wool..... tons				229				229
\$				321				321
Roofing..... tons				4,582				4,582
\$				36,345				36,345
Poultry grit..... tons		12	120	1,090	368	692	100	2,382
\$		120	780	4,646	552	3,392	654	10,144
Stucco dash..... tons			1,213	1,754			28	2,995
\$			7,323	6,720			306	14,358
Terrazzo flooring..... tons			74	608	170			852
\$			501	2,432	379			3,312
Rubble and riprap..... tons	216	1,171	122,060	12,177	2,678		37,103	175,405
\$	399	568	66,018	7,575	2,330		31,302	109,192
Concrete aggregate..... tons			420,719	400,380				821,099
\$			311,960	296,280				608,240
Crushed stone—								
Road metal..... tons	114,709	11,300	411,270	1,413,113	19,128		92,967	2,062,487
\$	140,720	18,000	328,126	1,096,284	17,007		68,784	1,668,927
Railroad ballast..... tons			56,366	270,106			19,330	345,802
\$			31,551	158,415			19,330	209,296
<b>Total..... tons</b>	<b>123,068</b>	<b>37,918</b>	<b>1,199,152</b>	<b>2,460,300</b>	<b>43,127</b>	<b>2,737</b>	<b>210,714</b>	<b>4,077,016</b>
<b>    \$</b>	<b>171,317</b>	<b>161,182</b>	<b>1,575,617</b>	<b>1,963,597</b>	<b>53,545</b>	<b>8,104</b>	<b>217,657</b>	<b>4,152,329</b>
Per cent of total..... Quantity	3.0	0.9	29.4	60.4	1.1	0.0	5.2	100.00
Value	4.1	4.0	37.9	47.3	1.3	0.2	5.2	100.00

NOTE.—See footnote to table 382.

\* Sales or shipments from quarries.

Table 385.—\*Production of Stone in Canada, by Kinds, Showing Purposes for Which Used, 1933 and 1934

Kind		Granite		Limestone		Marble		Sandstone	
		Tons	Value	Tons	Value	Tons	Value	Tons	Value
			\$		\$		\$		\$
Building—									
Rough.....	1933	1,749	6,994	20,987	49,548	35	2,083	6,707	9,997
	1934	4,752	16,228	14,493	50,682	1,000	4,000	8,359	23,575
Dressed.....	1933	4,140	114,318	5,638	111,235	165	27,377	818	19,309
	1934	10,105	216,574	13,036	173,536			920	5,500
Monumental and ornamental—									
Rough.....	1933	3,758	49,469			553	13,528		
	1934	4,325	37,464	47	349	287	6,162		
Dressed.....	1933	3,090	215,616	118	2,868			1	35
	1934	4,212	244,286	123	3,488	358	24,342	7	275
Flagstone.....	1933	70	35	24	61			772	2,325
	1934	20	16	82	67			812	3,725
Curbstone.....	1933	1,224	6,437	35	34				
	1934	345	1,645						
Paving blocks.....	1933	1,641	11,276						
	1934	5,160	44,015						
Lining open-hearth furnaces.....	1933			240	450				
	1934			602	1,129				
Chemical—									
Flux in iron and steel plants.....	1933			21,068	13,963				
	1934			91,629	64,399				
Flux in smelters.....	1933			74,106	58,898				
	1934			145,733	112,616				
Glass factories.....	1933			771	1,157	50	375		
	1934			1,021	1,531	1,450	9,419		
Pulp and paper mills.....	1933			128,852	129,856	3,318	2,654		
	1934			146,767	141,989	3,230	2,373		
Sugar refineries.....	1933			24,057	21,813				
	1934			19,299	17,275				
Other chemical uses.....	1933			63,065	68,939				
	1934			77,641	95,760	2,810	2,067		
Whiting.....	1933								
	1934								
Asphalt filler.....	1933	92	736	24,688	71,348				
	1934	171	1,368	20,465	42,581				
Dusting coal mines.....	1933			487	1,948				
	1934			658	2,632				
Agricultural purposes.....	1933			78,639	110,080				
	1934			81,564	142,126				
Rock wool.....	1933								
	1934			229	321				
Roofing.....	1933	1,193	9,544						
	1934	4,457	35,656	125	689				
Poultry grit.....	1933	3	60	891	3,325	1,270	5,648		
	1934	6	90	1,289	5,304	1,087	4,750		
Stucco dash.....	1933			61	428	2,119	10,551		
	1934			146	943	2,849	13,415		
Terrazzo flooring.....	1933					238	1,675		
	1934			170	379	682	2,933		
Rubble and riprap.....	1933	103,584	89,651	30,848	15,535	3,149	2,022	37,135	29,311
	1934	38,212	32,261	105,578	56,876	30	14	31,585	19,041
Crushed stone—									
Concrete aggregate.....	1933	19,259	21,962	961,854	659,975			347	276
	1934	22,680	23,278	789,856	574,271			8,563	10,691
Road metal.....	1933	116,323	152,969	1,043,455	769,217			53,203	47,318
	1934	135,840	125,858	1,697,307	1,466,943			59,340	73,126
Railroad ballast.....	1933	597	518	93,027	51,841				
	1934			339,919	201,946			5,983	7,350
Total.....	1933	256,723	679,585	2,572,911	2,142,516	10,897	65,913	99,043	108,562
	1934	290,285	781,739	3,747,779	3,157,832	13,783	69,175	115,169	113,283

\* For production of stone see Table 379 and footnote to Table 382.

Table 386.—Production of Stone for Building Purposes, Chemical Use, Cement Manufacture, Concrete Aggregate, Road Metal and Railroad Ballast, 1930-1934

		Building stone (a)	For chemical purposes (b)	For concrete aggregate	For road metal	For railroad ballast	For cement manufacture
1930.....	tons	173,204	586,456	2,115,104	3,910,245	2,036,981	2,925,399
	\$	4,184,778	540,534	1,623,904	3,434,935	1,674,298	
1931.....	tons	129,345	333,699	3,275,276	3,122,633	652,352	2,489,147
	\$	3,717,993	314,088	2,555,204	2,557,515	485,447	
1932.....	tons	62,951	228,966	1,929,750	1,847,371	89,835	1,141,376
	\$	1,035,571	188,825	1,329,088	1,474,870	84,930	
1933.....	tons	40,299	315,287	981,460	1,212,981	93,624	616,364
	\$	340,852	297,652	682,213	969,504	52,359	
1934.....	tons	52,665	489,580	821,099	2,062,487	345,802	806,540
	\$	490,095	447,429	608,240	1,668,927	209,296	

(a) Does not include monumental or ornamental stone.

(b) Does not include limestone used in Canadian lime industry.

Table 387.—Imports into Canada and Exports of Stone, by Kinds, 1933 and 1934

	1933		1934	
	Tons	Value \$	Tons	Value \$
<b>IMPORTS—</b>				
Curling stones and handles..... pair	115	3,075	113	2,645
Building stone, other than marble or granite, sawn on more than two sides, but not sawn on more than four sides.....	4	200		
Building stone, other than marble or granite, planed, turned, cut, or further manufactured than sawn on four sides.....			1	122
Flagstone, sandstone, and all building stone, not hammered, sawn or chiselled.....		8,947	3,155	16,879
Flagstone and building stone, other than marble or granite, sawn on not more than two sides.....		729	305	2,749
Granite, rough, not hammered or chiselled.....		48,928		65,925
Granite, sawn only.....		5,366		4,961
Granite, monuments.....		28,916		19,036
Granite, manufactures of, n.o.p.....		8,495		8,212
Marble, rough, not hammered or chiselled.....		7,063		3,144
Marble, sawn or sand rubbed, not polished.....		10,474		11,322
Marble, not further manufactured than sawn for tombstones.....		16,695		15,078
Marble, manufactures of, n.o.p.....		18,526		8,440
Paving blocks of stone.....		25		
Refuse stone, not sawn, hammered or chiselled.....	41,277	35,773	364,088	200,398
Slate roofing.....		7,064		12,476
Slate pencils.....		722		465
Slates, writing.....		17,816		18,354
Slate mantels and manufactures of slate, n.o.p.....		4,965		9,671
Chalk, china, Cornwall or cliff stone and mica schist.....		17,283		21,371
Mineral wool.....	1,115	38,262	1,494	69,267
Whiting, gilders' whiting and Paris white.....	9,903	91,744	12,034	119,643
Manufactures of stone, n.o.p.....		15,531		22,126
Lithographic stones not engraved.....		1,366		211
Pumice and pumice stone, lava and calcareous tufa, not further manufactured than ground.....		18,113		25,142
Grindstones, not mounted, and not less than 36 inches in diameter.....No.		76,615	1,024	140,327
<b>Total.....</b>		<b>482,693</b>		<b>797,963</b>
<b>EXPORTS—</b>				
Crushed stone.....	40,343	76,162	52,273	94,794
Granite and marble, unwrought.....	964	12,997	1,153	9,766
Freestone, limestone, and other building stone, unwrought.....	173	1,480		
Dressed stone of all kinds.....		701		409
Grindstones, manufactured.....		2,840		4,947
<b>Total.....</b>		<b>94,186</b>		<b>109,916</b>

## 2. SECONDARY PRODUCTION—Monumental and Ornamental Stone Industry

In 1934 there were 218 stone dressing works in Canada which were not operated in conjunction with the producers' own quarries. These works were engaged chiefly in cutting and polishing rough stone purchased from Canadian quarries or imported from foreign countries to produce finished monuments or dressed stone for building purposes. Production from these works



amounted in value to \$2,407,474 in 1934 as compared with \$2,162,650 in 1933 and \$2,961,914 in 1932. Output from the 111 establishments in Ontario totalled \$1,329,398 or 55 per cent of the total for Canada, and production from the 50 works in Quebec amounted to \$552,298 or 23 per cent of the total.

The average number of employees in the 218 works in this group was 881 in 1934 as compared with 821 in 1933 and payments in salaries and wages advanced to \$886,809 from \$841,425.

The cost of rough stone and other materials used in 1934 was \$834,323 as against \$691,523 in 1933.

Capital employed was reported at \$5,194,702 in 1934, including \$2,912,024 as the value of land, buildings, machinery and other equipment, \$1,274,603 as the value of inventories of raw materials, finished products and stocks in process, and \$1,008,075 as the total of operating capital. In 1933 the corresponding total was \$5,461,171.

Output of building stone has been much below normal during the past three years because of continued inactivity in the building trades. In 1934 the total output of dressed building stone, including that produced in both the primary and secondary plants was valued at \$849,748 as compared with \$666,973 in 1933, \$1,949,199 in 1932, \$6,819,615 in 1931, \$8,527,501 in 1930, and \$6,956,583 in 1929.

The total value of dressed stone for monumental and ornamental purposes was \$1,738,362 in 1934, \$1,560,521 in 1933, \$1,586,861 in 1932, \$2,143,030 in 1931, \$2,600,019 in 1930, and \$2,687,818 in 1929.

Table 388.—Production from the Monumental and Ornamental Stone Industry, by Provinces, 1933 and 1934

	Granite		Marble		Marble chips and dust	Limestone		Finished monuments, lettered only	Other products	Total
	Monu-ments	For building pur-poses	Monu-ments	For building pur-poses		Monu-ments and bases	For building pur-poses			
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Prince Edward Island										
1933	6,740		9,067					3,504	275	19,886
1934	9,410		9,806					4,560	212	24,987
Nova Scotia—										
1933	71,447		14,380			900		15,763	2,227	104,717
1934	64,102		13,741			1,679		25,330	2,554	107,406
New Brunswick—										
1933	42,791		1,900					3,565	443	49,699
1934	40,656		2,679			315		2,428	177	46,255
Quebec—										
1933	251,597	2,867	26,047	24,435	450	3,730	64,063	23,119	38,373	434,681
1934	327,867	17,865	21,652	35,812	672	1,110	106,119	25,243	15,958	552,298
Ontario—										
1933	593,140	26,472	88,179	26,060	1,000	13,052	215,495	240,507	25,811	1,229,316
1934	663,325	5,672	61,470	80,752		13,027	164,904	303,070	37,118	1,329,398
Manitoba—										
1933	51,691		14,073	11,300	100	6,537		31,411	2,593	117,705
1934	54,353	150	12,027	7,226	50	3,569	5,194	26,700	2,018	111,287
Saskatchewan—										
1933	27,824	810	18,290		1,087	4,371	1,516	6,237	4,533	64,688
1934	25,948	810	21,671		1,688	4,811	4,002	10,129	3,160	72,214
Alberta—										
1933	38,009	10,000	22,285	5,000	75	1,760		7,725	315	85,189
1934	48,091	11,000	17,612	5,650	40	2,535		9,360	1,040	95,319
British Columbia—										
1933	29,115	75	6,092	6,050				14,233	2,204	57,769
1934	37,262	460	7,544	8,462				13,902	1,681	69,311
Canada—										
1933	1,111,354	40,224	290,313	73,115	2,712	30,370	281,074	346,364	76,794	2,162,650
1934	1,271,009	35,957	168,201	137,902	2,450	27,636	286,279	420,722	63,818	2,407,474

## APPENDIX ONE

## EXPLANATORY NOTES

*Method of Computing Quantities and Values of the Mineral Production of Canada in 1934.*

*Arsenic.*—White arsenic ( $As_2O_3$ ) shipped from Canadian smelters at its sales value.

*Bismuth.*—(a) Recoverable metal in silver-lead-bismuth bullion shipped to foreign smelters for refining, at an arbitrary price; (b) Bismuth metal produced at Canadian smelters valued at the average New York price for the year.

*Cadmium.*—Smelter production valued at the average London price for the year.

*Cobalt.*—Cobalt content of the various cobalt products sold by the Ontario smelter producing these products added to the cobalt content of ores and residues exported for treatment in foreign smelters; the value given is the net amount received by the shippers.

*Copper.*—(a) Recoverable copper in ores and concentrates exported valued at the average London price for the year, in Canadian funds; (b) Copper in blister copper made by British Columbia, Manitoba, Ontario and Quebec smelters valued at the average London price for the year in Canadian funds; (c) Copper in copper-nickel matte exported from Canadian smelters valued at an arbitrary price agreed upon between the Dominion Bureau of Statistics and the Ontario Department of Mines.

*Gold.*—Gold in bullion produced and the recoverable gold in all other Canadian mine products is valued at the standard rate of \$20·671834 per fine ounce until the end of 1930. For succeeding years unless otherwise specified gold is valued at the average price on world markets transposed to Canadian funds.

*Lead.*—Recoverable lead in ores exported from Canada added to lead contained in base bullion made at Trail, B.C., valued at the average London quotations for the year in Canadian funds.

*Nickel.*—(a) Refined and electrolytic nickel produced at Canadian refineries valued in Canadian funds at the average price obtained for such products sold during the year; (b) Nickel in oxides and salts sold from Canadian smelters and refineries at its total selling value in Canadian funds in the form in which it was sold; (c) Nickel in matte exported from Canada valued at an arbitrary figure agreed upon by the Ontario Department of Mines and the Dominion Bureau of Statistics (representative of the value of the nickel in matte form).

*Platinum Group Metals.*—Recoverable metals in smelter products and placer platinum at the average London price and transposed to Canadian funds.

*Silver.*—Silver bullion produced and the recoverable silver in other smelter products, and the recoverable silver in Canadian ores exported, at the average New York price for the refined metal in Canadian funds.

*Tellurium and Selenium.*—Smelter production valued at the average London price for the year.

*Zinc.*—Refined zinc produced by the Consolidated Mining and Smelting Co. Ltd., at Trail, B.C., and by the Hudson Bay Mining and Smelting Co. Ltd., Flin Flon, Manitoba, and the recoverable zinc in concentrates exported, valued at the average monthly price quoted in London in Canadian funds.

*Coal.*—Output tonnage evaluated pro rata according to income from sales.

*Other Non-Metallic Minerals, Clay Products and Structural Materials.*—Shipments during the year at their respective sales values.

*Imports.*—Statements of quantities and values are based on the declarations of importers, as subsequently checked by government officials.

The value of imported merchandise is the fair market value or the price thereof when sold for home consumption in the principal markets of the country whence and at the time when the same were exported directly to Canada. The price and value of the goods in every case are stated as in condition packed ready for shipment, the fair value being shown in the currency of the country of export, and the selling price to the purchaser in Canada shown in the actual currency in which the goods were purchased. In the case of goods that are the manufacture or produce of

a foreign country, the currency of which is substantially depreciated, the value stated is the value that would be placed on similar goods manufactured or purchased in the United Kingdom and imported from that country, if such similar goods are made or produced there. If similar goods are not made or produced in the United Kingdom, the value stated is the value of similar goods made or produced in any European country the currency of which is not substantially depreciated.

*Exports.*—Statements of quantities and values are based on the declaration of exporters as subsequently checked by government officials.

The value of exports of Canadian merchandise is the actual cost or the value at the time of exportation at the points in Canada whence originally shipped.

*Weight.*—Weight, where shown in imports and exports is the net weight of the goods, excluding the weight of the covers or receptacles, except in the cases of certain goods, as provided in the tariff.

The expression "ton" means 2,000 pounds, and cwt. 100 pounds, avoirdupois. Where other units of quantity are used, imperial standards apply.

# DIRECTORY

In the following pages the names and addresses of all the principal operators in the Canadian mining industry are given and the location of the properties worked in 1934 is also shown.

## METAL MINING INDUSTRIES

### Alluvial Gold Mining Industry\*

Name	Head office address	Location
<b>QUEBEC—</b>		
Cook and Lloyd.....	St. Simon les Mines.....	Gilbert River.
Gold River Mining Co. Ltd.....	950 New Birks Bldg., Montreal.....	Compton Co.
Unit Co. Ltd.....	52 St. Peter St., Quebec.....	Beauce Co.
<b>ALBERTA—</b>		
McLeod River Mining Corp., Ltd.....	200 Bay St., Toronto, Ont.....	McLeod River.
<b>BRITISH COLUMBIA—</b>		
Alberta Pacific Cons. Oils, Ltd.....	302 Toronto General Trusts Bldg., Calgary, Alberta.....	Lillooet Mining Div.
Barkerville Gold Mines, Ltd.....	708-525 Seymour St., Vancouver.....	Barkerville.
Barrington, S.C.....	Wrangell, Alaska.....	Stikine.
Black Watch Mines, Ltd.....	Nelson.....	Nelson Mining Div.
Boundary Creek Mining Co.....	814 Metropolitan Bldg., Vancouver.....	Greenwood Mining Div.
Bride, Maurice.....	Atlin.....	Atlin Mining Div.
Brown, H. P.....	Hixon.....	Barkerville.
Buchanan & Cumming.....	Atlin.....	Atlin Mining Div.
Bullion Placers, Ltd.....	501 Vancouver Block, Vancouver.....	Quesnel Mining Div.
Butterworth & MacKay Bros.....	1056 Foul Bay Rd., Victoria.....	Leech River.
Cariboo Northern Development Co., Ltd.....	704 Bank of Toronto Bldg., Victoria.....	Omineca Mining Div.
Cedar Creek Hydraulic Mines, Ltd.....	323 Sayward Bldg., Victoria.....	Quesnel Mining Div.
Clay, J. R.....	Spruce Creek, Atlin.....	Atlin Mining Div.
Colpe, Chas. H.....	Atlin.....	Atlin Mining Div.
Columbia Development, Ltd.....	410 King St., Kitchener, Ont.....	Atlin Mining Div.
Compagnie Française des Mines d'Or du Canada.....	19 rue d'Aurnale, Paris, France.....	Atlin Mining Div.
Consolidated Gold Alluvials of B.C., Ltd.....	1040 West Georgia St., Vancouver.....	Lightning Creek.
Consolidated Mining & Smelting Company of Canada, Ltd.....	Trail.....	Atlin Mining Div., Fort Steel Mining Div., Omineca Mining Div.
De Mers Placer, Ltd.....	660 St. Catherine St. W., Montreal, P.Q.....	Wigwam.
Dredgement Syndicate.....	Tiell.....	Shuttle Island.
Eastman Reil Gulch Placers, Ltd.....	Barkerville.....	Cariboo Mining Div.
Eldorado Placers, Ltd.....	1044 Bench Ave., Vancouver.....	Cariboo Mining Div.
Elieff, McDonald & McKay.....	Atlin.....	Spruce Creek.
Falconer, D. H.....	Atlin.....	Atlin Mining Div.
French Creek Hydraulic Placers, Ltd.....	410 Lancaster Bldg., Calgary, Alberta.....	Cariboo Mining Div.
Gold Run Exploration Co., Ltd.....	509 Union Bldg., Victoria.....	Atlin Mining Div.
Golden Strand Syndicate (N. H. Tarry).....	Massett.....	Graham Island.
Guyet Placers, Ltd.....	1012 Royal Bank Bldg., Vancouver.....	Barkerville.
High Run Placer Gold Mines, Ltd.....	319 West Pender St., Vancouver.....	Jessica.
Hodges & Moron.....	Atlin.....	Atlin.
Jacobson, Roy.....	Troat Lake.....	Larleeau Creek.
Johnson, Nelson & Ueland.....	Atlin.....	Spruce Creek.
Ketch Hydraulic Co.....	Van Winkle.....	Devil's Canyon.
Lower Bridge River Placers, Ltd.....	708 Yorkshire Bldg., Vancouver.....	Lillooet Mining Div.
Lowhee Mining Co., Ltd.....	1109 Rust Bldg., Tacoma, Wash., U.S.A.....	Cariboo.
Lykegard, Carl E.....	Atlin.....	Spruce Creek.
Matson & Schultz.....	Atlin.....	Ruby Creek.
Morse, McKechnie & Brett.....	Atlin.....	Spruce Creek.
McKinnon, Chas. E.....	Atlin.....	Spruce Creek.
Mew, Edmund.....	914 East 15th Ave., Vancouver.....	Clinton Mining Div.
Moose Syndicate.....	Likely.....	Quesnel Mining Div.
Morrison, McKay & Johnson.....	Atlin.....	Ruby Creek.
Murphy, Nathan.....	Atlin.....	O'Donnell River.
Perrot, Francois.....	Quesnel.....	Finlay River.
Pine Creek Mining Co., Ltd.....	837 West Hastings St., Vancouver.....	Quesnel Mining Div.
Placer Engineers, Ltd.....	304-535 Georgia St. W., Vancouver.....	Quesnel Mining Div.
Queen City Mining Co.....	501-1411 4th Avenue Bldg., Seattle, Wash., U.S.A.....	Cariboo Mining Div.
Ruby Gold Mines, Ltd.....	470 Granville St., Vancouver.....	Quesnel Mining Div.
Sang Dang Placer.....	Barkerville.....	Cariboo Dist.
Silta & Hagberg.....	Finnmoore.....	
Skoldquist & Co.....	Atlin.....	Spruce Creek.
Slade-Cariboo Gold Placers, Ltd.....	1410 Hugo Bldg., Seattle, Wash., U.S.A.....	Barkerville.
Sombrio Placer Mining Syndicate.....	507 Stock Exchange Bldg., Vancouver.....	Victorian Mining Div.
Sovereign Creek Gold Mines, Ltd.....	612 Standard Bank Bldg., Vancouver.....	Quesnel Mining Div.
Sundberg, Carl.....	Wingdam.....	Barkerville.
Trehouse Hydraulic Mining Co.....	Barkerville.....	Cariboo Mining Div.
Turnquist, Emil.....	Atlin.....	Ruby Creek.
Tyughton Creek Gold Placers, Ltd.....	118 Vancouver Block, Vancouver.....	Lillooet Mining Div.
Walton, Lindal & Williams.....	Atlin.....	Spruce Creek.
Yates & Boe.....	Hudson Hope.....	Hudson Hope.
Yenger, A. C.....	Lamberton.....	Fort Steele Mining Div.
Zahara, A. J.....	Rycroft, Alberta.....	Hudson Hope.

(\*) In addition to the operators listed there were numerous active properties for which official returns were not received.



**DIRECTORY OF FIRMS—Continued**  
**Alluvial Gold Mining Industry—Concluded**

Name	Head office address	Location
<b>YUKON—</b>		
Holbrook Dredging Co.....	Glacier.....	60 Mile Creek.
Inea Mining Corp., Ltd.....	Carcross.....	Iron Creek.
McDonald, McCormick & Stewart.....	Glacier Creek.....	Glacier Creek.
Ostby, T.....	1070 Haro St., Vancouver, B.C.....	Hunker Creek.
Yukon Consolidated Gold Corp., Ltd.....	140 Wellington St., Ottawa, Ont.....	Dawson.

**Auriferous Quartz Mining Industry**

<b>NOVA SCOTIA—</b>		
*Associated Gold Mines of Nova Scotia, Ltd.	908 Transportation Bldg., Montreal, P.Q.....	Lawrencetown, Central Rawdon.
Banook Gold Mines, Ltd.....	1310 Concourse Bldg., Toronto, Ont.....	Molega.
Bracon Gold Mines, Ltd.....	706/100 Adelaide St. W., Toronto, Ont.....	Mill Village.
*Bluenose Gold Syndicate.....	321 Federal Bldg., Toronto, Ont.....	Goldboro.
Consolidated Mining & Smelting Company of Canada, Ltd.....	840 Dominion Square Bldg., Montreal, P.Q.....	Caribon Gold Mines.
Corwin Gold Mines, Ltd.....	Enfield.....	Oltham.
Guyshoro Mines, Ltd.....	1220/25 King St. W., Toronto, Ont.....	Goldthorpe.
Higgins & Lawlor.....	Moose River Gold Mines.....	Moose River Dist.
Hogan, F. J.....	Mt. Uniacke.....	Mt. Uniacke.
*Kemptville Gold Mining Co.....	Box 219, Yarmouth.....	Kemptville.
Lacey Gold Mining Co., Ltd.....	35 Bedford Row, Halifax.....	Chester Basin.
*Minerals, Limited.....	Roy Bldg., Halifax.....	Various mines.
Montague Gold Mines, Ltd.....	706/100 Adelaide St. W., Toronto, Ont.....	Dartmouth.
*Queens Mines, Ltd.....	297 Agricola St., Halifax.....	Mt. Uniacke.
Seal Harbour Gold Mines, Ltd.....	57 Bloor St. W., Toronto, Ont.....	Goldboro.
Stunt, S. J.....	Isaac's Harbour.....	Guyshoro Co.
*Thompson, J. H.....	Box 98, Oxford.....	Mooschoend.
United Goldfields of Nova Scotia, Ltd.....	Liverpool.....	Brookfield Mines.
<b>QUEBEC—</b>		
*Adanac Gold Mines, Ltd.....	601/330 Bay St., Toronto, Ont.....	Rouyn.
*Amity Gold Mines, Ltd.....	1302 Canada Permanent Bldg., Toronto, Ont.....	Bourlamaque Tp.
*Arenadian Rouyn Gold Mines Syndicate, Ltd.	Commonwealth Bldg., King St. E., Toronto, Ont.....	Rouyn.
*Arno Mines, Ltd.....	63 Sparks St., Ottawa, Ont.....	Rouyn.
*Arntfield Gold Mines, Ltd.....	303 Old Birks Bldg., Montreal.....	Arntfield.
*Avocelon Mining Syndicate, Ltd.....	67 Yonge St., Toronto, Ont.....	Vauquelin.
*Basin Gold Mines, Ltd.....	619/159 Craig St. W., Montreal.....	Varsan Tp.
*Beattie Gold Mines, Ltd.....	25 King St. W., Toronto, Ont.....	Duparquet Tp.
*Beaulor Gold Mines, Ltd.....	1208 Edifice Aldred, Montreal.....	Pascalis Tp.
*Bidlamaque Gold Mines, Ltd.....	320 Bay St., Toronto, Ont.....	Bourlamaque Tp.
*Birrell Gold Mines, Ltd.....	300 Sterling Tower, Toronto, Ont.....	Dupart Tp.
*Blake River Gold Mines, Ltd.....	317/132 St. James St. W., Montreal.....	Cadillac Tp.
*Blouin Lake Gold Mines, Ltd.....	136 Sparks St., Ottawa, Ont.....	Bourlamaque Tp.
*Bourbeau Lake Chibougamau Mines, Ltd.....	New Liskeard, Ont.....	Chibougamau.
*Browlee Mines, Ltd.....	Box 456, Noranda.....	Noranda.
*Bussières Mining Co., Ltd.....	221 Notre Dame St. W., Montreal.....	Louvicoourt Tp.
*Caldier-Bousquet Gold Mines, Ltd.....	706/100 Adelaide St. W., Toronto, Ont.....	Bousquet Tp.
*Canadian Malartic Gold Mines, Ltd.....	25 King St. W., Toronto, Ont.....	Fournière Tp.
*Canadian Pandora Gold Mines, Ltd.....	Box 790, New Liskeard, Ont.....	Cadillac Tp.
*Central Malartic Mines, Ltd.....	350 Bay St., Toronto, Ont.....	Malartic Tp.
*Chibougamau-Tibermont Syndicate.....	810 Federal Bldg., 85 Richmond St. W., Toronto, Ont.....	Tibermont Tp.
*Cunigas Reduction Co., Ltd.....	320 Bay St., Toronto, Ont.....	Guilet Tp.
*Consolidated Chibougamau Goldfields, Ltd.	276 St. James St. W., Montreal.....	Chibougamau.
*Consolidated Mining & Smelting Company of Canada, Ltd.....	840 Dominion Square Bldg., Montreal.....	
*Contact Gold Mines, Ltd.....	320 Bay St., Toronto, Ont.....	Bourlamaque Tp.
*Cummings-Trudel Mining & Develop. Co., Ltd.....	201 Victoria Bldg., Ottawa, Ont.....	Barrute Tp.
*Del Rio Mining Co., Ltd.....	506/50 Sparks St., Ottawa, Ont.....	Destor Tp.
*Dorington Mining Syndicate.....	2408 Stanley St., Niagara Falls, Ont.....	Boischatel Tp.
*Dorval-Siscoe Gold Mines, Ltd.....	357 Bay St., Toronto, Ont.....	Varsan Tp.
*Dubuison Mines, Ltd.....	25 King St. W., Toronto, Ont.....	N. W. Quebec.
*Duparquet Mining Co., Ltd.....	204 Hospital St., Montreal.....	Duparquet Tp.
*East Lamaque Gold Mines, Ltd.....	357 Bay St., Toronto, Ont.....	Bourlamaque Tp.
*East Malartic Mines, Ltd.....	913 Royal Bank Bldg., Montreal.....	Fournière Tp.
*Engineers Exploration Co., Ltd.....	Box 310, Noranda.....	
*Eric Canadian Mines, Ltd.....	Box Ex, Kirkland Lake, Ont.....	N. W. Quebec.
*Explorer Syndicate.....	c/o W. M. Goodwin, Ste. Anne de Bellevue.....	Rouyn Tp.
*Farrell Rouyn Mines, Ltd.....	25 King St. W., Toronto, Ont.....	Rouyn Tp.
*Fleming Mines, Ltd.....	2150 St. Jacques St., Montreal.....	Pascalis Tp.
*Fleming-Thompson Gold Mines, Ltd.....	Box 308, Rouyn.....	Duparquet Tp.
*Francoeur Gold Mines, Ltd.....	941 Dominion Square Bldg., Montreal.....	Boischatel Tp.
*Galatea Gold Mines, Ltd.....	1335 Star Bldg., Toronto, Ont.....	Duparquet Tp., Destor Tp.
*Gilbee Mines, Ltd.....	200 Bay St., Toronto, Ont.....	Pascalis Tp.
*Glenwood Mining Co., Ltd.....	Rouyn.....	Rouyn Tp.
*Gold Bar Mines, Ltd.....	204 Royal Bank Bldg., Toronto, Ont.....	Rouyn.
*Golden Quebec Mines, Ltd.....	Sterling Tower, Toronto, Ont.....	Bousquet Tp.
*Granada Gold Mines, Ltd.....	234 Royal Bank Bldg., Toronto, Ont.....	Rouyn Tp.
*Green Stabell Mines, Ltd.....	1406 Concourse Bldg., Toronto, Ont.....	Dubuison Tp.

## DIRECTORY OF FIRMS—Continued

## Auriferous Quartz Mining Industry—Continued

Name	Head office address	Location
<b>QUEBEC—Continued</b>		
*Halliwell Gold Mines, Ltd.	132 St. Jacques W., Montreal	Boischatel Tp.
*Harricana Amalgamated Gold Mines, Ltd.	105 Mountain Hill, Quebec	Abitibi Co.
*Herbin Lake Gold Syndicate, Ltd.	357 Bay St., Toronto, Ont.	Bourlamaque Tp.
*Joannes Mine Corporation	276 St. James St., Montreal	Joannes Tp.
*Jupiter Gold Syndicate	601/330 Bay St., Toronto, Ont.	Rouyn Tp.
*Kayroc Gold Mining Co., Ltd.	244 Bay St., Toronto, Ont.	Rouyn Tp.
*Kindall Mines, Ltd.	217 University Tower, Montreal	Rouyn Tp.
*Kinghorn Sturgeon Mines, Ltd.	357 Bay St., Toronto, Ont.	Bourlamaque Tp.
*Kirkland Crest Gold Mining Syndicate	811 Ottawa Electric Bldg., Ottawa, Ont.	Louvicoourt Tp.
*Lake Expanse Mines, Ltd.	701/407 McGill St., Montreal	Guillett Tp.
*Lake Fortune Gold Mines, Ltd.	941 Dominion Square Bldg., Montreal	Boischatel Tp.
La Mine d'Or Venus Cons.	51 Rue Colomb, Quebec	Barraute Tp.
*Leader Gold Mines, Ltd.	405 Concourse Bldg., 100 Adelaide St. W., Toronto, Ont.	Tibblemont Tp.
*Lamaque Gold Mines, Ltd.	Bourlamaque via Amos	Bourlamaque Tp.
*Louvre Gold Mines, Ltd.	701/407 McGill St., Montreal	Louvicoourt Tp.
*Manley Quebec Gold Mines, Ltd.	703/357 Bay St., Toronto, Ont.	LaRaine Tp.
*McDonald Gold Mines, Ltd.	Elmira, Ont.	Duparquet Tp.
*McIntyre Porcupine Mines, Ltd.	Schumacher, Ont.	Guillett Tp.
*McWatters Gold Mines, Ltd.	Box 689, Rouyn	Rouyn Tp.
*Maritime Cadillac Syndicate	Moncton, N.B.	Cadillac Tp.
*Murwood Gold Mines, Ltd.	405 Concourse Bldg., Toronto, Ont.	Tibblemont Tp.
*Met-Mac Prospectors, Ltd.	701/407 McGill St., Montreal	Louvicoourt Tp.
*Midland Mining Corp., Ltd.	231 Notre Dame St. W., Montreal	Desmeulieres Tp.
*Mines Development Corp.	139 St. Jean St., Quebec	N. W. Quebec
*Monarch Mines, Ltd.	14 King St. E., Toronto, Ont.	Dasserat Tp.
*Mooshla Gold Mines, Ltd.	25 King St. W., Toronto, Ont.	Bousquet Tp.
*Newroy Gold Mines, Ltd.	465 Bay St., Toronto, Ont.	Louvicoourt Tp.
*Norlake Mining Corp.	Castle Bldg., Montreal	Rouyn
*Normont Gold Mines, Ltd.	905 Transportation Bldg., Montreal	Rouyn Tp.
*Northern Aerial Canada Golds, Ltd.	Concourse Bldg., Toronto, Ont.	N. W. Quebec
*Northern Chibougamau Mines, Ltd.	460 St. Francois Xavier St., Montreal	Chibougamau
*Northern Quebec Gold Fields & Exploration Co.	Three Rivers	Bousquet Tp.
*Northern Quebec Gold Mines, Ltd.	341 Dominion Square Bldg., Montreal	Rouyn
*Nu Sigma Gold Syndicate, Ltd.	320 Bay St., Toronto, Ont.	Bourlamaque Tp.
*O'Brien Gold Mines, Ltd.	Kewagama	Cadillac Tp.
*O'Leary Malartic Mines, Ltd.	Box 120, Noranda	N. W. Quebec
*O'Neill-Thompson Mining Syndicate	c/o E. B. Eddy Co., Hull	Joannes Tp.
*Pan Canadian Gold Mines, Ltd.	24 Milk St., Boston, Mass.	Cadillac Tp.
*Payore Gold Mines, Ltd.	357 Bay St., Toronto, Ont.	Bourlamaque Tp.
*Perron Gold Mines, Ltd.	Pascalis	Pascalis Tp.
*Pontiac Rouyn, Ltd.	706/100 Adelaide St. W., Toronto, Ont.	Noranda
*Powell Rouyn Gold Mines, Ltd.	440 Confederation Life Bldg., Toronto, Ont.	Rouyn Tp.
*Prospectors Airways, Ltd.	80 King St. W., Toronto, Ont.	Rose Lake
*Quebec Eureka Gold Mines, Ltd.	11 King St. W., Toronto, Ont.	Tibblemont Tp.
*Quebec Gold Belt Mines, Ltd.	Box 190, Fort Erie, Ont.	Bourlamaque Tp.
*Quebec Viking Gold Mines, Ltd.	335/330 Bay St., Toronto, Ont.	Boischatel Tp.
*Raymond Tibblemont Syndicate	205 Brock Bldg., Toronto, Ont.	Tibblemont Tp.
*Reodor Gold Mines, Ltd.	Usher Bldg., Toronto, Ont.	Bourlamaque Tp.
*Rouyn Reward Gold Mines, Ltd.	305/330 Bay St., Toronto, Ont.	Joannes and Rouyn Tps.
*Seguin Rouyn Gold Mines, Ltd.	507 Place d'Armes, Montreal	Rouyn
*Senneterre Gold Syndicate	1007/465 Bay St., Toronto, Ont.	Senneterre
*Shawkey Gold Mining Co., Ltd.	67 Yonge St., Toronto, Ont.	Dubuisson Tp.
*Sigma Mines, Ltd.	Valdor	Bourlamaque Tp.
*Sisroc Gold Mines, Ltd.	907 Dominion Square Bldg., Montreal	Dubuisson Tp.
*Sladen Malartic Mines, Ltd.	63 Sparks St., Ottawa, Ont.	N. W. Quebec
*South Tibblemont Mines, Ltd.	1007/465 Bay St., Toronto, Ont.	Tibblemont Tp.
*Sudbura Rouyn Mines, Ltd.	159 Craig St. W., Montreal	Rouyn
*Stanley Sisroc Extension Gold Mines, Ltd.	231 St. James St. W., Montreal	Varusan Tp.
*Sudbury Contact Mines, Ltd.	25 King St. W., Toronto, Ont.	Bousquet Tp.
*Sudbury Mines, Ltd.	11 Jordan St., Toronto, Ont.	Joannes Tp.
*Sullivan Consolidated Mines, Ltd.	1257 Aldred Bldg., Montreal	Dubuisson Tp.
*Tavernier Gold Mining Syndicate	11 King St. W., Toronto, Ont.	Tavernier Tp.
*Tibblemont Contact Mining Syndicate	34 King St. E., Toronto, Ont.	Tibblemont Tp.
*Tibblemont Extension Syndicate	811 Federal Bldg., Toronto, Ont.	Tibblemont Tp.
*Tibblemont Island Mining Co., Ltd.	Senneterre	Tibblemont Tp.
*United Gold Exploration, Ltd.	276 St. James St. W., Montreal	Laverlochere Tp.
*Vireux Gold Mines, Ltd.	80 King St. W., Toronto, Ont.	Louvicoourt Tp.
*West Shore Gold Mines, Ltd.	816 Keefer Bldg., Montreal	Abitibi Co.
*Witsey-Coglan Mines, Ltd.	25 King St. W., Toronto, Ont.	Rouyn Tp.
<b>ONTARIO—</b>		
*Algoid Mines, Ltd.	45 Richmond St. W., Toronto	Goudreau Dist.
*Algoma Summit Gold Mines, Ltd.	514 McKinnon Bldg., Toronto	Goudreau Dist.
*Alsagbach Gold Mining Co., Ltd.	New Liskeard, Ont.	Crenfell Tp.
*Amalgamated Gold Fields Corp., Ltd.	1104 Northern Ontario Bldg., Toronto	Beatty Tp.
*Anglo-Huronian, Ltd.	80 King St. W., Toronto	Timmins
*Arleen Gold Mines, Ltd.	132 St. James St. W., Montreal, Que.	Knashabowia
*Ashley Gold Mining Corp., Ltd.	602/350 Bay St., Toronto	Rannochburn Tp.
*Bankfield Gold Mines, Ltd.	1006 Concourse Bldg., Toronto	Errington Tp.
*Barry-Hollinger Mines, Ltd.	57 Bloor St. W., Toronto	Boston Creek
*Beatty-Waterloo Mines, Ltd.	16 Cedar St. E., Waterloo	Beatty Tp.
*Bay Mines, Ltd.	1601 Sterling Tower, Toronto	Eastern Ontario
*Bigdood Kirkland Gold Mines, Ltd.	32 Main St., Hamilton	Kirkland Lake
*Bilmae Gold Mines, Ltd.	364 Bay St., Toronto	Shining Tree

## DIRECTORY OF FIRMS—Continued

## Auriferous Quartz Mining Industry—Continued

Name	Head office address	Location
ONTARIO—Continued.		
*Bob Tough Gold Mines, Ltd.	21 Main St. E., Hamilton	McKinnon Tp.
*Buffalo Ankerite Gold Mines, Ltd.	Box 1728, Buffalo, N.Y.	South Porcupine.
*Canadian Reserve Mines, Ltd.	306 C.P.R. Bldg., Toronto	Larder Lake.
*Canusa Gold Mines, Ltd.	416 Penobscot Bldg., Detroit, Mich., U.S.A.	Porcupine Area.
*Casey-Summit Gold Mines, Ltd.	465 Bay St., Toronto	Summit Lake.
*Centennial Gold Mines, Ltd.	Box 212, Blind River	Michipicoten.
*Central Canada Mines, Ltd.	232 Grain Exchange, Winnipeg, Man.	Supawo.
*Central Patricia Gold Mines, Ltd.	1001 Federal Bldg., Toronto	Patricia Dist.
*Clark Gold Mines, Ltd.	388 St. James St., Montreal, Que.	Dyinent.
*Coulson Consolidated Gold Mines, Ltd.	1104 Northern Ontario Bldg., Toronto	Matheson.
*Concordia Gold Mining Co., Ltd.	276 St. James St. W., Montreal, Que.	Porcupine Dist.
*Coniaurum Mines, Ltd.	25 King St. W., Toronto	Schumacher.
*Consolidated Mining & Smelting Company of Canada, Ltd.	840 Dominion Square Bldg., Montreal, Que.	Cordova Mines.
*Craig Gold Mines, Ltd.	Box 179, Madoc	Hastings Co.
*Darwin Gold Mines, Ltd.	703/357 Bay St., Toronto	Wawa.
*Delite Mines, Ltd.	Box E.N., Kirkland Lake, Ont.	Timmins.
*De Sautis Gold Mining Co.	241 Second Ave., Timmins	Ogden Tp.
*Dikdik Exploration Co., Ltd.	941 Dominion Square Bldg., Montreal, Que.	Kinghorn.
*Domo Mines, Ltd.	36 Toronto St., Toronto	South Porcupine.
*Dumond Mining & Exploration Co., Ltd.	Haileybury	Jellioce.
*Duport Mining Co., Ltd.	Utilities Bldg., Port Arthur	Shoal Lake.
*Erie Canadian Mines, Ltd.	Box E.N., Kirkland Lake	Kirkland Lake.
*Excello Mines, Ltd.	159 Bay St., Toronto	South Porcupine.
*Federalist Mining Corp., Ltd.	11 King St. W., Toronto	Tisdale Tp.
*Foley Syndicate	57 Bloor St., Toronto	Mine Centre.
*Four Nations Consolidated Gold Mines, Ltd.	372 Bay St., Toronto	Kenogami Lake.
*Fox Lake Gold Mines, Inc.	511 Liberty Bank Bldg., Buffalo, N.Y.	Michipicoten.
*Gillies Lake Porcupine Gold Mines, Ltd.	18 Toronto St., Toronto	Timmins.
*Glenora Gold Mines, Ltd.	1005 Federal Bldg., Toronto	Kirkland Lake.
*Golden Gate Mining Co., Ltd.	59 Yonge St., Toronto	Swesitka.
*G. Iden Summit Mines, Ltd.	2374 Bloor St. W., Toronto	Seskinkita.
*Gold Range Mines, Ltd.	1604 Royal Bank Bldg., Toronto	Schreiber.
*Hinterow swazey Mines, Ltd.	1821 Canadian Bank of Commerce Bldg., Toronto	
*Hard Rock Gold Mines, Ltd.	603 Royal Bank Bldg., Toronto	Halcrow Tp.
*Harwood Lake Mines, Ltd.	21 King St. E., Toronto	Little Long Lac.
*Hislop Gold Mines, Ltd.	503/357 Bay St., Toronto	Sadbury Dist.
*Hollinger Consolidated Gold Mines, Ltd.	Timmins	Hislop Tp.
*Horseshoe Mines, Ltd.	302 Royal Bank Bldg., Toronto	Timmins and Hislop Tp.
*Howay Gold Mines, Ltd.	717 Federal Bldg., Toronto	Kenora Dist.
*Hudson Patricia Gold Mines, Ltd.	112 Yonge St., Toronto	Red Lake.
*Interlake Gold, Ltd.	112 Dalhousie St., Bradford	Narrow Lake.
*Interquois-Kirkland Mines Corp., Ltd.	637 Elliott St., Buffalo, N.Y., U.S.A.	Long Lac Dist.
*J.M. Consolidated Gold Mines, Ltd.	1116 Federal Bldg., Toronto	Kirkland Lake.
*Kenora Prospectors & Miners, Ltd.	Box 591, Kenora	Patricia Dist.
*Kirkland Gold Belt Mines, Ltd.	156 Yonge St., Toronto	Shoal Lake.
*Kirkland Lake Gold Mining Co., Ltd.	930 Canadian Bank of Commerce Bldg., Toronto	Kirkland Lake.
*Koch Danoff Gold Mines, Ltd.	1104 Bank of Hamilton Bldg., Toronto	Jellioce.
*Lafayette Long Lac Gold Mines, Ltd.	200 Bay St., Toronto	Long Lac Dist.
*Lake Caswell Mines, Ltd.	1465 Yonge St., Toronto	Shining Tree Dist.
*Lakeland Gold, Ltd.	19 Sun Life Bldg., Hamilton	Muscowille Tp.
*Lake Shore Mines, Ltd.	Kirkland Lake	Kirkland Lake.
*Langmuir Longlac Gold Mines, Ltd.	1005 Federal Bldg., Toronto	Little Long Lac Area.
*Lebel Oro Mines, Ltd.	703 Northern Ontario Bldg., Toronto	Long Lake.
*Lee Gold Mines, Ltd.	244 Bay St., Toronto	Greenlaw Tp.
*Little Long Lac Gold Mines, Ltd.	1331 Canadian Bank of Commerce Bldg., Toronto	
*Longlac Lagoon Gold Mines, Ltd.	1005 Federal Bldg., Toronto	Geraldton.
*Lucky Kirkland Gold Mines, Ltd.	215/159 Bay St., Toronto	Little Long Lac Area.
*Macnaig Red Lake Gold Mines, Ltd.	347 Bay St., Toronto	Eby Tp.
*McFarlane Long Lac Gold Mines, Ltd.	1112/85 Richmond St. W., Toronto	Red Lake.
*McIntyre Porcupine Mines, Ltd.	Box 12, Schumacher	Long Lac Dist.
*Macroe Sturgeon Gold Mines, Ltd.	67 Yonge St., Toronto	Fisdale Tp.
*McKenzie Red Lake Gold Mines, Ltd.	507 National Bldg., Bay St., Toronto	Thunder Bay Dist.
*McLaren-Porcupine Gold Mines, Ltd.	Box 507, South Porcupine	Red Lake.
*MacLeod-Cockshutt Gold Mines, Ltd.	1001 Federal Bldg., Toronto	Deloro Tp.
*McMillan Gold Mines, Ltd.	Sudbury	Gerrishilton.
*Macassa Mines, Ltd.	85 Richmond St. W., Toronto	Mangowin Tp.
*May-Spiers Gold Mines, Ltd.	919/159 Bay St., Toronto	Kirkland Lake.
*Magnet Lake Gold Mines, Ltd.	1005 Federal Bldg., Toronto	Red Lake.
*Makwa Champagne Gold Mines, Ltd.	502 McKinnon Bldg., Toronto	Little Long Lac Area.
*Manitoba & Eastern Mines, Ltd.	1821 Canadian Bank of Commerce Bldg., Toronto	Champagne Tp.
*Marbuan Gold Mines, Ltd.	1730 Rand Bldg., Buffalo, N.Y., U.S.A.	Strathv Tp.
*Margo Mines, Ltd.	1102 Canadian Permanent Bldg., Toronto	South Porcupine.
*Matachewan Consolidated Mines, Ltd.	2810/25 King St. W., Toronto	Matachewan Dist.
*Minto Gold Mines, Ltd.	Wawa	Matachewan Dist.
*Moffat Hall Mines, Ltd.	Haileybury	Wawa.
*Murray Algoma Mining Co., Ltd.	1105/45 Richmond St. W., Toronto	Label Tp.
*Munro Croesus Gold Mines, Ltd.	Haileybury	Algoma Dist.
*Naylob Gold Mines, Ltd.	808/85 Richmond St. W., Toronto	Munro Tp.
*Northern Empire Mines Co., Ltd.	Empire	Porcupine Dist.
*Northern Securities Co.	39 Bank of Toronto Bldg., London	Beardmore.
		Boston Creek and Mongowin Tp.



## DIRECTORY OF FIRMS—Continued

## Auriferous Quartz Mining Industry—Continued

Name	Head office address	Location
<b>ONTARIO—Concluded.</b>		
Northern Turnbull Gold Mines, Ltd.	372 Bay St., Toronto.	Turnbull Tp.
Parkhill Gold Mines, Ltd.	1835 Beaver Hall Bldg., Montreal, Que.	Wawa.
Paymaster Consolidated Mines, Ltd.	South Porcupine	South Porcupine.
*Pamour Porcupine Mines, Ltd.	221 Notre Dame St. W., Montreal, Que.	Whitney Tp.
*Pickle Crow Gold Mines, Ltd.	1406 Concourse Bldg., Toronto	Patricia Dist.
*Pianik Mining Syndicate	6 Norton Ave., Toronto	Goward.
*Plymouth Gold Mining Co., Ltd.	276 St. James St. W., Montreal, Que.	Rainy River Dist.
*Porcupine Peninsular Gold Mines, Ltd.	80 King St. W., Toronto	Connaught.
*Rahill Red Lake Mining Co., Ltd.	67 Yonge St., Toronto	Red Lake.
*Richelieu Gold Mines, Ltd.	701/330 Bay St., Toronto	Savant Lake.
*Rich Rock Gold Mines, Ltd.	901 Star Bldg., Toronto	Lennox and Addington.
*Rickard Raymore Gold Mines, Ltd.	601 Concourse Bldg., Toronto	Rickard Tp.
*St. Anthony Gold Mines, Ltd.	159 Bay St., Toronto	Sturgeon Lake.
Saundary Syndicate	Mine Centre	Rainy River Dist.
*Scott Gold Mining Syndicate	1405/302 Bay St., Toronto	Red Lake.
*S. B. Smith Mine	Wawa	Wawa.
Sol d'Or Gold Mine, Ltd.	Narrow Lake	Narrow Lake.
*Socana Mining Co., Ltd.	450 Queen St. E., Sault Ste. Marie.	Algoma Dist.
*South McKenzie Island Mines, Ltd.	1112/85 Richmond St. W., Toronto	Red Lake.
Swayze Huycke Gold Mines, Ltd.	913 Sterling Tower, Toronto	Cunningham Tp.
*Sylvanite Gold Mines, Ltd.	Box EX, Kirkland Lake	Kirkland Lake.
*Tache Gold Syndicate, Ltd.	Brantford, Man.	Dymont.
*Talisman Gold Mines, Ltd.	364 Bay St., Toronto	Guilford Tp.
*Tashuta Goldfields, Ltd.	706/100 Adelaide St. W., Toronto	Inshota.
*Teck-Hughes Gold Mines, Ltd.	Kirkland Lake	Kirkland Lake.
*Toburn Gold Mines, Ltd.	217 Bay St., Toronto	Kirkland Lake.
*Wawa Gold Fields, Ltd.	616 Canada Cement Bldg., Montreal, Que.	Wawa.
*Wayne Sturgeon River Mining Syndicate	1821 Canadian Bank of Commerce Bldg., Toronto	Sturgeon River.
*Wendigo Mines, Ltd.	601 Ussher Bldg., Toronto	Kenora Dist.
*Wells Long Lac Mines, Ltd.	171 Yonge St., Toronto	Kenora Dist.
West Side Long Lac Mines, Ltd.	372 Bay St., Toronto	Thunder Bay Dist.
Wright-Hargreaves Mines, Ltd.	Liberty Bank Bldg., Buffalo, N.Y., U.S.A.	Kirkland Lake.
Young-Dominion Mines, Ltd.	c/o Hollinger Mine, Timmins	Matachewan.
<b>MANITOBA—</b>		
*Bailor Gold Mines, Ltd.	505 Union Trust Bldg., Winnipeg	Beresford Lake.
*Black River Gold Mines	232 Curry Bldg., Winnipeg	Rice Lake.
*Brooks God's Lake Gold Mines, Ltd.	801 Bank of Hamilton Bldg., Toronto, Ont.	God's Lake.
*Central Manitoba Mines, Ltd.	Paris Bldg., Winnipeg	Wadhope.
*Clover Gold Mines, Ltd.	1207 McArthur Bldg., Winnipeg	Beresford Lake.
*Consolidated Goldfields of Manitoba, Ltd.	941 Somerset Bldg., Winnipeg	Rice Lake.
*Coupland Gold Mines, Ltd.	67 Yonge St., Toronto, Ont.	Island Lake.
*Diana Gold Mines, Ltd.	67 Yonge St., Toronto, Ont.	Gom Lake.
*Forty-Four Mines, Ltd.	237 Curry Bldg., Winnipeg	Rice Lake.
*Gabrielle Mines, Ltd.	903 McArthur Bldg., Winnipeg	Bissett.
*Garry God's Lake Mines, Ltd.	204 Royal Bank Bldg., Toronto, Ont.	God's Lake.
*God's Lake Gold Mines, Ltd.	395 Main St., Winnipeg	God's Lake.
*Gunnar Gold Mines, Ltd.	2301 Star Bldg., Toronto, Ont.	Beresford Lake.
*Highland Enterprise Mining Co., Ltd.	505 Huron & Erie Bldg., Winnipeg	Falcon Lake.
*Island Lake Mines, Ltd.	395 Main St., Winnipeg	Island Lake.
*Jowsey Island Gold Mines, Ltd.	395 Main St., Winnipeg	God's Lake.
*Kiskoba Mining Co., Ltd.	Winnipeg	Herb Lake.
*Knee Lake Gold Mines, Ltd.	395 Main St., Winnipeg	God's Lake.
*Laguna Gold Mines, Ltd.	602/350 Bay St., Toronto, Ont.	Herb Lake.
*Lake Maron Gold Mines, Ltd.	1005 Federal Bldg., Toronto, Ont.	Reed Lake.
*Little God's Lake Syndicate, Ltd.	1116 Federal Bldg., Toronto, Ont.	God's Lake.
*Mandahay Gold Mines, Ltd.	205 Enderton Bldg., Winnipeg	Beresford Lake.
*Manco Gold Mines, Ltd.	Lumsden Bldg., Toronto, Ont.	Elbow Lake.
*Maskwa Lake Gold Mines, Ltd.	701 Grant West Permanent Bldg., Winnipeg	Maskwa Lake.
*Midfield Gold Mines, Ltd.	504 Kensington Bldg., Winnipeg	Rice Lake.
*Normandy Gold Mines, Ltd.	601 Union Trust Bldg., Winnipeg	Rice Lake.
*Oro Grande Development Co., Ltd.	1207 McArthur Bldg., Winnipeg	Beresford Lake.
*Oro Plata Mining Co., Ltd.	1005 Federal Bldg., Toronto, Ont.	Reed Lake.
*Packstack Mines, Ltd.	395 Main St., Winnipeg	Rice Lake.
*Ranger Gold Mines, Ltd.	941 Somerset Bldg., Winnipeg	Rice Lake.
*San Antonio Gold Mines, Ltd.	237 Curry Bldg., Winnipeg	Rice Lake.
*Saultgood Manitoba Gold, Ltd.	291 Somerset Bldg., Winnipeg	Beresford Lake.
*Scott Lake Mines, Ltd.	293 Garry St., Winnipeg	Beresford Lake.
*Snelter Gold Mines, Ltd.	1104 Bank of Hamilton Bldg., Toronto, Ont.	God's Lake.
*Stevenson Lake Gold Mines, Ltd.	395 Main St., Winnipeg	Stevenson Lake.
*Tinney Lake Gold Mines, Ltd.	302 Main St., Winnipeg	Wadhope.
*Watson Manitoba Gold Mines, Ltd.	610 McArthur Bldg., Winnipeg	Rice Lake.
*Wallace Lake Gold Mines, Ltd.	403 Scott Block, Winnipeg	Rice Lake.
*Wingold Mines, Ltd.	403 McIntyre Bldg., Winnipeg	Bissett.
*Wylie Dominion Gold Mines, Ltd.	2200 Sterling Tower, Toronto, Ont.	Wylie Station.
<b>SASKATCHEWAN—</b>		
*Consolidated Mining & Smelting Company of Canada, Ltd.	Trail, B.C.	Amisk Lake.
*Flin Flon Gold Mining Syndicate, Ltd.	601 Avenue Blk., Winnipeg, Man.	Douglas Lake.
*Grent Bear Lake Mines, Ltd.	601 Ussher Bldg., Toronto, Ont.	Athabasca Lake
*Wekach Lake Gold Mines, Ltd.	293 Garry St., Winnipeg, Man.	Wekach Lake.



**DIRECTORY OF FIRMS—Continued**  
**Auriferous Quartz Mining Industry—Continued**

Name	Head office address	Location
<b>BRITISH COLUMBIA—</b>		
Alma N. Mining Co.	511 Fidelity Bldg., Tacoma, Wash., U.S.A.	Nelson Div.
Ashloo Gold Mining Syndicate	411 Bank of Nova Scotia Bldg., Vancouver.	Squamish.
*Atlin-Ruffner Mines, Ltd.	1405 Trusts & Guarantee Bldg., Toronto, Ont.	Atlin Lake.
*B. C. Cariboo Gold Fields	1824 Marine Bldg., Vancouver.	Mayne.
*Blue Jack Mines, Ltd.	706 Metropolitan Bldg., Vancouver.	McGuire.
Blue Hawk Gold Mines Syndicate	2083 Hyron St., Victoria	Kelowna.
*Bradnor Mines, Ltd.	555 Burrard St., Vancouver.	Lillooet Dist.
Bralorne Mines, Ltd.	555 Burrard St., Vancouver.	Bralorne.
Bunker Hill Gold Mines, Ltd.	Nelson.	Nelson.
*B. R. X. Gold Mines, Ltd.	816 Hall Bldg., Vancouver.	Lillooet Dist.
*Buena Vista Mining Co., Ltd.	Trail.	Stewart.
*Camp McKinney Gold Hill Mining Co., Ltd.	703 Dominion Bank Bldg., Vancouver.	Yale Dist.
Caroni Gold Mines, Ltd.	804 Standard Bank Bldg., Vancouver.	Caroni.
*Canada Smelters, Ltd.	Sanra.	Sanra.
Cariboo Gold Quartz Mining Co., Ltd.	815 Bower Bldg., Vancouver.	Wells.
*Cariboo Yankee Bells Mining Co., Ltd.	425 Standard Bank Bldg., Vancouver.	Keithley.
*Chilco Explorations, Ltd.	918 Rogers Bldg., Vancouver.	Tatlayoko Lake.
Clubine Comstock Gold Mines, Ltd.	Nelson.	Boulder Creek.
Clubario Consolidated Gold Mines, Ltd.	1910 Kent Bldg., Toronto, Ont.	Uk.
*Consolidated Mining & Smelting Company of Canada, Ltd.	Trail.	Fish Lake, Upper Salmon Valley.
Danzig Mines, Ltd.	Nootka.	Nootka Sound.
Dawson Consolidated Gold Mines, Ltd.	716 Hall Bldg., Vancouver.	Jessica.
Denton Mines, Ltd.	239 Lancaster Bldg., Calgary, Alta.	Greenwood.
*Dictator Gold Mines, Ltd.	Penticton.	Edgewood.
*Durango Gold Mines, Ltd.	712 Standard Bank Bldg., Vancouver.	Nelson.
Dynamo Mining & Milling Co., Ltd.	1927 Marine Bldg., Vancouver.	Greenwood.
Engineer Mine (R. Brook)	Mining Corporation of Canada, 350 Bay St., Toronto, Ont.	Atlin.
Euphrates Mining Co., Ltd.	Box 677, Nelson.	Nelson.
*Fairview Amalgamated Gold Mines, Ltd.	208 Pacific Bldg., Vancouver.	Osoyoos Div.
*Foster Ledge Gold Mines, Ltd.	816 Hall Bldg., Vancouver.	Cariboo Div.
*Frances Gold Mines, Ltd.	210 Pemberton Bldg., Victoria.	Bridge River, Kamloops.
*Gem Gold Mines, Ltd.	955 Thurlow St., Vancouver.	Texada Island.
Gold Belt Mining Co., Ltd.	Box 544, Nelson.	Salmo.
*Goldfinch Gold Mines, Ltd.	320 Pemberton Bldg., Victoria.	Camborne.
*Gold Standard Mining Co., Ltd.	Penticton.	Fairview Dist.
Good Hope Mine	Box 1089, Nelson.	Nelson.
Granby Consolidated Mining, Smelting & Power Co., Ltd.	Hall Bldg., Vancouver.	Granby Point.
*Grill-Wilksne Gold Mines, Ltd.	1007 Royal Bank Bldg., Vancouver.	Bridge River Dist.
*Gun Lake Gold Mines, Ltd.	816 Hall Bldg., Vancouver.	Lillooet Dist.
Grandoro Mines, Ltd.	Box 474, Penticton.	Osoyoos Div.
Grange Mines, Ltd.	Burrard St., Vancouver.	Clinton.
*Haida Gold Mines, Ltd.	612 Standard Bank Bldg., Vancouver.	Queen Charlotte Islands.
Hercules Consolidated Mining, Smelting & Power Co., Ltd.	618 Vancouver Bldg., Vancouver.	Nanaimo Dist.
Home Gold Mining Co., Ltd.	614 Rogers Bldg., Vancouver.	Jessica.
*Ideal Gold & Nickel Mines, Ltd.	612 Vancouver Bldg., Vancouver.	Yale Dist.
Imperial Leasing Syndicate	Rock Creek.	Greenwood.
Island Mt. Mines Co., Ltd.	744 West Hastings St., Vancouver.	Cariboo Div.
I. X. L. Leasers, Ltd.	Rosslund.	Rosslund.
*Jenny Long Gold Mines	547 Howe St., Vancouver.	Nicola Div.
*Kelowna Exploration Co., Ltd.	Hedley.	Hedley.
Kennedy Lake Gold Mines, Ltd.	1214 Broad St., Victoria.	Kennedy Lake Dist.
Kootenay Belle Gold Mines, Ltd.	470 Granville St., Vancouver.	Salmo.
*Kootenay Nevada Mines, Ltd.	1312 Royal Bank Bldg., Vancouver.	Nelson.
*Lillooet Lake Mining Co., Ltd.	North Bend.	Fire Mountain.
Livingstone Mining Co., Inc.	Tughum.	Tughum.
*Lytton Gold Mines, Ltd.	1110 E. 15th Avenue, Vancouver.	Lytton.
Mak Shear Gold Mines, Ltd.	124 Pacific Bldg., Vancouver.	Similkameen.
*Martel Gold Mines, Ltd.	607 Standard Bank Bldg., Vancouver.	Ashcroft Div.
McArthur, W. E., Jr.	Box 629, Greenwood.	Greenwood and Grand Forks Divs.
McDaniel, E. H.	Box 180, Nelson.	Trout Lake.
*Meridian Mining Co., Ltd.	555 Howe St., Vancouver.	Lardeau Dist.
Midnight Syndicate	Midnight Mine, Rosslund.	Rosslund.
Minto Gold Mines, Ltd.	Bridge River.	Lillooet Dist.
*Mix Gold Mines, Ltd.	414/780 West Pender St., Vancouver.	Bridge River.
*Monashee Mines Syndicate, Ltd.	312 Pacific Bldg., Vancouver.	Greenwood Mining Div.
Morning Star Gold Mines, Ltd.	840 West Hastings St., Vancouver.	Oliver.
*National Gold Mines, Ltd.	502 Pacific Bldg., Vancouver.	McGillivray Falls.
Nicola Mines & Metals, Ltd.	210/602 Hastings St. W., Vancouver.	Stump Lake.
*Noble Five Mines, Ltd.	420 Baker St., Nelson.	Sandon and Nelson.
*Northern Reef Gold Mines, Ltd.	704 Bank of Toronto Bldg., Victoria.	Omineca Mining Div.
O. K. Leasing Syndicate	Box 167, Rosslund.	Rosslund.
Osganson Bros.	Erie.	Nelson Mining Div.
*Osoyoos Mines, Ltd.	1054-8th Avenue West, Calgary, Alta.	Osoyoos.
*Pacific Eastern Gold, Ltd.	Pacific Bldg., Vancouver.	Pioneer.
*Pacific Golden West Syndicate	34/553 Granville St., Vancouver.	Bridge River.
Patterson, T. F.	Redge Bay.	Skeena Div.
*Phillips Arm Consolidated Mines, Ltd.	475 Howe St., Vancouver.	Port Neville.
Piskering, B. A.	Box 857, Nelson.	West Kootenay.
Pioneer Gold Mines, Ltd.	606 Rogers Bldg., Vancouver.	Lillooet Dist.
Precambrian Gold Mines	Smith Tower, Seattle, Wash., U.S.A.	Twings Landing.

## DIRECTORY OF FIRMS—Continued

## Auriferous Quartz Mining Industry—Concluded

Name	Head office address	Location
<b>BRITISH COLUMBIA—Continued</b>		
*Premier Gold Mining Co., Ltd.	Royal Trust Bldg., Vancouver	Portland Canal.
*Proserpine Gold Mines, Ltd.	502 Pacific Bldg., Vancouver	Burkerville.
*Quasnel Quartz Mining Co., Ltd.	1003 Hall Bldg., Vancouver	Hixon.
*Radio Gold Mines, Ltd.	612 Vancouver Bldg., Vancouver	Omineca Mining Div
*Reliance Gold Mines, Ltd.	1308 Northern Life Tower, Seattle, Wash., U.S.A.	Bridge River.
Relief-Arlington Mines, Ltd.	Erie	Nelson Mining Div.
Reno Gold Mines, Ltd.	Yorkshire Bldg., Vancouver	Salmo.
Robertson, H. W.	Box 1133, Nelson	Nelson Mining Div.
*Saddle Mines, Ltd.	c/o Britannia Mining & Smelting Co., Britannia Beach	Queanell Mining Div.
Salmo-Malartic, Ltd.	608/159 Bay St., Toronto, Ont.	Nelson Mining Div.
*Standard Gold Mines, Ltd.	716 Hall Bldg., Vancouver	Bridge River.
Superior Gold Mines, Ltd.	614 Stock Exchange Bldg., Vancouver	Greenwood.
*Sunloch Mines, Ltd.	Trail	Jordan River.
Surf Point Mine (N. A. Timmins Corp.)	1010 Canada Cement Bldg., Montreal, Que.	Porcher Island.
Taylor, J. E. (Republic)	32 Fairfield Bldg., Vancouver	Greenwood.
Taylor Windfull Gold Mining Co., Ltd.	102 Pacific Bldg., Vancouver	Clinton Mining Div.
*Trites Gold Mining Co., Ltd.	608 Pacific Bldg., Vancouver	Ymir.
Turner, T. H.	Columbia Gardens	Nelson Mining Div.
Twin Lakes Gold Mining Co., Ltd.	Penticton	Fairview Dist.
Union Mine (J. F. McCarthy)	Grand Forks	Grand Forks.
Vancouver Island Gold Mines, Ltd.	678 Howe St., Vancouver	Alberni.
Velvet Gold Mining Co.	1309-7th Avenue, Seattle, Wash., U.S.A.	Rossland.
Victoria Fairview Mines, Ltd.	823 W. Hastings St., Vancouver	Oliver.
Vidette Gold Mines, Ltd.	312 Pacific Bldg., Vancouver	Savona.
*Viking Gold Mines, Ltd.	712 Standard Bank Bldg., Vancouver	Fairview Dist.
Walters, Williamson & Wanke	Greenwood	Greenwood Mining Div.
Waterloo Gold Mines, Ltd.	Penticton	Lightning Peak.
Wayside Consolidated Gold Mines, Ltd.	Whyside via Bridge River	Lillooet Div.
*Wesko Exploration & Development Co., Ltd.	816 Hall Bldg., Vancouver	Nelson Mining Div.
Widdowson, E. W.	Nelson	Ymir.
Wilcox Mining Syndicate	Box 235, Rossland	Ymir.
Wilson Mining & Investment Co., Ltd.	506 Pacific Bldg., Vancouver	Smithers.
Windpass Gold Mining Co., Ltd.	744 Hastings St., Vancouver	Chu Chua.
Ymir Consolidated Gold Mines, Ltd.)	716 Hall Bldg., Vancouver	Ymir.
Ymir Dundee Gold Mining Co., Ltd.	Box 246, Nelson	Ymir.
Ymir Yankee Girl Gold Mines, Ltd.	Ymir	Nelson Mining Div.
<b>NORTHWEST TERRITORIES—</b>		
*Burwash Yellow Knife Mines, Ltd.	1112/85 Richmond St. W., Toronto, Ont.	Yellow Knife River.
<b>YUKON—</b>		
*Timmins Corp., N. A.	1010 Canada Cement Bldg., Montreal, Que.	Carmacks.

\* Active but not producing.

NOTE.—Complex auriferous-sulphide ores that are mined essentially for their gold content are largely classified in this report under auriferous quartz.

## Copper-Gold-Silver Mining Industry

<b>QUEBEC—</b>		
Alderinae Mines, Ltd.	941 Dominion Square Bldg., Montreal	Arntfield.
*Astoria Rouyn Mines, Ltd.	74 St. Paul St., Quebec	Rouyn.
*Baganac Rouyn Mines, Ltd.	Haileybury, Ont.	Rouyn.
*Carlson Copper Syndicate	New Liskeard, Ont.	Dugay Tp.
*Clericy Consolidated Mines, Ltd.	74 Sparks St., Ottawa, Ont.	Clericy Tp.
Consolidated Copper & Sulphur Co.	Eustis	Eustis.
*Consolidated Mining & Smelting Company of Canada, Ltd.	Dominion Square Bldg., Montreal	Chibougamau.
Noranda Mines, Ltd.	804 Royal Bank Bldg., Toronto, Ont.	Rouyn, *Chibougamau.
*Normetal Mining Corp., Ltd.	350 Bay St., Toronto, Ont.	Desminois Tp.
*Opemiska Copper Mines, Ltd.	25 King St. E., Toronto, Ont.	Opemiska Lake.
*Prospectors Airways, Ltd.	80 King St. W., Toronto, Ont.	Various claims.
*Robb-Monthray Mines, Ltd.	85 Richmond St. W., Toronto, Ont.	Monthray Tp.
*Syndicat Minier de Gaboury	Guigues	Gaboury Tp.
<b>MANITOBA AND SASKATCHEWAN—</b>		
Hudson Bay Mining & Smelting Co., Ltd.	Woodstock, Ont.	Flin Flon.
<b>BRITISH COLUMBIA*—</b>		
Britannia Mining & Smelting Co., Ltd.	Britannia Beach	Vancouver, Mining Div.
Granby Consolidated Mining, Smelting & Power Co., Ltd.	Hall Bldg., Vancouver	Anyox.

x In addition to the companies listed there were numerous operators working under lease on the LeRoy, Centre Star and other mines.

\* Active but not producing.

## DIRECTORY OF FIRMS—Continued

## Chrome Ore Mining Industry

Name	Head office address	Location
QUEBEC— Asbestos Corporation, Ltd..... Product—Chromite.	Canada Cement Bldg., Montreal.....	Thetford Mines.
Camire, Lucien..... Product—Chromite.	Thetford Mines.....	Eastern Townships.
ONTARIO— Chromium Mining & Smelting Corp., Ltd.... Product—Chromite and ferrochrome.	Bank of Commerce Bldg., Hamilton.....	Collins.

## Iron Mining Industry

NOVA SCOTIA— Dominion Steel & Coal Corporation, Ltd.,....	Sydney.....	Bell Island, Nfld.
QUEBEC— Baie St. Paul Titanic Iron Ore Co.....	Baie St. Paul.....	Charlevoix Co.

## Manganese Mining Industry

NOVA SCOTIA— Atlantic Manganese Corp., Ltd.(*).. Product—Manganese ore.	Roy Bldg., Halifax.....	New Ross.
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## Molybdenite Mining Industry

QUEBEC— Height of Land Co.(*)..... Product—Molybdenite.	4327 Old Orchard Ave., Montreal.....	Abitibi Co.
ONTARIO— The Phoenix Molybdenite Corp., Ltd.(*)..... Product—Molybdenite.	36 Toronto St., Toronto.....	Renfrew Co.
BRITISH COLUMBIA— Langley, A.(*)..... Product—Molybdenite.	Endako.....	Endako.
Hardscrabble Mine(*)..... Product—Molybdenite.	Barkerville.....	Barkerville.

## Nickel-Copper Mining Industry

ONTARIO— Cuniptau Mines Development Co., Ltd.(*)...	465 Bay St., Toronto.....	Strathy Tp.
Falconbridge Nickel Mines, Ltd.....	25 King St. W., Toronto.....	Falconbridge Tp.
International Nickel Company of Canada, Ltd	Copper Cliff.....	Copper Cliff, Coniston and Port Colborne.
BRITISH COLUMBIA— B. C. Nickel Mines, Ltd.(*).....	894 Standard Bank Bldg., Vancouver.....	Choate.

## Non-Ferrous Smelting and Refining Industry

## Copper Smelting Companies

Noranda Mines, Ltd.....	2 King St. E., Toronto.....	Noranda.
†International Nickel Co. of Canada, Ltd.....	67 Wall St., New York City, U.S.A.....	Copper Cliff and Coniston.
†Falconbridge Nickel Mines, Ltd.....	25 King St. W., Toronto.....	Falconbridge.
Hudson Bay Mining & Smelting Co., Ltd.....	404 Dundas St., Woodstock.....	Flin Flon.
Granby Consolidated Mining, Smelting & Power Co., Ltd.....	789 Pender St. W., Vancouver.....	Anyox.

(\*) Active but not producing.

† Smelt nickel-copper ores and produce platinum and other precious metals.

## DIRECTORY OF FIRMS—Continued

## Electrolytic Copper Refining Companies (a)

Name	Head office address	Location
Canadian Copper Refiners, Ltd.....	2 King St. E., Toronto.....	Montreal East.
Ontario Refining Co., Ltd.....	Copper Cliff.....	Copper Cliff.

## Lead Smelting and Refining Companies

*Consolidated Mining & Smelting Company of Canada, Ltd.....	215 St. James St. W., Montreal.....	Trail.
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## Electrolytic Zinc Refining Companies

†Consolidated Mining & Smelting Co. of Canada, Ltd.....	215 St. James St. W., Montreal.....	Trail.
†Hudson Bay Mining and Smelting Co., Ltd....	404 Dundas St. Woodstock.....	Flin Flon.

## Smelters and Refiners of Cobalt-Silver-Arsenic Ores

*Deloro Smelting & Refining Co., Ltd.....	Deloro.....	Deloro.
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## Refiners of Uranium-Radium Ores

Eldorado Gold Mines, Ltd.....	Star Bldg., Toronto.....	Port Hope.
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## Producers of Primary Aluminium

Aluminium Company of Canada, Ltd.....	Canada Life Bldg., Toronto.....	Arvida and Shawinigan Falls
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\* Produce bismuth or bismuth-bearing hullion as by-products.

† Produce cadmium or cadmium compounds as by-products.

(a) Also produce selenium and tellurium.

## Silver-Cobalt Mining Industry(†)

Beaver Mine.....	10 Silver St., Cobalt, Ont.....	Cobalt.
Cobalt Properties, Ltd.....	Box 929, Cobalt, Ont.....	Cobalt.
(*)Cobnor Silver Mines, Ltd.....	North Cobalt, Ont.....	Cobalt.
Daniell, E. O. (McKinley-Darragh).....	Kirkland Lake, Ont.....	Cobalt.
Hudson Bay Mines, Ltd.....	New Liskeard, Ont.....	Cobalt.
Martin, Geo. (Crown Reserve).....	Box 659, Cobalt, Ont.....	Cobalt.
McKinley Mines Securities, Ltd.....	40 King St. W., Toronto, Ont.....	Cobalt.
Mining Corporation of Canada, Ltd.....	350 Bay St., Toronto, Ont.....	Cobalt.
Nipissing Mining Co., Ltd.....	Excelsior Life Bldg., Toronto, Ont.....	Cobalt.
O'Brien, M. J., Ltd.....	Victoria Bldg., Ottawa, Ont.....	Cobalt and Gowganda.
Peterson Cobalt Mines, Ltd.....	301 Royal Bank Bldg., Toronto, Ont.....	Cobalt.
Price, C. W. (Poster).....	Box 388, Cobalt, Ont.....	Cobalt.
Sandoe & Moyle.....	Box 362, Cobalt, Ont.....	Cobalt.
(*)Smith Cobalt Mines, Ltd.....	Cobalt, Ont.....	Cobalt.
(*)Windsor Cobalt Silvers, Ltd.....	213-414 Bay St., Toronto, Ont.....	Cobalt.
Wood, A. (Dominion Reduction Co.).....	Cobalt, Ont.....	Cobalt.

(\*) Active but not producing.

(†) All properties located in Ontario.



## DIRECTORY OF FIEMS—Continued

## Silver-Lead-Zinc Mining Industry

Name	Head office address	Location
<b>QUEBEC—</b>		
(*)Estate Pierre Tetreault.....	70 Holyrood Ave., Outremont, Montreal....	Montauban les Mines.
(*)Federal Zinc & Lead Co., Ltd.....	Room 608, Drummond Bldg., Montreal....	Gaspé Co.
(*)Lyall & Heidelman.....	Room 608, Drummond Bldg., Montreal....	Gaspé Co.
<b>BRITISH COLUMBIA—</b>		
Ainslie, Ray F.....	Slocan City.....	Slocan City.
Base Metals Mining Corp., Ltd.....	350 Bay St., Toronto, Ont.....	Field.
Beaver Silver Mines, Ltd.....	708 Yorkshire Bldg., Vancouver.....	Beaverdell.
Beaverdell Wellington Syndicate, Ltd.....	Greenwood.....	Beaverdell.
Bell Mine, Ltd.....	Box 464, Penticton.....	Beaverdell.
Black Coal Leasors.....	Sandon.....	Sandon.
Brown & Curwen.....	Ymir.....	Nelson Mining Div.
Campbell, C. J.....	4675-5th Ave. W., Vancouver.....	New Denver.
C. Q. Mining Co., Ltd.....	1840 Georgia St. W., Vancouver.....	Slocan City Mining Div.
Consolidated Mining & Smelting Company of Canada, Ltd.....	Trail.....	Kimberley.
Doney, E., & Son.....	Box 17, Sandon.....	Slocan.
Dunwell Mines, Ltd.....	101 Pemberton Bldg., Victoria.....	Stewart.
Forshaw, Robt.....	Box 478, Greenwood.....	Greenwood.
(*)Gray, Auton.....	Box 216, Revelstoke.....	Cumbarne.
Graham, W. E.....	Slocan.....	Slocan.
Harbour, Herbert.....	Box 700, Nelson.....	Slocan.
Highland Luss, Ltd.....	Box 782, Kelowna.....	Beaverdell.
Jackson Mines, Ltd.....	804 Stock Exchange Bldg., Vancouver.....	Slocan.
Marzoli, S.....	Sandon.....	Kaslo Mining Div.
McClane, M. M.....	c/o H. Giegerich, Kaslo.....	Slocan.
Meteor Mining Co.....	Slocan City.....	Slocan.
Molly Hughes Syndicate.....	c/o Federal Land Bank, Spokane, Wash., U.S.A.....	Slocan.
Nordonn, J. L.....	Beaverdell.....	Beaverdell.
Olson, A. K.....	Sandon.....	Slocan.
Ruth-Hope Mining Co., Ltd.....	804 Stock Exchange Bldg., Vancouver.....	Sandon.
Sally Mines, Ltd.....	Box 220, Penticton.....	Beaverdell.
(*)Silversmith Mines, Ltd.....	Box 1032, Seattle, Wash., U.S.A.....	Sandon.
United Empire Gold & Silver Mining Co., Ltd.....	Standard Bank Bldg., Vancouver.....	Stewart.
Watkins, Howland & Moa.....	Hyder, Alaska.....	Portland Canal.
(*)Waverly Tangier Mines, Ltd.....	201/602 Hastings St. W., Vancouver.....	Albert Canyon.
Western Exploration Co., Ltd.....	Silverton.....	Silverton.
<b>NORTH WEST TERRITORIES(a)—</b>		
Bear Exploration & Radium, Ltd.....	1112/85 Richmond St. W., Toronto, Ont.....	Great Bear Lake Dist.
Consolidated Mining & Smelting Company of Canada, Ltd.....	Trail, B.C.....	Great Bear Lake Dist.
Eldorado Gold Mines, Ltd.....	Star Bldg., Toronto, Ont.....	Great Bear Lake Dist.
(*)Great Bear Lake Mines, Ltd.....	244 Bay St., Toronto, Ont.....	Great Bear Lake Dist.
(*)White Eagle Silver Mines, Ltd.....	1006 Concourse Bldg., Toronto, Ont.....	Great Bear Lake Dist.
<b>YUKON—</b>		
Treudwell Yukon Co., Ltd.....	920 Crocker Bldg., San Francisco, Calif., U.S.A.....	Mayo Mining Dist.
York Investments, Ltd.....	804 Standard Bank Bldg., Vancouver, B.C.....	Keno Hill.

(a) Chiefly developing pitchblende, pitchblende-silver or silver ores.

NOTE.—Based on the value of the gold content of their ores, some important silver-lead producers are classified as gold mines and as such are listed in the directory contained in the Bureau of Statistics bulletin on the Canadian Gold Mining Industry.

## Radium (Pitchblende) Mining Industry (b)

(*)Canada Radium Mines, Ltd.....	224 Bay St., Toronto, Ont.....	Haliburton Co., Ont.
Product—Pitchblende.		

(b) Also see under silver-lead-zinc mining industry.

## Tungsten Mining Industry

(*)Indian Path Mines, Ltd.....	605 Dennis Bldg., Halifax, N.S.....	Lunenburg Co., N.S.
Product—Tungsten Ore.		

(\*)Active but not producing

## NON-METAL MINING INDUSTRIES, INCLUDING FUELS

## FUELS

## DIRECTORY OF FIEMS—Continued

## Coal Mining Industry

Name	Head office address	Location District
<b>NOVA SCOTIA—</b>		
Acadia Coal Co., Ltd.	Stellarton	Pictou.
Bras d'Or Coal Co., Ltd.	Little Bras d'Or Bridge	Cape Breton.
Cumberland Railway & Coal Co., Ltd.	Springhill	Cumberland.
Dominion Coal Co., Ltd.	Sydney	Cape Breton.
Fundy Coal Co., Ltd.	Amherst	Cumberland.
Greenwood Coal Co., Ltd.	New Glasgow	Pictou.
Indian Cove Coal Co., Ltd.	Sydney Mine	Cape Breton.
Intercolonial Coal Co., Ltd.	Westville	Pictou.
Inverness Coal Mine	Inverness	Inverness.
Maritime Coal, Railway & Power Co., Ltd.	Amherst	Cumberland.
Nova Scotia Steel & Coal Co., Ltd.	Sydney	Cape Breton.
Shore Coal Co., Ltd.	Amherst	Cumberland.
Standard Coal Co., Ltd.	River Hébert	Cumberland.
Symons, J. F.	Port Hood	Inverness.
Victoria Coal Co., Ltd.	New Glasgow	Cumberland.
<b>NEW BRUNSWICK—</b>		
Avon Coal Co., Ltd.	Saint John	County Queens.
Evans, W. B.	Minto	Queens.
King, Gerald H.	Chipman	Queens.
Minto Coal Co., Ltd.	Minto	Queens.
Miramichi Lumber Co., Ltd.	Minto	Queens.
Newcastle Coal Co.	Minto	Queens.
Reade Construction Co., Ltd.	Chipman	Queens.
Welton, Harvey	Minto	Queens.
Welton & Henderson, Ltd.	Minto	Queens.
<b>SASKATCHEWAN—</b>		
Anderson, N.	Estevan	Municipality Near Estevan.
Banks, H.	Taylorlton	Near Pinto.
Baniulis Bros.	Roche Percée	Roche Percée.
Bienfait Commercial Co.	Bienfait	Near Bienfait.
Bienfait Mines, Ltd.	Bienfait	Near Bienfait.
Blue Flame Coal Mines, Ltd.	Leakville	
Crescent Collieries, Ltd.	Bienfait	Near Bienfait.
Eastern Collieries of Bienfait, Ltd.	Estevan	Near Bienfait.
Sinclair Mine	Roche Percée	Roche Percée.
Galloway, John	Estevan	Near Estevan.
Jenish Bros.	Estevan	Near Estevan.
Lignite Coal Mines, Ltd.	Pinto	Near Taylorlton.
Manitoba & Saskatchewan Coal Co., Ltd.	503 Avenue Block, Winnipeg, Man.	Near Bienfait (Taylorlton).
Moose Jaw Coal Mine, Ltd.	Regina	Near Leakville.
Pouge, H. F.	Roche Percée	Roche Percée.
Shand Coal & Brick Co.	Shand	Shand.
Sinclair Mine	Roche Percée	Roche Percée.
Truax Fraer Coal Co., Ltd.	Estevan	Near Estevan.
Uhrich & Matheson	Taylorlton	Taylorlton.
Western Dominion Collieries, Ltd.	Taylorlton	Taylorlton.
<b>ALBERTA—</b>		
<b>Bituminous—</b>		
Brzeau Collieries, Ltd.	Nordegg	Nordegg.
Cadomin Coal Co., Ltd.	Cadomin (mine office), Edmonton (business office)	Mountain Park.
Canmore Coal Co., Ltd.	Canmore	Cascade.
Hillcrest Collieries, Ltd.	Hillcrest	Crownest.
International Coal & Coke Co., Ltd.	Coleman	Crownest.
Luscar Collieries, Ltd.	Edmonton	Mountain Park.
McGillivray Creek Coal & Coke Co., Ltd.	Coleman	Crownest.
Mohawk Bituminous Mines, Ltd.	Bellevue	Crownest.
Mountain Park Collieries, Ltd.	410 Tegler Bldg., Edmonton	Mountain Park.
West Canadian Collieries, Ltd.	Blainmore	Crownest.
<b>Sub-bituminous—</b>		
Alexo Coal Co., Ltd.	Alexo	Saunders.
Bighorn & Saunders Creek Collieries, Ltd.	Saunders	Saunders.
Bryan Coal Co., Ltd.	Edmonton	Coalspur.
Coal Valley Mining Co., Ltd.	Coal Valley	Coalspur.
Foothills Collieries, Ltd.	Foothills	Coalspur.
Hinton Collieries, Ltd.	Hinton	Prairie Creek.
Jasper Coal Co., Ltd.	Edmonton	Prairie Creek.
Lakeside Coal, Ltd.	Edmonton	Coalspur.
McLeod River Hard Coal Co., Ltd.	Mercoal	Coalspur.
Sterling Collieries, Ltd.	Edmonton	Coalspur.
<b>Lignite—</b>		
Aetna Coal Co., Ltd.	Drumheller	Drumheller.
Alberta Block Coal Co., Ltd.	Drumheller	Drumheller.
Atlas Coal Co., Ltd.	East Coulee	Drumheller.

## DIRECTORY OF FIRMS—Continued

## Coal Mining Industry—Concluded

Name	Head office address	Location District
<b>ALBERTA—Concluded</b>		
<b>Lignite—Concluded</b>		
Balogh Coal Co., Ltd.	Carbon	Carbon.
Beverley Coal Co., Ltd.	Edmonton.	Edmonton.
Brilliant Coal Co., Ltd.	Drumheller.	Drumheller.
Bush Mines, Ltd.	Edmonton.	Edmonton.
Cadillac Coal Co., Ltd.	Lethbridge	Lethbridge.
Canadian Dinant Coal Co., Ltd.	Dinant.	Camrose and Carbon.
Canadian Pacific Railway Co.	Dept. of Natural Resources, Calgary.	Lethbridge.
Chinook Coal Co., Ltd.	Sheerness.	Sheerness.
City of Lethbridge Coal Mines	Lethbridge.	Lethbridge.
Dawson Coal Co., Ltd.	Edmonton.	Edmonton.
Edina Coal Co., Ltd.	Edmonton.	Edmonton.
Elgin Coal Co., Ltd.	Drumheller.	Drumheller.
Empire Collieries, Ltd.	East Coulee.	Drumheller.
Empire Collieries, Ltd.	Barnwell.	Taber.
Fraser-Murray Collieries, Ltd.	10055-101st St., Edmonton.	Edmonton.
Fridel Red Hot Coal Co.	Edmonton.	Edmonton.
Gibb, W. E.	Edmonton.	Edmonton.
Great West Coal Co., Ltd. (Black Diamond Mine)	Edmonton.	Edmonton.
Great West Coal Co., Ltd. (Star Mine)	Aerial.	Drumheller.
Gunderson Brick & Coal Co., Ltd.	Redcliff.	Redcliff.
Hy-Grade Coal Co., Ltd.	Drumheller.	Drumheller.
Ideal Coal Co., Ltd.	Wayne.	Drumheller.
Jewel Collieries, Ltd.	Wayne.	Drumheller.
Keith & Fulton Coal Co.	Edmonton.	Edmonton.
Kent Coal Co., Ltd.	Edmonton.	Edmonton.
Kleenbira Collieries, Ltd.	Eyremore.	Brooks.
Lakeside Coals, Ltd.	Edmonton.	Pembina.
Larson, J. L.	Wheat Centre.	Brooks.
Leavell Coal Co., Ltd.	Sheerness.	Sheerness.
Lund, Nelson & Dugaust.	Lethbridge.	Lethbridge.
Maple Leaf Minerals, Ltd.	Drumheller.	Drumheller.
Marcus Coal Mines, Ltd.	Edmonton.	Edmonton.
McDonnell & Gwilliam	Naino.	Edmonton.
Midland Coal Mining Co., Ltd.	Midlandvale.	Drumheller.
Minute Coal Co.	Drumheller.	Drumheller.
Murray Collieries, Ltd.	East Coulee.	Drumheller.
Mutual Supplies, Ltd.	Wayne.	Drumheller.
Newcastle Coal Co., Ltd.	Drumheller.	Drumheller.
Oliphant, John	Medicine Hat.	Redcliff.
Oliphant, J. H.	Carbon.	Carbon.
Ottewill Coal Co.	Clover Bar.	Edmonton.
Parker, L.	Cardiff.	Edmonton.
Poorless Carbon Collieries	Carbon.	Carbon.
Penn Coals, Ltd.	Edmonton.	Edmonton.
Red Deer Valley Coal Co., Ltd.	Drumheller.	Drumheller.
Rollinson, J.	Lethbridge.	Lethbridge.
Rosedale Coal Co., Ltd.	Rosedale.	Drumheller.
Royal Lethbridge Collieries	Lethbridge.	Lethbridge.
Royalties Oil & Share Corp., Ltd.	Calgary.	Lethbridge and Pembina.
Sinoski, M.	Strathcona.	Edmonton.
Sovereign Coal Mining Co., Ltd.	Wayne.	Drumheller.
Stoney Creek Collieries, Ltd.	Camrose.	Camrose.
Super Heat Coal Co.	Ardley.	Ardley.
Superior Grade Coal Co., Ltd.	Wayne.	Drumheller.
Tofield Coal Co., Ltd.	Tofield.	Tofield.
Tredway & Co.	Dodds.	Tofield.
Western Gem Coal Co., Ltd.	Drumheller.	Drumheller.
<b>BRITISH COLUMBIA—</b>		
Canadian Collieries (Dunsmuir), Ltd.	Nanaimo.	Island.
Coalmont Collieries, Ltd.	Coalmont.	Inland.
Corbin Collieries, Ltd.	Corbin.	Crow's Nest Pass.
Crow's Nest Pass Coal Co., Ltd.	Fernie.	Crow's Nest Pass.
Middleboro Collieries, Ltd.	Merritt.	Inland.
Pleasant Valley Mining Co., Ltd.	Princeton.	Inland.
Tulameen Coal Mines, Ltd.	Princeton.	Inland.
Western Coal Corporation of Canada, Ltd.	Nanaimo.	Island.
Wilson Motor & Investment Co., Ltd.	Vancouver.	Inland.

## Natural Gas Industry

Name	Head office address	Field District
<b>NEW BRUNSWICK—</b>		
New Brunswick Gas & Oilfields, Ltd.	Moncton.	Stony Creek.
The Moncton Electricity & Gas Co., Ltd.	Moncton.	
<b>QUEBEC—</b>		
(a) Canadian Seaboard Oil & Gas Co., Ltd.	39 Broadway, New York City, U.S.A.	Nicolet Co.
(a) Cartier Natural Gas Co., Ltd.	167 Main St., Hull.	Berthier and Chambly Cos.
(a) Mohr, Carl M.	706 Insurance Exchange Bldg., Montreal.	Berthier Co.



## DIRECTORY OF FIRMS—Continued

## Natural Gas Industry—Continued

Name	Head office address	Location Field
<b>ONTARIO—</b>		
Aeene Gas & Oil Co., Ltd.	350 Bay St., Toronto	Middleton.
Ajax Oil & Gas Co., Ltd.	159 Bay St., Toronto	Dover, Middleton and Tuscarora.
Aloka Oil Co., Ltd.	57 Queen St. W., Toronto	Ancaster and Onondaga.
Amity Gas Co.	Kenmore, New York, U.S.A.	Canboro and Moulton.
Aragain Gold & Natural Gas Syndicate.	34 King St. E., Toronto	Canboro and Seneca.
Avery, Edmond	539 Penobscot Bldg., Detroit, Mich., U.S.A.	Cayuga North.
Beacon Natural Gas Syndicate	189 King St. N., Waterloo	Rainham and Walpole.
Beer, Geo.	Bimbrook	Bimbrook.
Benn, A. S.	Hagersville	Walpole.
Bertie Gas Syndicate	Selkirk	Bertie.
Bimbrook Gas Co.	Bimbrook	Bimbrook.
Blackhenth Gas Co.	539 Penobscot Bldg., Detroit, Mich., U.S.A.	Seneca.
Border Cities Syndicate	21 James St. N., Hamilton	Onondaga.
(b) Brantford Gas Co.	518 Jackson Bldg., Buffalo, N.Y., U.S.A.	
Broadway Gas Syndicate	Jarvis	Walpole.
Buck, J. L.	Port Rowan	Walsingham South.
Glenny, D.	Dunnville	Canboro.
Grand River Gas & Oil Syndicate	Canfield	Cayuga North.
Grand River Natural Gas Co., Ltd.	Welland	Moulton.
Grimsby Natural Gas Co., Ltd.	Grimsby	Caistor and Gainsboro.
Haldimand Gas Syndicate	Cayuga	Rainham.
Haldimand Natural Gas Syndicate	Stevensville	Bertie.
Highbank Oil, Ltd.	215 King St. W., Chatham	Raleigh.
Hill, A. W.	Coatsworth	Tilbury East.
Hope Gas Syndicate	43 Ontario St., St. Catharines	Moulton.
House & Harris	Stevensville	Bertie.
Ideal Gas Syndicate	Fisherville	Rainham.
Industrial Natural Gas Co., Ltd.	Jamestown, N.Y., U.S.A.	Bertie, Crowland, Humber- stone and Willoughby.
Jasperson, Bon	Kingsville	Gosfield South, Romney and Tilbury East.
Kelly Gas & Oil Syndicate	357 Bay St., Toronto	Rainham and Walpole.
Kindy, D., & Son	Selkirk	Rainham.
Ladd & Kabana	1002 Buhl Bldg., Detroit, Mich., U.S.A.	Tilbury East.
Ladd & Zeigen	1002 Buhl Bldg., Detroit, Mich., U.S.A.	Tilbury East.
(b) Leamington, Town of	Leamington	
Lincoln Gas Co., Ltd.	10 Adelaide St. E., Toronto	Caistor, Canboro, Gainsboro and Wainfleet.
Lindsay, William B., Estate of	Canada Permanent Bldg., Edmonton, Alberta	Canboro, Rainham and Walpole.
(c) Lowbunks Drillers Gas Syndicate	36-35 King St. E., Toronto	Moulton.
Lymburner Bros. & Webber	Dunnville	Moulton and Rainham.
Lynn Valley Natural Gas Syndicate	112 Yonge St., Toronto	Onidea.
Manchester, James	36 King St. E., Toronto	Rainham.
(b) Manufacturers Natural Gas Co., Ltd.	518 Jackson Bldg., Buffalo, N.Y., U.S.A.	
May-Gold Gas Co.	511 National Bldg., Toronto	Canboro.
McKechnie & Hussey	Dunnville	Canboro.
McLrose Oil & Gas Syndicate	509 Kent Bldg., Toronto	Onidea.
Middleton-Norfolk Natural Gas Syndicate	Tillsonburg	Middleton.
Midfield Gas Co., Ltd.	312-313 Pigott Bldg., Hamilton	Cayuga North and Onidea.
Midwal Oil & Gas Co., Ltd.	5 Elmer Ave., Toronto	Middleton and Walsingham North.
Mohawk Gas & Oil Syndicate, Ltd.	421 Main St. E., Hamilton	Canboro, Onidea and Walpole.
(c) Monarch Natural Gas Syndicate	Selkirk	Walpole.
(c) National Gas Syndicate	Dunnville	Seneca.
Nelles Corners Gas Syndicate	Nelles Corners	Cayuga North and Rainham
Niagara Natural Gas Co., Ltd.	401 Genesee Bldg., Buffalo, N.Y., U.S.A.	Moulton.
Sterling Gas Co., Ltd.	319 Bay St., Toronto	Walpole.
Stevensville Natural Gas & Fuel Co.	Stevensville	Bertie.
Stover, F. H.	330 Bay St., Toronto	Dove.
Stromwell Syndicate	Tillsonburg	Moulton.
Sundy Gas Co.	Dunnville	Canboro.
Superior Gas Syndicate	Fisherville	Rainham.
Sweets Corners Gas & Oil Syndicate	Fisherville	Rainham.
Tillsonburg Oil & Gas Co., Ltd.	224 Carlton St., Toronto	Middleton.
Union Gas Company of Canada, Ltd.	52 Fifth Ave., Chatham	Aldborough, Dawn, Dover, Euphemia, Haldimand, Raleigh, Romney, Som- bra and Tilbury East.
Vacuum Gas & Oil Co., Ltd.	350 Bay St., Toronto	Middleton.
Walpole Gas Syndicate	Cayuga	Walpole.
Walter Gas Syndicate, Ltd.	3020 Bailey Ave., Buffalo, N.Y., U.S.A.	Canboro, Middleton, Towns- end and Woodhouse.
(d) Walwork Gas Co.	Simcoe	Bayham.
Welland County Gas Syndicate	Stevensville	Bertie.
Western Ontario Natural Gas Co., Ltd.	Dunnville	Canboro, Cayuga North, Dunn and Sherbrooke.
White Oil & Gas Co., Ltd.	Box 216, Sarnia	Seneca and Walpole.
<b>MANITOBA—</b>		
(a) Ligar Oil & Gas Co., Ltd.	Manitou	Near Purves.



## DIRECTORY OF FIRMS—Continued

## Natural Gas Industry—Concluded

Name	Head office address	Location Field
<b>SASKATCHEWAN—</b>		
(a) Altoba Gas Exploration Co.....	Box 28, Calgary.....	Manitou.
Lloydminster Gas Co., Ltd.....	Lloydminster.....	Lloydminster.
(a) Twin Provinces Oil Co., Ltd.....	Maple Creek.....	Near Maple Creek.
<b>ALBERTA—</b>		
Advance Oil Co., Ltd.....	Albertan Bldg., Calgary.....	Turner Valley.
Alberta Clay Products Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Associated Oil & Gas Co., Ltd.....	200 Leeson-Lineham Block, Calgary.....	Turner Valley.
Baltac Oils, Ltd.....	200 Leeson-Lineham Block, Calgary.....	Turner Valley.
(b) Bow Island, Town of.....	Bow Island.....	
British Dominion Oil & Development Corp., Ltd.....	208 Dominion Bank Bldg., Calgary.....	Turner Valley
Calgary Power Co., Ltd.....	244 St. James St., Montreal, Que.....	Bassano.
Canadian Pacific Railway Co.....	Medicine Hat.....	Medicine Hat
Canadian Western Natural Gas, Light, Heat & Power Co., Ltd.....	215-6th Ave. W., Calgary.....	Brooks.
Canadian Western Power & Fuel Co., Ltd.....	Redcliff.....	Redcliff.
Carlton Royalties, Ltd.....	123-8th Ave. W., Calgary.....	Turner Valley.
Century Royalties, Ltd.....	123-8th Ave. W., Calgary.....	Turner Valley.
Commonwealth Petroleum, Ltd.....	410 Lancaster Bldg., Calgary.....	Turner Valley.
Dalhousie Oil Co., Ltd.....	636-2nd St. W., Calgary.....	Turner Valley.
Director Royalties, Ltd.....	415 Bank of Nova Scotia Bldg., Vancouver, B.C.....	Turner Valley.
Dominion Glass Co., Ltd.....	1111 Beaver Hill Hill, Montreal, Que.....	Redcliff.
East Crest Oil Co., Ltd.....	409 Nucleon Block, Calgary.....	Turner Valley.
Foothills Oil & Gas Co., Ltd.....	606-2nd St. W., Calgary.....	Turner Valley.
Freehold Oil Corp., Ltd.....	817 Lancaster Bldg., Calgary.....	Turner Valley.
Gold Standard Oils, Ltd.....	Wainwright.....	Wainwright.
Gunderson Brick & Coni Co., Ltd.....	Redcliff.....	Redcliff.
Highwood-Sarcoe Oils, Ltd.....	61 Canada Life Bldg., Calgary.....	Turner Valley.
Home Oil Co., Ltd.....	744 Hastings St. W., Vancouver, B.C.....	Turner Valley.
Hudson's Bay Oil & Gas Co., Ltd.....	79 Main St., Winnipeg, Man.....	Viking.
Hylo Oils, Ltd.....	118 Ronfrew Bldg., Calgary.....	Turner Valley.
Lawery Petroleum, Ltd.....	68 King St. E., Toronto, Ont.....	Turner Valley.
Maple Leaf Milling Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Maple Leaf Oil Co., Ltd.....	1007 Stock Exchange Bldg., Vancouver, B.C.....	Fabyan.
Mar-Jon Oil Co., Ltd.....	827 Rogers Bldg., Vancouver, B.C.....	Turner Valley.
Medco Oil Co., Ltd.....	233 Grain Exchange Bldg., Calgary.....	Turner Valley.
Medicine Hat, City of.....	Medicine Hat.....	Medicine Hat.
Mercury Oils, Ltd.....	300 Lancaster Bldg., Calgary.....	Turner Valley.
Merland Oil Company of Canada, Ltd.....	327-13th St. N.W., Calgary.....	Turner Valley.
Midfield Oil Co., Ltd.....	Turner Valley.....	Turner Valley.
Miracle Oils, Ltd.....	300 Lancaster Bldg., Calgary.....	Turner Valley.
Model Oils, Ltd.....	7 Cameron Block, Calgary.....	Turner Valley.
New McDougall-Sagor Oil Co., Ltd.....	70 Union Bldg., Calgary.....	Turner Valley.
Northwest Co., Ltd.....	606-2nd St. W., Calgary.....	Turner Valley.
Northwest Royalties, Ltd.....	900 Lancaster Bldg., Calgary.....	Turner Valley.
Northwestern Utilities, Ltd.....	10124-104th St., Edmonton.....	Viking.
Ogilvie Flour Mills Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Oil Investors, Ltd.....	225-8th Ave. W., Calgary.....	Turner Valley.
Pacalta Oils, Ltd.....	317 Alberta Corner, Calgary.....	Turner Valley.
Premier Brick Co.....	Redcliff.....	Redcliff.
Publix Oil & Gas, Ltd.....	228 Examiner Bldg., Calgary.....	Turner Valley.
Range Oil & Gas Co., Ltd.....	101 Canadian Bank of Commerce Bldg., Calgary.....	Border.
Redcliff Dressed Brick Co.....	Redcliff.....	Redcliff.
Rialto Oils, Ltd.....	300 Lancaster Bldg., Calgary.....	Reserve.
Roylrite Oil Co., Ltd.....	606-2nd St. W., Calgary.....	Turner Valley.
Southwest Petroleum Co.....	606-2nd St. W., Calgary.....	Turner Valley.
Spooner Oils, Ltd.....	1202-1st St. W., Calgary.....	Turner Valley.
Sterling Royalties, Ltd.....	123-8th Ave. W., Calgary.....	Turner Valley.
Suffield, Village of.....	Suffield.....	Suffield.
Vamita, Ltd.....	Granville Island, Vancouver, B.C.....	Red Coates.
(b) Wainwright Gas Co., Ltd.....	36 Dominion Bank Bldg., Edmonton.....	
Wayne Oils, Ltd.....	Wayne.....	Turner Valley.
Wellington Oil & Gas Co., Ltd.....	4 Central Bldg., Calgary.....	Turner Valley.
Wetaskiwin, City of.....	Wetaskiwin.....	Wetaskiwin.

NOTE.—(a) Drilling only.  
 (b) Distributing only.  
 (c) Producing wells drilled in 1934—No output reported.  
 (d) Dry well drilled in 1934.

## Peat Industry

<b>ONTARIO—</b>		
Alfred Bog.....	Alfred.....	Alfred.
Counryman, G.....	Chesterville.....	Winchester Tp.
Fleming, J.....	Morwood.....	Winchester Tp.
Hummel, Wm.....	Chesterville.....	Winchester Tp.
Leasa, Wm.....	Milvorton.....	Ellice Tp.
Roe, Stephen.....	Milvorton, R.R. 2.....	Elma Tp.
Stewart Bros.....	Chesterville.....	Winchester Tp.

## DIRECTORY OF FIRMS—Continued

## Crude Petroleum Industry

Name	Head office address	Location Field
<b>NEW BRUNSWICK—</b>		
New Brunswick Gas & Oil Fields, Ltd.....	Moncton.....	Stony Creek.
<b>ONTARIO—(a)</b>		
Armstrong, J. E., Estate of.....	Petrolia.....	Petrolia and Enniskillen.
Atkinson, John.....	Petrolia.....	Petrolia and Enniskillen.
Barnes, Henry.....	Oil Springs.....	Oil Springs.
Beak, Thos.....	Petrolia.....	Petrolia and Enniskillen.
Brookfield Oil & Gas, Ltd.....	Sarnia.....	Brooke.
Brown, J. F.....	Sarnia.....	Moore.
Bryson, G. C.....	Petrolia.....	Petrolia and Enniskillen.
Bryan Oil & Gas Syndicate.....	Toronto.....	Brooke.
Burns Bros.....	Oil Springs.....	Oil Springs.
Burns, Mrs. Lydia.....	Oil Springs.....	Oil Springs.
Canadian Oil Refineries, Ltd.....	12 Strachan Ave., Toronto.	Petrolia and Enniskillen.
Carron, W. G.....	Petrolia.....	Petrolia and Enniskillen.
Cochester Oil & Gas Co.....	Toronto.....	Thamesville.
Cole, W. J.....	Petrolia.....	Petrolia and Enniskillen.
Collins, Matthew.....	Petrolia.....	Petrolia and Enniskillen.
Crocker-Parks Oil Co., Ltd., The.....	Oil Springs.....	Oil Springs.
Daunis, Charles.....	Oil Springs.....	Oil Springs.
Daunis, Welcome.....	Oil Springs.....	Oil Springs.
Deauston Petroleum Co., Ltd., The.....	Glencoe.....	Mosa.
Donald, George.....	Oil Springs.....	Oil Springs.
Duncan, D. A.....	Petrolia.....	Moore.
Edward, F. H.....	Petrolia.....	Petrolia and Enniskillen.
Fairbank, J. H., Estate of.....	Petrolia.....	Oil Springs.
Forsythe, A.....	Copleston.....	Petrolia and Enniskillen.
Gillespie, Wm. O.....	Petrolia.....	Petrolia and Enniskillen.
(b) Gregory, G. F.....	Petrolia.....	—
Hamlin, F. G.....	Petrolia.....	Petrolia and Enniskillen.
Halls Bros.....	Oil Springs.....	Oil Springs.
Holmes, E. B.....	Bothwell.....	Bothwell.
Houston, Mrs. Annie.....	Petrolia.....	Petrolia and Enniskillen.
(c) Hussey, W. J.....	Petrolia.....	—
Hawlett, Fred W., & Sons, Ltd.....	Petrolia.....	Petrolia and Enniskillen.
Kells, E. E.....	Petrolia.....	Petrolia and Enniskillen.
Kelly, J. E.....	Petrolia.....	Petrolia and Enniskillen.
Kerr, John, Estate of.....	Petrolia.....	Petrolia and Enniskillen.
Kettle, Robt.....	Petrolia.....	Petrolia and Enniskillen.
(d) Kiser Bros.....	Chatham.....	—
Luther, Arthur.....	Bothwell.....	Bothwell.
Leving, Harry.....	Petrolia.....	Petrolia and Enniskillen.
Levis Bros.....	Oil Springs.....	Oil Springs.
(e) Merchant, F. J.....	Petrolia.....	—
McCrie, R. D.....	Bothwell.....	Bothwell.
McGill, J.....	Bothwell.....	Bothwell.
McGillivray, G. A.....	201 Mount Pleasant Ave., London.	Oil Springs.
McMillan, D. C. and Warwick, J.....	Bothwell.....	Bothwell.
Miller, Agnes E.....	Petrolia.....	Petrolia and Enniskillen.
Mitchell, Chas.....	Oil Springs.....	Oil Springs.
Mitchell, Robert.....	Oil Springs.....	Oil Springs.
Mobey, Charles.....	Bothwell.....	Bothwell.
Morningstar, H. M.....	Oil Springs.....	Oil Springs.
Morningstar, L. H.....	Oil Springs.....	Oil Springs.
Ontario Lands & Oil Co., Ltd., The.....	Petrolia.....	Petrolia and Enniskillen.
Parks, Blake.....	Petrolia.....	Petrolia and Enniskillen.
Petrol Oil & Gas Co., Ltd.....	73 Adelaide St. W., Toronto.	Daver.
Premier Oils, Ltd.....	539½ St. Clair Ave. W., Toronto.	Raleigh.
Producers Gas Corp., Ltd.....	320 Bay St., Toronto.	Petrolia and Enniskillen.
Rawson, W. J.....	Petrolia.....	Brooke.
Stoddard & Darke.....	15379 Westbrooke Ave., Detroit, Mich.	Oil Springs.
Sutherland, B. M.....	Petrolia.....	Dawn.
Tenn Gas Company of Canada, Ltd.....	52 Fifth St., Chatham.	Oil Springs.
Warwick, J.....	Oil Springs.....	—
(f) Willis, D. E.....	Bothwell.....	Bothwell.
Winnett, J. W. G.....	4181 Talbot St., London.	Oil Springs.
Woodward, Wm.....	Oil Springs.....	Petrolia and Enniskillen.
Yerks, Carlton S.....	Petrolia.....	Petrolia and Enniskillen.
Yerks, Frank.....	Petrolia.....	—
<b>ALBERTA—</b>		
Advance Oil Co., Ltd.....	Albertan Bldg., Calgary.	Turner Valley.
Albertan Federated Oils, Ltd.....	c/o Security Trust Co., Ltd., Calgary.	Turner Valley.
Associated Oil & Gas Co., Ltd.....	200 Leeson-Lineham Block, Calgary.	Turner Valley.
Associated Royalties, Ltd.....	Renfrew Bldg., Calgary.	Turner Valley.
Baltac Oils, Ltd.....	200 Leeson-Lineham Block, Calgary.	Turner Valley.
British Dominion Oil & Development Corp., Ltd.....	208 Dominion Bank Bldg., Calgary.	Turner Valley.
British Wainwright Oil & Development Co., Ltd.....	703 Paris Bldg., Winnipeg, Man.	Wainwright.

(a) Producers of 500 barrels or more during the year, except in Brooke township where producers of 400 barrels and over are shown.

(b) Driller only.

## DIRECTORY OF FIRMS—Continued

## Petroleum Industry—Concluded

Name	Head office address	Location Field
<b>ALBERTA—Concluded</b>		
Calmont Oils, Ltd.	301 Toronto General Trust Bldg., Calgary	Turner Valley.
Carleton Royalties, Ltd.	123-8th Ave. W., Calgary	Turner Valley.
Century Royalties, Ltd.	123-8th Ave. W., Calgary	Turner Valley.
Commonwealth Petroleum, Ltd.	410 Lancaster Bldg., Calgary	Turner Valley.
Dalhousie Oil Co., Ltd.	606-2nd St. W., Calgary	Turner Valley.
Dovenish Petroleum, Ltd.	300 Jasson-Lincham Block, Calgary	Skiff.
Director Royalties, Ltd.	415 Bank of Nova Scotia Bldg., Vancouver, B.C.	Turner Valley.
East Crest Oil Co., Ltd.	409 Maclean Block, Calgary	Turner Valley.
Edalta Oils, Ltd.	9918-107th St., Edmonton	Wainwright.
Edmonton Wainwright Oils, Ltd.	Wainwright	Wainwright.
Footbills Oil & Gas Co., Ltd.	606-2nd St. W., Calgary	Turner Valley.
Frano Oils Co.	Cardston	Cardston.
Freehold Oil Corp., Ltd.	817 Lancaster Bldg., Calgary	Turner Valley.
Gas & Oil Products, Ltd.	300 Lancaster Bldg., Calgary	Turner Valley.
Gold Standard Oils, Ltd.	Wainwright	Wainwright.
Hargal Oils, Ltd.	1007 Stock Exchange Bldg., Vancouver, B.C.	Turner Valley and Wainwright.
*Highwood Royalties, Ltd.	820-4th St. W., Calgary	Turner Valley.
Highwood Sareco Oils, Ltd.	61 Canada Life Bldg., Calgary	Turner Valley.
Home Oil Co., Ltd.	744 Hastings St. W., Vancouver, B.C.	Turner Valley.
Homeside Oils, Ltd.	303 Beveridge Bldg., Calgary	Turner Valley.
Hudson's Bay Oil & Gas Co., Ltd.	79 Main St., Winnipeg, Man.	Kelbo.
Hunter Valley Oil Co., Ltd.	508 Loughheed Bldg., Calgary	Hunter Valley.
Hylo Oils, Ltd.	Renfrew Bldg., Calgary	Turner Valley.
Lowery Petroleums, Ltd.	68 King St. E., Toronto, Ont.	Turner Valley.
*Maple Leaf Royalties, Ltd. (Canadian Royalties)	Central Bldg., Calgary	Turner Valley.
Mar-Jon Oil Co., Ltd.	827 Rogers Bldg., Vancouver, B.C.	Turner Valley.
Maxmont Oil Co.	Lundbrook	Watson Structure.
McLeod Oil Co., Ltd.	203 Grain Exchange Bldg., Calgary	Turner Valley.
Mercury Oils, Ltd.	300 Lancaster Bldg., Calgary	Turner Valley.
Merland Oil Company of Canada, Ltd.	327-13th St. N.W., Calgary	Turner Valley.
Midfield Oil Co., Ltd.	Turner Valley	Turner Valley.
Miracle Oils, Ltd.	300 Lancaster Bldg., Calgary	Turner Valley.
Model Oils, Ltd.	7 Cameron Block, Calgary	Turner Valley.
*Meyers & Wright Royalties	112-7th Ave. E., Calgary	Turner Valley.
New McDougall-Segur Oil Co., Ltd.	70 Union Bldg., Calgary	Turner Valley.
Northwest Co., Ltd.	606-2nd St. W., Calgary	Turner Valley.
*Northwest Royalties, Ltd.	900 Lancaster Bldg., Calgary	Turner Valley.
Oil Investors, Ltd.	225a-8th Ave. W., Calgary	Turner Valley.
Okalta Oils, Ltd.	Renfrew Bldg., Calgary	Turner Valley.
Onalta Oil Co.	Wainwright	Wainwright.
Pacalta Oils, Ltd.	112-7th Ave. E., Calgary	Turner Valley.
*Pekisko Hills Co., Ltd.	4 Central Bldg., Calgary	Pekisko.
*Phillips Petroleums, Ltd.	Turner Valley	Turner Valley.
Public Oil & Gas, Ltd.	226 Exarimor Bldg., Calgary	Turner Valley.
Regent Oil Co., Ltd.	Grain Exchange Bldg., Calgary	Turner Valley.
*Renfrew Royalty Co., Ltd.	225a-8th Ave. W., Calgary	Turner Valley.
Rindco Oils, Ltd.	300 Lancaster Bldg., Calgary	Reserve Structure.
Richfield Petroleum, Ltd.	225a-8th Ave. W., Calgary	Turner Valley.
*Richfield Royalties, Ltd.	225a-8th Ave. W., Calgary	Turner Valley.
*Royliffe Oil Co., Ltd.	606-2nd St. W., Calgary	Turner Valley.
Susko-Wainwright Oil & Gas, Ltd.	Wainwright	Wainwright.
Southwest Petroleum Co., Ltd.	606-2nd St. W., Calgary	Turner Valley.
Spooner Oils, Ltd.	1202 First St. W., Calgary	Turner Valley.
Sterling Royalties, Ltd.	123-8th Ave. W., Calgary	Turner Valley.
Vanalta, Ltd.	Granville Island, Vancouver, B.C.	Red Coulee.
Vulcan Oils, Ltd.	Vulcan	Turner Valley.
Wainwright Petroleums, Ltd.	10625-99th Ave., Edmonton	Wainwright.
Wayne Oils, Ltd.	Wayne	Turner Valley.
Wellington Oil & Gas Co., Ltd.	4 Central Bldg., Calgary	Turner Valley.
Widney Oils, Ltd.	229-8th Ave. W., Calgary	Turner Valley.
<b>NORTHWEST TERRITORIES—</b>		
Northwest Co., Ltd.	606-2nd St. W., Calgary	Fort Norman.

\* Drilling only.

† Operates an absorption plant.

‡ In addition to operating wells in the Turner Valley field this company operates an absorption plant.



## OTHER NON-METAL MINING INDUSTRIES

## Actinolite Mining Industry

Name	Head office address	Location
ONTARIO— The Actinolite Mining Co.....	1420 Chomedy St., Montreal, P.Q.....	Kaladar, Ont.

## Asbestos Mining Industry\*

Asbestos Corporation, Ltd.....	Canada Cement Bldg., Montreal, P.Q.....	Thetford Mines, East Broughton, Black Lake, Coleraine, Asbestos.
Canadian Johns-Manville Co., Ltd.....	Montreal, P.Q.....	Thetford Mines, Coleraine.
Johnson's Co.....	Thetford Mines West, P.Q.....	Thetford Mines.
Kensby & Mattison Co.....	Ambler, Pa., U.S.A.....	
Nicolet Asbestos Mines, Ltd.....	c/o Greenshields & Greenshields, Transpor- tation Bldg., Montreal, P.Q.....	Wotton Tp., Tingwick Tp.
Northern Asbestos Co., Ltd.....	Box B1, Thetford Mines, P.Q.....	Thetford Mines.
Quebec Asbestos Corp., Ltd.....	East Broughton, P.Q.....	East Broughton.

\* All plants located in the province of Quebec.

## Barytes

ONTARIO— *Canada Night Hawk Mines, Ltd.....	Room 305, 372 Bay St., Toronto.....	Porcupine Area.
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\* Not producing.

## Bituminous Sands

ALBERTA— Absand Oils, Ltd.....	3703 Northern Ontario Bldg., Toronto, Ont..	Northern Alberta.
*Bituminous Sand Extraction Co., Ltd.....	507 MacLean Block, Calgary.....	Northern Alberta.
McMurray Asphaltum & Oil, Ltd.....	Petrolia, Ont.....	Northern Alberta.

\* Active but not producing.

## Diatomite

NOVA SCOTIA— International Diatomite Industries, Ltd.....	206 Patriot Bldg., Concord, N.H.....	Little River, East New Annan.
ONTARIO— Diatomite Refiners Co.....	45 Richmond St. W., Toronto.....	Novar.
Diatomite Products, Ltd.....	c/o A. C. Clark, 302 Bay St., Toronto.....	Martin Siding.
BRITISH COLUMBIA— B.C. Refractories, Ltd.....	660 Taylor St. Vancouver.....	Quesnel.
Hind, W. H.....	Vancouver.....	Burnaby Lake.

## Feldspar and Quartz Mining Industry

NOVA SCOTIA— (a) Dominion Steel & Coal Corp., Ltd.....	Sydney.....	Leitch Creek.
(a) Smith, R. M., and MacDougall, J. D.....	Port Hood.....	Melford.
QUEBEC— Bertrand, W.....	Buckingham.....	Derry Tp.
(a) Bigelow, E. M., and Stewart, Wm.....	Glen Almond.....	Catineau Dist.
(a) Bigelow, Robt. A.....	Buckingham.....	Buckingham Dist.
(a) Canadian Carborundum Co., Ltd.....	Box 65, Niagara Falls, Ont.....	St. Canut.
(*) Canadian Flint & Spar Co., Ltd.....	Box 340, Buckingham.....	Buckingham.
(a) Canadian Kaolin Silica Products, Ltd.....	660 St. Catherine St. W., Montreal.....	St. Remi d'Amherst.
(a) Canadian Silica Products, Ltd.....	81 Tache St., Chicoutimi.....	Roberval.
(a) Côté, Hector.....	R. R. 4, Sherbrooke.....	Sherbrooke Dist.
(a) Couture, Edmond.....	Glen Almond.....	Glen Almond.
Derry Mining Co.....	Buckingham.....	Derry Tp.
Donaldson, Robt. J.....	Glen Almond.....	Buckingham Tp.
Evans, W. H.....	Box 386, Buckingham.....	Buckingham Tp.
(a) Flint Sands, Ltd.....	24 King St. W., Toronto, Ont.....	St. Bruno de Guigues.
(a) Gordon, Alfred.....	Brigham.....	Missisquoi Co.
McCllements, Albert.....	Buckingham.....	Buckingham Dist.
McDonnell, B. A.....	Glen Almond.....	Derry Tp.
(a) McDonnell, Edmond.....	Buckingham.....	Buckingham Dist.
McDonnell, James.....	Glen Almond.....	Buckingham Dist.



## DIRECTORY OF FIRMS—Continued

## Feldspar and Quartz Mining Industry—Concluded

Name	Head office address	Location
<b>QUEBEC—Concluded</b>		
(a) McLann-McNicoll, Ltd.	609 Confederation Bldg., Montreal	Labelle.
O'Brien & Fowler, Ltd.	Box 340, Buckingham	Derry Tp.
(a) Ottawa Silica & Sandstone, Ltd.	East Templeton	East Templeton.
Pareher, Alfred	Glen Almond	Derry Tp.
Pedneaud, G.	Buckingham	Buckingham Dist.
(a) Rivest, Zorila	St. Sulpice	Assomption Co.
Tontloff, Frank, and Wallingford, A.	Gatineau Point	Gatineau Dist.
(a) Warwick, Wm.	Glen Almond	Gatineau Dist.
Whitfield, T.	Buckingham	Buckingham Dist.
Winning, Bush	Notre Dame de la Salette	Buckingham Dist.
<b>ONTARIO—</b>		
Anderson, J. G., & Son	Lucknow	Britt and Warren.
(a) Barnes, W. R.	Hamilton	Springville.
Barr, Walter J.	Westmeath	Renfrew Co.
Bathurst Feldspar Mines, Ltd.	230 King St. E., Toronto	Lanark Co.
Charotte, S., & Son	Estaire	Burwash.
Chayer, Leo	Warren	Warren Station.
Craig, T. H.	10 Victoria St., Perth	Lanark Co.
(a) Dominion Mines & Quarries, Ltd.	Canada Life Bldg., Toronto	Killarney.
(a) Frontenac Floor & Wall Tile Co., Ltd.	Kingston	Kingston.
Gunter, Judson A.	Princes Lake	Nipissing Dist.
MacDonald, P.	Hybla	Hybla.
(a) Wright & Co.	960 Queen St., Sault Ste. Marie	Derocho Tp.
<b>MANITOBA—</b>		
(a) Lake Bar Sand & Gravel Co., Ltd.	307 Scott Block, Winnipeg	Black Island.
Winnipeg River Tin Mines, Ltd.	c/o Dysons, Ltd, Winnipeg	Pointe du Bois.

(a) Reported production of silica only.

(\*) Operated grinding plants.

NOTE.—In addition to these operators, metallurgical plants in Ontario, Manitoba, Saskatchewan and British Columbia produced silica flux for their own use.

## Fluorspar

<b>ONTARIO—</b>		
Stocklosar, Chas. A.	Box 198, Madoc	Hastings Co.

## Garnets

<b>QUEBEC—</b>		
*La Belle Mining, Inc.	4203 Brebeuf, Montreal	Joly Tp., Labelle Co.

\* Active but not producing.

## Graphite

<b>QUEBEC—</b>		
Canadian Graphite Corporation	1193 Phillips Place, Montreal	Boyer Tp.
<b>ONTARIO—</b>		
Black Donald Graphite Co., Ltd.	Calabogie	Brougham Tp.

\* Company now inactive.

## Grindstones, Pulpstones and Sharpening Stones

<b>NOVA SCOTIA—</b>		
The Read Stone Co., Ltd.	Box 549, Sackville, N.B.	Quarry Island.
<b>NEW BRUNSWICK—</b>		
National Trust Co., Ltd. (Mirmichi Quarry Co., Ltd.)	225 St. James St., Montreal, P.Q.	Quarryville.
The Read Stone Co., Ltd.	Box 549, Sackville	Stonehaven.
Smith, E. A.	Box 79, Shediac	Shediac.
<b>BRITISH COLUMBIA—</b>		
J. A. and C. H. McDonald, Ltd.	1571 Main St., Vancouver	Gabriola Island and Vancouver.

## Gypsum Mining Industry

<b>NOVA SCOTIA—</b>		
Atlantic Gypsum Products Co.	40 Central St., Boston, Mass., U.S.A.	Aspy Bay, Cheticamp and Walton.
Canadian Gypsum Co., Ltd.	1221 Bay St., Toronto, Ont.	Wentworth.
The Connecticut Adamant Plaster Co.	10 River St., New Haven, Conn., U.S.A.	Chéverie.
The Nova Scotia Coal & Gypsum Co., Ltd.	Box 13, Mabou	Mabou Harbour.
North American Gypsum Co.	96 Curtis Ave., Rutland, Vt., U.S.A.	Baddeck Bay.
Windsor Gypsum Co.	Box 727, Newburgh, N.Y., U.S.A.	Newport Station.
Windsor Plaster Co., Ltd.	Windsor	Brooklyn, Hants Co.

## DIRECTORY OF FIRMS—Continued

## Gypsum Mining Industry—Concluded

Name	Head office address	Location
NEW BRUNSWICK— Canadian Gypsum Co., Ltd..... Thompson, F. M.....	1221 Bay St., Toronto, Ont..... Hillsborough.....	Hillsborough. Petitcodiac Co.
ONTARIO— Canadian Gypsum Co., Ltd..... Gypsum, Lime and Alabastine, Canada, Ltd.	1221 Bay St., Toronto..... Paris.....	Hagersville. Caledonia.
MANITOBA— Gypsum, Lime and Alabastine, Canada, Ltd. Western Gypsum Products, Ltd.....	Paris, Ont..... 503 McArthur Bldg., Winnipeg.....	Gypsumville. Amaranth.
BRITISH COLUMBIA— Gypsum, Lime and Alabastine, Canada, Ltd.	Paris, Ont.....	Falkland.

## Iron Oxides Mining Industry

QUEBEC— Argall, Thos. H..... *Montmorency Paint Products Co., Ltd..... The Sherwin-Williams Company of Canada, Ltd..... McNicol, Eugene.....	639 St. Angel, Three Rivers..... 6684 St. Urbain St., Montreal..... 2875 Centre St., Montreal..... 354 St. Catherine St. W., Montreal.....	La Pointe du Lac. Les Forges. Red Mill. Labelle Co.
BRITISH COLUMBIA— Davidson, J. G., and Thompson, J. H.....	3498 Marine Drive, Vancouver.....	Mons.

\* No production reported in 1934.

## Magnesitic Dolomite

QUEBEC— Canadian Refractories, Ltd..... International Magnesite Co., Ltd.....	1050 Canada Cement Bldg., Montreal..... Calumet.....	Grenville Tp. Harrington Tp.
BRITISH COLUMBIA— *Consolidated Mining & Smelting Company of Canada, Ltd.....	Trail.....	Marysville.

\* No production reported in 1934.

## Magnesium Sulphate

BRITISH COLUMBIA— Epsom Refineries, Ltd.....	395 Main St., Winnipeg, Man.....	Kamloops, Dist.
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## Manganese Bog

NEW BRUNSWICK— *Singleton, Clarence.....	North Renous.....	North Renous.
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\* Active but not producing.

## Mica Mining Industry

QUEBEC— (*)Ahearn, W..... (a)Blackburn Bros., Ltd..... Brown Bros..... Cleary, G..... Cross, W. C..... Flynn, B. J..... Martin, A. G..... (*)McGlashan, Wm..... Wallingford Bros., Ltd.....	538 McLaren St., Ottawa, Ont..... Blackburn Bldg., Ottawa, Ont..... Cantley, P.Q..... Wilson's Corners, P.Q..... 209 Bridge St., Hull, P.Q..... 33 Montcalm St., Hull, P.Q..... 236 Besserer St., Ottawa, Ont..... Wilson's Corners, P.Q..... Perkins, P.Q.....	Hull Tp. Templeton Tp. Hull Tp. Gatineau Tp. Hull Tp. Hull Dist. Hull Tp. and Wakefield Tp. Wakefield Tp. Hull Tp.
ONTARIO— Kent Bros..... Lee, W. W., & Son..... Loughborough Mining Co., Ltd..... Murtin, A. G..... Thirty Island Lake, Mica Co.....	Kingston, Ont..... Bedford Mills, Ont..... Sydenham, Ont..... 236 Besserer St., Ottawa, Ont..... Verona, Ont.....	Kingston. Bedford Tp. Sydenham. Ottawa. Thirty Island Lake.
BRITISH COLUMBIA— (a)B.C. Refractories, Ltd..... (b)Roy, P. M.....	660 Taylor St., Vancouver, B.C..... Princes Rupert, C.B.....	Armstrong. Baker Inlet.

(\*) Active but not shipping.

(a) Operates a grinding plant.

(b) Mines sericite.

## DIRECTORY OF FIRMS—Continued

## Mineral Waters (Natural)

Name	Head office address	Location
<b>QUEBEC—</b>		
Abenakis Springs Co.	Blondin.	Yamaska Co.
Bellefleur Josaphat.	St. Maurice.	St. Maurice.
Eau Minérale Etoile.	St. Geneviève de Batiscan.	St. Geneviève de Batiscan.
Fernet, J. G.	Berthierville, R.R. 2.	Berthierville, R.R. 2.
Gélinas, Ezilda.	St. Séver.	St. Maurice Co.
Gurd, Chas., & Co., Ltd.	1016 Bleury St., Montreal.	Varenes.
La Cie Embouteillage d'Eau.	3 St. Germain St., St. Hyacinthe.	St. François du Lac.
La Cie Embouteillage St. Laurent.	64 St. Pierre St., St. Hyacinthe.	St. Hyacinthe.
La Cie d'Eau Minérale.	148 Concorde St., St. Hyacinthe.	St. Hyacinthe le Confesseur.
Muski Bottling Works.	Maskinongé.	Maskinongé.
Pellerin, Albert.	St. Barnabé Nord.	St. Maurice Co.
Radnor Mineral Water Springs.	St. Maurice.	St. Maurice.
Richard, Girard.	St. Grégoire.	St. Grégoire.
Source, Coulombia.	L'Epiphanie.	L'Epiphanie.
<b>ONTARIO—</b>		
Boyd, T. R.	Carlsbad Springs.	Carlsbad.
Denaault, F.	Bourget.	Bourget.
Gurd, Chas., & Co., Ltd.	1016 Bleury St., Montreal, P.Q.	Caledonia Springs.

## Phosphate

<b>QUEBEC—</b>		
Mageau, Donat.	Notre-Dame de la Salette.	Villeneuve.
McClashan, R. J.	Hull.	Buckingham Dist.
St. Amour, Abie.	Notre-Dame de la Salette.	Buckingham Dist.
<b>BRITISH COLUMBIA—</b>		
The Consolidated Mining & Smelting Co. of Canada, Ltd.*	Trail, B.C.	Crowanest, Fernie.

\*Inactive in 1934.

## Pyrites (Sulphur)

<b>QUEBEC—</b>		
Aldermac Mines, Ltd.(x)	941 Dominion Square Bldg., Montreal.	Boischatel Tp.
Consolidated Copper & Sulphur Co., Ltd.(*)	Eustis.	Ascot Tp.
<b>ONTARIO—</b>		
International Nickel Co. of Canada, Ltd.(a)	Copper Cliff.	Copper Cliff.
<b>BRITISH COLUMBIA—</b>		
Consolidated Mining & Smelting Company of Canada, Ltd.(a)	Trail.	Trail.
Britannia Mining & Smelting Co., Ltd.(*)	Britannia Beach.	Britannia Beach.

(\*)Pyrites concentrated from copper ore.

(a)Salvaged smelter gas.

## Salt Industry

<b>NOVA SCOTIA—</b>		
Malagash Salt Co., Ltd.	204 Provost St., New Glasgow.	Malagash.
<b>ONTARIO—</b>		
Drummond, Mond, Canada, Ltd.	Canadian Bank of Commerce Bldg., Toronto	Amherstburg.
Canadian Industries, Ltd.	P.O. Box 1260, Montreal, P.Q.	Sandwich.
The Dominion Salt Co., Ltd.	Sarnia.	Sarnia.
Goderich Salt Co., Ltd.	Box 577, Goderich.	Goderich.
The Walker Salt Corp., Ltd.(*)	Port Franks.	Port Franks.
Warwick Pure Salt Co., Ltd.	R.R. 5, Watford.	Lambton Co.
Western Canada Flour Mills Co., Ltd.	287 MacPherson Ave., Toronto.	Goderich.
<b>MANITOBA—</b>		
Neepawa Salt Co., Ltd.	Neepawa.	Neepawa.
<b>SASKATCHEWAN—</b>		
Simpson Oil Co., Ltd.	Simpson.	Simpson.

(\*) First produced in 1935.

## Silica Brick

<b>NOVA SCOTIA—</b>		
Dominion Steel & Coal Corp., Ltd.	Sydney.	Sydney.
<b>ONTARIO—</b>		
Algoma Steel Corp., Ltd.	Sault Ste. Marie.	Sault Ste. Marie.

## DIRECTORY OF FIRMS—Continued

## Sodium Carbonate

Name	Head office address	Location
BRITISH COLUMBIA— B.C. Sodium Syndicate..... Bishop, James A.(a).....	Kamloops..... Clinton.....	Cherry Creek. Clinton.

## Sodium Sulphate

SASKATCHEWAN— Alexander, W. R..... Dominion Sodium Refineries, Ltd..... *Easterest Holding & Development Co..... Horseshoe Lake Mining Co., Ltd..... *Midwest Chemical Co..... *Muskiki Sulphates, Ltd..... Natural Sodium Products, Ltd..... Saskasal, Ltd..... Sodium Corporation, Ltd..... *Sodium Sulphate Co. of Saskatchewan, Ltd..... White Shore Salts & Chemicals Co., Ltd.....	831 D. North, Saskatoon..... 513 Loughheed Bldg., Calgary, Alta..... Calgary, Alta..... Orminster..... Palo..... Muskiki Lake..... 409 Walter Scott Bldg., Moose Jaw..... 513 Westman Chambers, Regina..... 302 Bay St., Toronto, Ont..... 1753 Rose St., Regina..... 1371 George St., North Battleford.....	Viscount. Fusilier. Oban. Orminster. Palo. Muskiki Lake. Frederick Lake. Watrous. Alaska. Sec. 1, T. 4, R. 2, W. 2. White Shore Lake.
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\* Idle in 1934.

## Talc and Soapstone Industry

QUEBEC— Broughton Soapstone & Quarry Co., Ltd..... Fortin, Charles..... Pharo, L. C.....	Broughton Station..... Robertsonville..... Thetford Mines.....	Broughton Station. Thetford Tp. Thetford Tp.
ONTARIO— Canada Talc, Ltd..... Gillespie, Geo. H..... Henderson Mines, Ltd.....	Madoc..... Madoc..... Madoc.....	Hastings Co. Madoc. Hastings Co.
BRITISH COLUMBIA— B. C. Refractories, Ltd..... Kennedy, J. J.....	660 Taylor St., Vancouver..... Sooke Lake.....	Anderson Lake. Sooke Lake.

## Volcanic Dust

SASKATCHEWAN— Chadwick, A. W.....	1178 Osler St., Regina.....	Waldeck.
BRITISH COLUMBIA— G. G. Groome.....		Williams Lake.



## Clay Productions and Other Structural Materials

## CLAY PRODUCTS INDUSTRY

## Brick, Tile, Clay and Sewer Pipe

Name	Head office address	Location
<b>NOVA SCOTIA—</b>		
Brooks, Stephen, & Son (a).....	Box 359, New Glasgow.....	New Glasgow.
Miller, Jas. B.....	Elmadale, Hants Co.....	Barney Brook.
Shaw, L. E., Ltd.....	137 Lower Water St., Halifax.....	Lantz Siding, Hants Co.
Standard Clay Products, Ltd.....	St. Johns, P.Q.....	New Glasgow.
<b>NEW BRUNSWICK—</b>		
Little River Brick Co., Ltd.....	Little River.....	Little River.
Ryan, M., & Son, Ltd.....	Fredericton.....	Fredericton.
Shaw, L. E., Ltd.....	137 Lower Water St., Halifax.....	Chipman.
<b>QUEBEC—</b>		
Ascot Tile & Brick Co., Ltd.....	Ascot Corner.....	Richmond Co.
Bégin, Olivier.....	St. Sauveur de Québec.....	R. R. 1, St. Sauveur de Québec.
Bourbeau, Georges, & Fils.....	R. R. 1, Danville.....	Kingsey Falls.
Branelle, L. H.....	Box 273, Victoriaville.....	Ste. Victoire.
Canadian Kaolin Silica Products.....	660 St. Catherine St. W., Montreal.....	St. Rémi d'Amherst.
Champlain Brick, Ltd.....	56 Laliberté St., Québec.....	Beauport East.
Chicoutimi Brick, Ltd.....	Chicoutimi.....	Chicoutimi.
Citadel Brick, Ltd.....	14 St. Joseph St., Québec.....	L'Islet Station, Boischaînel and Lauzon.
Duquette, Isidore.....	Box 626, East Angus.....	Westbury Tp.
Hodgins, David I.....	Box 114, Shawville.....	Clarendon Tp.
Laprairie Co., Inc.....	660 St. Catherine St. W., Montreal.....	Laprairie and Delson.
Montreal Terra Cotta Co., Ltd.....	Dominion Square Bldg., Montreal.....	Lakeside.
Panet Brick Co., Ltd.....	L'Islet Station.....	L'Islet Station.
Parrot, M. H.....	Deschailions.....	Deschailions.
Potvin, Alphonse.....	Deschailions.....	Deschailions.
Richmond Brick Co.....	Richmond.....	Richmond.
Scott Brick Co., Ltd.....	15 St. Joseph St., Québec.....	Dorchester Co.
Standard Clay Products, Ltd.....	Box 189, St. Johns.....	St. Johns.
St. Lawrence Brick Co., Ltd.....	1010 St. Catherine St. W., Montreal.....	Laprairie.
St. Tite Industrial, Ltd.....	St. Tite.....	St. Tite.
<b>ONTARIO—</b>		
Barnhardt, W. H.....	Stratford.....	Stratford.
Brampton Pressed Brick Co., Ltd.....	Brampton.....	Chinquacousy Tp.
Broadwell, B., & Son.....	Kingsville.....	Essex Co.
Campbell, N. F., & Son.....	West Lorne.....	Elgin Co.
Canadian Pressed Brick Co., Ltd.....	195 Ottawa St. S., Hamilton.....	Hamilton.
Casemore, R., & Son.....	Shallow Lake.....	Shallow Lake.
Chapman Bros.....	145 Dawes Rd., Toronto.....	East York Tp.
Construction Materials, Ltd.....	New Toronto.....	York Co.
Cookville Co., Ltd.....	120 St. James St. W., Montreal, P.Q.....	Cookville.
Coults, George, & Son.....	Thedford.....	Lambton Co.
Cowell, Geo. W.....	Box 361, Tillsonburg.....	Oxford Co.
Craig, Booth, Ltd.....	New Toronto.....	N. York.
Curtin, F., Estate.....	R. R. 4, Lindsay.....	Victoria Co.
Curtis Bros.....	Box 809, Peterboro.....	Otonabee and Douro Tps.
Deller, Albert, & Son.....	Brownsville.....	Oxford Co.
Deller Bros.....	R. R. 2, Norwich.....	Oxford Co.
Deller, Wm. H.....	R. R. 4, Thorndale.....	W. Nissouri Tp.
Denison Tile Co., Ltd.....	Windsor.....	Fletcher, Tilbury East Tp. Rochester Tp.
Dochart Brick, Tile & Terra Cotta Works.....	Arnprior.....	Arnprior.
Dolan, John, & Sons.....	R. R. 2, Wadford.....	Lambton Co.
Douglas & Douglas.....	Wilkesport.....	Lambton Co.
Dover Brick & Tile Works.....	Chatham.....	Dover 1p.
Donaldson, Thos. Geo.....	R. R. 1, Greenock.....	Culross 1p.
Elliott, Chas.....	Blueville.....	Lunenburg 1p.
Elliott, James, Jr.....	Sault Ste. Marie.....	Kornh 1p.
Elliott, Wm.....	Glenora.....	Brace Co.
Fort William Brick Co.....	Fort William.....	Fort William.
Frid Bros., Ltd.....	Main W. and Macklin Sts., Hamilton.....	Hamilton.
Gardiner, Wm.....	Box 83, Blenheim.....	Kent Co.
Godfrey, Thos., & Co.....	Carleton Place.....	Beckwith 1p.
Gomoll Brick & Tile Works.....	Powassan.....	Hinsworth 1p.
Grimsby Brick & Tile, Ltd.....	Grimsby.....	Grimsby.
Hamilton Pressed Brick Co., Ltd.....	Kensington Ave. S., Hamilton.....	Wentworth Co.
Harper Brick Works.....	348 Greenwood Ave., Toronto.....	York Co.
Hill, A. W.....	R. R. 1, Coatesworth.....	Tilbury E. Tp.
Hitch, D. A.....	Ridgetown.....	Ridgetown.
Hitch, Thomas.....	Box 254, St. Thomas.....	Elgin Co.
Hodder, Mrs. J. H., & Sons.....	Dutton.....	Dunwich.
Howlett, Fred W., & Sons, Ltd.....	Box 3, Petrolia.....	Petrolia and Brigden.
Huntsville Brick Works.....	Box 308, Huntsville.....	Muskoka.
Interprovincial Brick Co., Ltd.....	120 St. James St. W., Montreal, P.Q.....	Chinquacousy 1p., Nassagaweya Tp.
Jamieson Lime Co.....	Renfrew.....	Renfrew.
James, D. A.....	Mt. Brydges.....	Caradoc Tp.

(a) Includes production of refractories.

## DIRECTORY OF FIRMS—Continued

## Brick, Tile, Clay and Sewer Pipe—Concluded

Name	Head office address	Location
<b>ONTARIO—Concluded</b>		
Jasperson Brick & Tile Co.....	Kingsville.....	Coatsworth.
Jervis, W. J.....	R. R. 3, Dorchester.....	N. Dorchester.
Johnson, James, Estate.....	R. R. 3, Pembroke.....	Stafford Tp.
Koebel Bros.....	Box 3, St. Clements.....	Waterloo Co.
Lindsay, Earl, & Sons.....	R. R. 2, Wallaceburg.....	Chatham Gore Tp.
McComb, Chester.....	R. R. 2, London.....	Middlesex Co.
McCormick Bros.....	R. R. 5, Watford.....	Lambton Co.
McEachran, N., & Son.....	Highgate.....	Orford Tp.
McFarlane, W. J.....	Forest.....	Forest.
Milton Brick, Ltd.....	1158 Bay St., Toronto.....	Milton and Streetsville.
Moulton, John.....	R. R. 2, Holyrood.....	Bruce Co.
Napanee Brick & Tile Works.....	R. R. 3, Napanee.....	N. Fredericksburg Tp.
National Fire Proofing Co. of Canada, Ltd.....	211 Dominion Bank Bldg., Toronto, 2.....	Aldershot.
National Sewer Pipe Co., Ltd.....	Aldershot.....	Hamilton, Swansea and East Flamboro Tp.
New Liskeard Brick Works.....	Box 74, New Liskeard.....	New Liskeard.
Ontario Brick & Tile Plant (Government).....	Provincial Secretary, Parliament Building, Toronto.....	Mimico.
O'Reilly, Thos.....	329 Bay St., Ottawa.....	Prescott Highway.
Ott Brick & Tile Manufacturing Co., Ltd.....	Kitchener.....	Kitchener.
Ottawa Brick & Terra Cotta Co., Ltd.....	Billings Bridge.....	Gloucester Tp.
Owen Sound Brick Co., Ltd.....	Owen Sound.....	Owen Sound.
Parks, H. W., Estate.....	R. R. 2, Dresden.....	Camden Tp.
Paxton, Fred. R.....	70 Herrick Ave., St. Catharines.....	St. Catharines.
Phian, Geo. A.....	St. James Park P.O., London.....	Middlesex Co.
Phippen, H. W., & Son.....	Dawes Rd., Toronto.....	East York.
Port Rowan Brick & Tile Co.....	Port Rowan.....	Port Rowan.
Richardson, J., & Son.....	Kerwood.....	Kerwood.
Rollins, D. W.....	Belleville.....	Thurlow Tp.
Snelgrove, A.....	Beaverton.....	Ontario Co.
Sproat & Sproat.....	R. R. 4, Seaford.....	Tuckersmith Tp.
Standard Brick Co., Ltd.....	500 Greenwood Ave., Toronto.....	Toronto.
Sun Brick & Tile Co., Ltd.....	1104 Bay St., Toronto.....	Don Valley.
Superior Brick & Tile Co., Ltd.....	426 Victoria Ave., Fort William.....	Paiponge Tp.
Thompson, Ralph.....	Hemfryn.....	Huron Co.
Tope, Richard, Brick Works.....	677 Main St. W., Hamilton.....	Hunilton.
Toronto Brick Co., Ltd.....	397 Bay St., Toronto.....	Milton, Toronto and York Tp.
Wagstaff, Chas.....	R. R. 4, Lindsay.....	Lindsay.
Wallace, R., & Son.....	Toronto General Trust Corp., 253 Bay St., Toronto.....	Widdifield Tp.
Wein, Aaron.....	Crediton.....	Huron Co.
Weitzel, John E.....	R. R. 1, Tavistock.....	Oxford Co.
Wright, Geo., & Sons.....	Comber.....	Comber.
<b>MANITOBA—</b>		
Alsip Brick, Tile & Lumber Co., Ltd.....	537 Portage Ave., Winnipeg.....	Winnipeg.
Marion Brick Co.....	Box 39, St. Boniface.....	St. Boniface.
Snyder Brick Yards, Ltd.....	Portage la Prairie.....	Portage la Prairie.
Wardrop, D. M.....	Whitemouth.....	Whitemouth.
<b>SASKATCHEWAN—</b>		
Dominion Fire Brick & Clay Products, Ltd.(a).....	Moose Jaw.....	Claybank.
International Clay Products, Ltd.(a).....	Box 399, Estevan.....	Estevan and Prince Albert.
Shand Coal & Brick Co.....	Shand.....	Shand.
<b>ALBERTA—</b>		
Acme Brick Co., Ltd.....	125 Alberta Block, Edmonton.....	Cannell Siding.
Alberta Clay Products Co., Ltd.(a).....	Box 672, Medicine Hat.....	Medicine Hat.
Gunderson Brick & Coal Co., Ltd.....	Redcliff.....	Redcliff.
Johnsen, K.....	Box 1722, Grand Prairie.....	Grand Prairie.
Little, J. B., & Sons, Ltd.....	Edmonton.....	Edmonton.
Medicine Hat Brick & Tile Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Redcliff Premier Brick Co., Ltd.....	Redcliff.....	Redcliff.
Redcliff Pressed Brick Co., Ltd.(a).....	Redcliff.....	Redcliff.
<b>BRITISH COLUMBIA—</b>		
Baker Brick & Tile Co., Ltd.....	3191 Douglas St., Victoria.....	Victoria.
B. C. Refractories, Ltd.(a) (b).....	660 Taylor St., Vancouver.....	Williams Lake and Princeton.
Christian Community of U. B., Ltd.....	Brilliant.....	Grand Forks.
Clayburn Co., Ltd.(a).....	850 West Hastings St., Vancouver.....	Kilgard.
Gabriola Shale Products, Ltd.....	1304 Broad St., Victoria.....	Gabriola Island.
Glover, Frank(b).....	Princeton.....	Princeton.
Gorse, Percy A.....	Salmon Arm.....	Enderby.
Haug, Wm., & Son.....	Box 166, Kelowna.....	Kelowna.
Port Haney Brick Co., Ltd.....	846 Howe St., Vancouver.....	Port Haney.
Vancouver Brick & Tile Co., Ltd.....	2521 Maple St., Vancouver.....	Sullivan.

(a) Includes production of refractories.

(b) Includes production of bentonite.

## DIRECTORY OF FIRMS—Continued

## Stoneware and Pottery

Name	Head office address	Location
NEW BRUNSWICK— Foley Pottery, Ltd.(a).....	Loch Lomond Road, Saint John.....	Saint John.
ONTARIO— Foster Pottery Co..... London Pottery Mfg. Co.....	Main St. W., Hamilton..... 95 Rectory St., London.....	Hamilton. London.
ALBERTA— Medalta Potteries, Ltd.....	Medicine Hat.....	Medicine Hat.
BRITISH COLUMBIA— B. C. Clay Products Co.....	3439 Euclid Ave., Vancouver.....	Vancouver.

(a) Includes production of refractories.

## OTHER STRUCTURAL MATERIALS

## Cement Industry

QUEBEC— Canada Cement Co., Ltd..... National Cement Co., Ltd.....	Box 290, Station B, Montreal..... Box 170, Station Hochelaga, Montreal.....	Hull and Montreal East. Montreal East.
ONTARIO— Canada Cement Co., Ltd..... St. Mary's Cement Co., Ltd.....	Box 290, Station B, Montreal, P.Q..... 357 Bay St., Toronto.....	Belleville, Lakefield and Port Colborne. St. Marys.
MANITOBA— Canada Cement Co., Ltd.....	Box 290, Station B, Montreal, P.Q.....	Fort Whyte and Steep Rock.
ALBERTA— Canada Cement Co., Ltd.....	Box 290, Station B, Montreal, P.Q.....	Edshaw.
BRITISH COLUMBIA— British Columbia Cement Co., Ltd..... Coast Cement Co., Ltd.....	Belmont House, Victoria..... Granville Island, Vancouver.....	Bamberton and Tod Inlet. Granville Island.

## Lime Industry

NOVA SCOTIA— Dominion Steel & Coal Corp., Ltd..... Eastern Lime Co., Ltd.....	Sydney..... Windsor.....	Sydney. Windsor.
NEW BRUNSWICK— Bathurst Power & Paper Co., Ltd..... Purdy & Green, Ltd..... Randolph & Baker, Ltd..... Saint John Lime Co..... Snowflake Lime, Ltd.....	Bathurst..... 323 Main St., Saint John..... Randolph..... Brookville..... 3 Pokiak Road, Saint John.....	Bathurst. Saint John. Randolph. Brookville. Saint John.
QUEBEC— Arnaud & Beaudry..... Boivin, Arthur..... Canada Lime Products Co..... Canada Lime & Stone, Ltd..... Dominion Lime Co..... Filion, Narcisse..... Gagné, Octave..... Héon & Héon..... Laurentian Stone Co., Ltd..... Lalunière, Joseph..... Limoges, Henri..... Moreure, C..... Montreal Lime Co., Ltd..... National Stone & Lime Co., Reg'd..... Shawinigan Chemicals, Ltd..... Standard Lime Co., Ltd.....	Joliette..... Pont Rouge..... 7403 Drolet St., Montreal..... St. Marc des Carrières..... Lime Ridge..... St. Joachim..... St. Ulric..... St. Louis de Champlain..... 195 Nicholas St., Ottawa..... St. Dominique de Bagot..... 552 Poupart St., Montreal..... 9 rue St. Denis, St. Hyacinthe..... St. Marc des Carrières..... 388 rue Lemoine, Montreal..... Power Bldg., Montreal..... Joliette.....	Joliette. Pont Rouge. Cap St. Martin. St. Marc des Carrières. Lime Ridge. St. Joachim. St. Ulric. St. Louis de Champlain. Hull. St. Dominique de Bagot. Montreal. St. Dominique de Bagot. Ville St. Michel. St. Marc des Carrières. Shawinigan Falls. Joliette and St. Marc des Carrières. St. Marc des Carrières.
Trottier, David.....	St. Marc des Carrières.....	St. Marc des Carrières.
ONTARIO— American Cyanamid Co..... Bell, Harry..... Brown's Lime Works..... Brunner, Mond Canada, Ltd..... Cameron, W. M.....	30 Rockefeller Plaza, New York City, U.S.A. R. R. 4, Chesley..... 491-9th Ave. E., Owen Sound..... Canadian Bank of Commerce Bldg., Toronto..... Carleton Place.....	Niagara Falls. Grey Co. Owen Sound. Amherstburg. Carleton Place.

## DIRECTORY OF FIRMS—Continued

## Lime Industry—Concluded

Name	Head office address	Location
<b>ONTARIO—Concluded</b>		
Canada & Dominion Sugar Co., Ltd.	Chatham	Chatham and Wallaceburg.
Canada Lime Co., Ltd.	114 Cluny Drive, Toronto	Coboconk.
Canadian Gypsum Co., Ltd.	Windsor, N.S.	Guelph.
Chalmers Lime Works	Owen Sound	Owen Sound.
Dominion Rock Products, Ltd.	941 Dominion Square Bldg., Montreal, P.Q.	Eganville.
Gallagher Lime & Stone Co., Ltd.	Upper James St., Hamilton	Barton Tp.
Gypsum, Lime & Alabastine, Canada, Ltd.	Paris	Oxford Tp., Oxford Co., Glen Christie and Nas- sagaweya Tp.
Innerkip Lime & Stone Co., Ltd.	Beachville	Beachville.
Jamieson Lime Co.	Renfrew	Renfrew.
Morris, Stanley	Delta	Delta.
Rockwood Lime Co.	Rockwood	Eramosa, Concession 5.
Shaee Lime Co.	Eganville	Eganville.
Toronto Brick Co., Ltd.	897 Bay St., Toronto	Coboconk.
Weppler, Henry	Priceville	Grey Co.
<b>MANITOBA—</b>		
Gillis Quarries, Ltd.	Spruce and Richard Sts., Winnipeg	Winnipeg.
Gypsum, Lime & Alabastine, Canada, Ltd.	Paris, Ont.	Winnipeg.
Winnipeg Supply & Fuel Co., Ltd.	812 Boyd Bldg., Winnipeg	Spearhill and Stonewall.
<b>ALBERTA—</b>		
Canadian Sugar Factories, Ltd.	Raymond	Raymond.
Loder's Lime Co., Ltd.	Kananaskis	Kananaskis.
Summit Lime Works	Box 273, Lethbridge	South half Sec. 7, Twp. 8, Rge. 5, W. 5th.
<b>BRITISH COLUMBIA—</b>		
Lyon, F.	Hedley	Hedley.
Pacific Mills, Ltd.	Ft. Raymur Ave., Vancouver	Ocean Falls.
Pacific Lime Co., Ltd.	744 West Hastings St., Vancouver	Blubber Bay.
Reno Gold Mines, Ltd.	Yorkshire Bldg., Vancouver	Sahmo.

## Sand and Gravel

<b>NOVA SCOTIA—</b>		
Campbell, M. J.	Boisdale	Boisdale.
Nova Scotia Dept. of Highways	Halifax	Various.
Walker, A. G.	Bridgetown	Bridgetown.
<b>NEW BRUNSWICK—</b>		
Anderson, A. W.	Fairville	Fairville.
Likely, Jos. A., Ltd.	Saint John	East Saint John.
Maxwell, Chas. & Son	R.R. 3, St. Stephen	St. Stephen.
New Brunswick Dept. of Highways	Fredericton	Various.
<b>QUEBEC—</b>		
Ball, Clayton	Abbotsford	Abbotsford.
Burbe, Alfred	Ste. Rose West	Ste. Rose West.
Béland, A.	St. Agapit Station	St. Agapit Station.
Béland, Eusèbe	St. Agapit Station	St. Agapit Station.
Bélanger & Bertrand	L'Orignal, Ont.	Temiskaming.
Bélanger, Joseph	Ascot Corner	Ascot Corner.
Bélisle, Euclide	Contrecoeur	Contrecoeur.
Beaumont, Pierre	197 St. Pierre St., St. Jean	St. Jean.
Bennett, Gertrude	Box 403, Lennoxville	Lennoxville.
Bergeron, Ursin	Jonquière	Jonquière.
Berthiaume, Chas. Ed.	Contrecoeur	Contrecoeur.
Bigras, Omer	Ste. Rose West	Ste. Rose West.
Bitumen Products Corp.	3590 St. Patrick St., Montreal	Various.
Bonner Sand & Ballast, Ltd.	1434 St. Catharine St. W., Montreal	South Durham and Abbotsford.
Bourgeois, Edmond	St. Albert de Warwick	St. Albert.
Bourget, Hubert	R.R. 1, St. Joseph	St. Joseph.
Brouillet Sand & Gravel	Box 195, Rawdon	Ste. Julieanne.
Cabana, Alphonse	Contrecoeur	Contrecoeur.
Canadian Good Roads Construction, Ltd.	2020 Union Ave., Montreal	Shefford Tp.
Canadian Rock Products, Ltd.	2020 Union Ave., Montreal	St. Louis de Gonzague, Huntingdon, Foster and Waterloo.
Chabot, Osmis	St. Jean Baptiste de Rouville	St. Jean.
Chabot, Mde. Stanislas	St. Jean Baptiste de Rouville	St. Jean.
Chadwick, Thomas	St. Gilles	St. Gilles.
Contrecoeur, Town of	100 Child St., Contrecoeur	Contrecoeur.
Compagnie de Sable, Ltée	10-3ième Ave., Limoilou	St. Charles River.
Consolidated Oka Sand & Gravel Co., Ltd.	248 McCord St., Montreal	Lake of Two Mountains.
Crawford, J. J.	Eastman	Eastman.
Demers, Aimé	St. Agapit Station	St. Agapit Station.
Demers, Joseph	Kateville	Kateville.
Department of National Defence	Quebec	Valcartier.



## DIRECTORY OF FIRMS—Continued

## Sand and Gravel—Continued

Name	Head office address	Location
<b>QUEBEC—Continued</b>		
Desgagné, Honorius	St. Fulgence	St. Fulgence
Deslandes, Mustat	St. Dominique	St. Dominique
Desrochers, Oscar	Warwick	Warwick
Dominion Sand & Stone Co., Ltd.	1472 Laurier Est., Montreal	South Durham
Dubreuil, Albert	St. Dominique	St. Dominique
Duchéne, Joseph	Hébertville	Hébertville
Dumont & Dumours Eng.	Rivière du Loup Centre	Trois Pistoles
Dupont, Albin	Magog	Magog
Durand, Albert	St. Jérôme	St. Jérôme
Eastern Townships Paving & Contr. Co., Ltd.	Box 234, Sherbrooke	Lennoxville
Fréchette, Mathias	St. Emile	St. Emile
Galipeau, François	Mont St. Grégoire	Mont St. Grégoire
Gauthier & Tremblay	164 rue Racine, Chicoutimi	Rivière du Moulin
Gorman, Hubert E.	Buckingham	Buckingham
Gosselin, Mme. F. X.	Box "U," Chicoutimi	Chicoutimi
Goulet, Edmond	Stratford Centre	Stratford Centre
Goyer, Edouard	St. Bruno	St. Bruno
Goyette, Cyril	Mont St. Grégoire	Mont St. Grégoire
Granby, City of	Granby	Granby
Grandmaître, D.	Eastview, Ont.	Hull
Guay, J. L. & Frère Ltée	37 Notre-Dame West, Montreal	St. Bruno
Hurvey, Adjutor	St. Joseph d'Alma	St. Joseph d'Alma
Houle, Fernand	St. Rémi	St. Rémi
Jacques, Joseph	St. Joseph de Beauce	St. Joseph de Beauce
Kenny, Wm.	Gaspé	Gaspé
Lacasse, Josephat	Brownsburg	Brownsburg
Lafortune, Emelien	Box 284, Joliette	Joliette
Lagaré, Armand	Beauport	Beauport
Lanlois, Georges	R. R. 1, Montmagny	Montmagny
Laudippe, E.	St. Louis de Pintendre	St. Louis de Pintendre
Lauzon, Josephat	R. R. 1, Terrebonne	Terrebonne
Lavallée, Michel	Contrecoeur	Contrecoeur
Laverdière, Albert	Beaurivage	Beaurivage
Labena, Adolard	St. Dominique	St. Dominique
Leamy, René	St. Jérôme	St. Jérôme
Levesque, Gonzague & Trefflé	12 rue Bergeron, Kenogami	Kenogami
Loranger, Pierre	Cap de la Madeleine	Cap de la Madeleine
Magog, City of	Magog	Magog
Marchand, Euclide	Carboneau	Carboneau
Marois, Lucien	St. Agapit	St. Agapit
Meroure, C.	9 St. Denis St., St. Hyacinthe	St. Dominique
Monette, Olivier	Brownsburg	Brownsburg
Moody, I. H.	Terrebonne	Terrebonne
Newton, Wellington	Buckingham	Buckingham
Pères Trappistes, Les	Village des Pères	La St. Jean
Poirier, Alphonse	St. Polycarpe	St. Polycarpe
Quebec, City of	Quebec	St. Thérèse de Beauport
Quebec Department of Highways	Quebec	Various
Raymond, McDonell & Co., Ltd.	660 St. Catherine St. W., Montreal	St. Julienne, St. Roch, L'Assomption
Roulier, Arsène	L'Acadie	L'Acadie
Shawinigan Engineering Co., Ltd.	Box 2670, Montreal	Windigo, Rapide Blanc
Sherbrooke, City of	Sherbrooke	Sherbrooke
Société d'Enterprises Générales, Ltée	Box 363, Lac Mégantic	Armstrong
Standard Lime Co., Ltd.	Joliette	St. Emélie
Standard Sand & Gravel, Ltd.	St. Félix de Valois	St. Félix de Valois
Tétreault, Émile	Mont St. Grégoire	Mont St. Grégoire
Thibault, Donat	Howick	Howick
Thouin, Josephat	Mascouche	Mascouche
Tremblay, Joseph	376 Georges, St., Shawinigan	Shawinigan
Vinier, Mme. Arthur	St. Thérèse de Blainville	St. Thérèse de Blainville
Venne, Oscar	Lachenaie	Lachenaie
<b>ONTARIO—</b>		
Barnes, Wm. R., Co., Ltd.	243 Cumberland Ave., Hamilton	Brantford, Capetown, Springvale, Watertown, Hamilton and Nixon
Bellou, N. E.	R. R. 4, Trenton	Trenton
Birch, Jas. A.	R. R. 2, Richmond	Richmond
Bras Bros.	R. R. 3, Niagara Falls	Niagara Falls
Brantford, City of	Brantford	Brantford
Canadian Aggregates, Ltd.	78 Wyandotte St., Walkerville	Walkerville
Carroll Bros.	400 Ellicott Square, Buffalo, N.Y., U.S.A.	Sherkston
Consolidated Sand & Gravel, Ltd.	402 Harbour Bldg., Toronto	Durham, Fuller, Paris, Waterford
Campbellford, Corporation of	Ferris Block, Campbellford	Campbellford
Cudmore, Mrs. Alice	R. R. 1, Hensall	Hensall
Dominion Concrete Co., Ltd.	Box 103, Kemptville	Oxford Tp. and Augusta Tp.
Farris, Chas. S.	R. R. 1, Glencoe	Near Glencoe
File, Secord	43 Port St., Brantford	Brantford
Foster, R. R.	86 Spadina Ave., Ottawa	Near Ottawa

## DIRECTORY OF FIRMS—Continued

## Sand and Gravel—Continued

Name	Head office address	Location
<b>ONTARIO—Concluded</b>		
Frid Bros., Ltd.	Main West and Macklin Sts., Hamilton	Hamilton.
Grace Builders' Supplies	291 South Christina St., Sarnia	Near Sarnia.
Hadley's, Chatham, Ltd.	47 Wellington St. W., Chatham	River Thames.
Halpenny, Lewis E.	R. R. 4, Arthur	Near Arthur.
Hinde Bros.	134 Northland Ave., Mount Dennis	Mount Dennis.
Howard Sand & Gravel Co., Ltd.	Aldershot	Aldershot.
Hydro Electric Power Commission of Ontario	620 University Ave., Toronto	Lake St. Joseph.
Jupp, A. E., Const. Co., Ltd.	170 Berkeley St., Toronto	Whitby Tp.
Kingston Sand & Gravel Co., Ltd.	Villa St. Clair Apts., Kingston	Near Kingston.
Lovelace, E. J.	St. Catharines	Near St. Catharines.
Lowe, G. G.	R. R. 1, Leonard	Near Leonard.
McLean, A. B., & Sons	Sault Ste. Marie	Lake Superior.
Nevill, Thos. & Son	R. R. 5, Aylmer West	Aylmer.
Newell, H., & Son	R. R. 4, Aylmer	Malahide Tp.
Northern Development Department	Toronto	Various.
Ontario Department of Highways	Toronto	Various.
Page, Jacob A.	R. R. 3, Fenwick	Near Fenwick.
Peterborough, City of	133 Simcoe St., Peterborough	Peterborough.
Pyke Salvage Co.	506 Princess St., Kingston	Lake Ontario.
Quigley's	317 Main St. E., Hamilton	Bartonville, Waterdown.
Robinson, Wm. J.	R. R. 1, Crediton	Stephen Tp.
Sargeant Co., Ltd.	49 Dunlop St., Barrie	Barrie.
Sarnia Cement Products Co.	Sarnia	Sarnia Tp.
Skinner, R.	Exeter	Exeter.
Smythe, C., Ltd.	60 Carlton St., Toronto	Etobicoke Tp.
Spratt, J. H.	Billings Bridge	Billings Bridge.
Stevens, J. H.	Stoney Creek	Stoney Creek, Copetown.
Tees Transit Co.	16 New St., Hamilton	Niagara.
Vallery, F., Estate of	Belwood	Belwood.
Wallaceburg Sand & Gravel Co., Ltd.	Wallaceburg	Pt. Edward.
Wilcox, Hervey	985 Bridge St., Niagara Falls	Stamford Tp.
Woolfitt Fuel & Supply Co., Ltd.	109 Ottawa St., Walkerville	Gosfield South Tp.
Wright & Co.	960 Queen St., Sault Ste. Marie	Korah Tp.
<b>MANITOBA—</b>		
Brandon, City of	City Hall, Brandon	Brandon.
Building Products & Coal Co., Ltd.	Christie St., Winnipeg	Birds Hill.
Cumming & Dobbie	233 9th St., Brandon	Brandon.
Cusson, J. A.	St. Boniface	Ste. Anne des Chênes.
Greater Winnipeg Water Dist.	Civic Offices, Winnipeg	Mile 31 and Mile 80, G.W., W.D.R.
Manitoba Highways Department	Winnipeg	Various.
McCurdy Supply Co., Ltd.	49 Notre Dame Ave., Winnipeg	Various.
National Parks Branch	Ottawa	Springfield.
Northwest Gravel & Coal Co., Ltd.	604 Greatwest Permanent Bldg., Winnipeg	Various.
Provincial Gravel & Coal Co., Ltd.	704 Greatwest Permanent Bldg., Winnipeg	Molson.
Riley, W. J.	Molson	Rosser.
Rosser, Municipality of	Rosser	
<b>SASKATCHEWAN—</b>		
National Parks Branch	Ottawa	Various.
North Battleford, City of	North Battleford	North Battleford.
Saskatchewan Department of Highways	Regina	Various.
<b>ALBERTA—</b>		
Alberta Highways Department	Edmonton	Various.
Cristall Sand	10165-104th St., Edmonton	Perryvale.
Nanton, Town of	Nanton	Nanton.
National Parks Branch	Ottawa, Ont.	Various.
Sutherland, M.	Olde	Westerdale Municipality.
<b>BRITISH COLUMBIA—</b>		
Armstrong, City of	Armstrong	Vernon Mining Division.
Britannia Sand & Gravel Co., Ltd.	1901 West Georgia St., Vancouver	Britannia Beach.
British Columbia Department of Highways	Victoria	Various.
British Columbia Sand & Gravel Co., Ltd.	Suite 19, 136 W. Hastings St., Vancouver	Lynn timer.
Burnaby, Corporation of	Edmonds	Edmonds.
Cascade Rock & Gravel Co., Ltd.	23410 Seymour St., Vancouver	North Vancouver.
Chilliwack, City of	Chilliwack	Chilliwack Tp.
Consolidated Mining & Smelting Company of Canada, Ltd.	Trail	Tadanac.
Deeks Sand & Gravel Co., Ltd.	101 West First Ave., Vancouver	North Vancouver and Port Coquitlam.
Enderby, Corporation of	City Hall, Enderby	Enderby.
Freshwater Sand & Gravel Co., Ltd.	902 Columbia St. W., New Westminster	Port Coquitlam.
Hillside Sand & Gravel Ltd.	1075 Main St., Vancouver	Hillside.
Kamloops, City of	Box 360, Kamloops	Kamloops.
National Parks Branch	Ottawa, Ont.	Various.
Nelson, Corporation of the City of	Nelson	Nelson.
Port Alberni, City of	Port Alberni	Port Alberni.

## DIRECTORY OF FIRMS—Continued

## Sand and Gravel—Concluded

Name	Head office address	Location
<b>BRITISH COLUMBIA—Concluded</b>		
Port Coquitlam, City of.....	Port Coquitlam.....	Port Coquitlam.
Prince Rupert.....	Prince Rupert.....	Prince Rupert.
Producers Sand & Gravel Co. (1929), Ltd.....	1902 Store St., Victoria, B.C.....	Equinault Dist.
Trail, City of.....	Trail.....	Near Trail.
West Kootenay Power & Light Co., Ltd.....	Trail.....	Kootenay Dist.

## Stone Quarrying Industry

## Granite

<b>NOVA SCOTIA—</b>		
Bower, A. R.....	Box 255, Shelburne.....	Birchtown.
*Rice Bros.....	Lawrencetown.....	Nictaux West.
*Rice, W. D.....	Middleton.....	Nictaux West.
<b>NEW BRUNSWICK—</b>		
*Granite Street Pavement & Construction Co. Ltd.....	Hampstead.....	Hampstead.
Holt & Spinney.....	St. George.....	Digdegash Lake.
*Milne, Coutts & Co., Ltd.....	St. George.....	St. George.
*Mooney, B. & Son, Realty, Ltd.....	112 Queen St., Saint John.....	Spoon Island.
New Brunswick Department of Highways.....	Fredericton.....	
*O'Brien & Baldwin.....	St. George.....	St. George.
<b>QUEBEC—</b>		
Alcoa Power Co., Ltd.....	P.O. Box 620, Kenogami.....	Racine.
B. & R. Granite Quarry.....	Beebe.....	Stanstead Co.
Barrowman & Denny.....	Box 21, Beebe.....	Beebe.
*Bernier & Sons.....	Box 491, Roberval.....	Roberval.
Bérubé, Lucien, & Sons.....	Brownsburg.....	Clatham Co.
Bourbonnais, J. A.....	Vaudreuil Station.....	Rigaud.
*Brodie's, Ltd.....	1070 Bleury St., Montreal.....	Graniteville, Guenette, Mt. Johnston.
*Bussière, A. L.....	St. Sébastien.....	St. Cécile.
Chicoutimi, City of.....	Chicoutimi.....	Chicoutimi.
*Cloutier Bros.....	Beebe.....	Beebe.
*Delwaide, Anselme.....	Chicoutimi.....	Simard Tp.
Diamond Granite Co.....	Beebe.....	Beebe.
Dontigny, Alphonse.....	Shawinigan Falls.....	Shawinigan Falls.
*Dumas, Arthur, & Co. Engr.....	Rivière a Pierre.....	Bois Tp.
*Dumas, Auguste.....	Rivière a Pierre.....	Bois Tp.
Gingras & Frère, Ltée.....	St. Marc des Carrières.....	Stanhope.
Gosselin, Oscar.....	Lac Mégantic.....	St. Sébastien.
*Granit Noir Canadien Engr.....	St. Joseph d'Alma.....	Signaie Tp., Roberval Tp.
Gronier, E.....	Glenada.....	Glenada.
Guenette Granite Co., Ltd.....	Guenette.....	Campbell Tp.
*Haselton, Wm. M.....	Beebe.....	Stanstead.
Jonquière, Ville de.....	Jonquière.....	Jonquière.
Lacasse & Boulais.....	Box 23, Beebe.....	Beebe.
La Cie Routière Lac St. Jean, Chicoutimi.....	Box 448, Roberval.....	Jonquière.
Lavoie & Doyer Engr.....	Rousseau Mill.....	Portneuf Co.
McIntosh, Robert.....	Beebe.....	Beebe.
National Defence Department.....	Valcartier.....	Valcartier Camp.
*National Granite, Ltd.....	Box 270, Roberval.....	St. Gédéon.
*Nett, Olson, Hokanson & Henrikson.....	Beebe.....	Graniteville.
Pères Trappistes, Les.....	Village des Pères.....	Village des Pères.
Quebec Department of Highways.....	Quebec.....	Various.
Scotstown Granite Co., Ltd.....	Scotstown.....	Scotstown.
Shawinigan Falls, City of.....	Shawinigan Falls.....	Almaville.
*Silver Granite Co., Ltd.....	117 Côte d'Abraham, Quebec.....	St. Samuel Station.
St. Bruno Quarry & Paving Co., Ltd.....	7420 De La Roche St., Montreal.....	St. Bruno.
*Stanstead Granite Quarries Co., Ltd.....	Beebe.....	Graniteville.
*Voyer, F., et Frère.....	Rivière a Pierre.....	Rivière a Pierre.
*Wilkinson, Frank L.....	Beebe.....	Beebe.
<b>ONTARIO—</b>		
Appleby, Thos. A.....	Garden St., Gananoque.....	Leeds Co.
Billie, Chas. V.....	Box 1185, Smiths Falls.....	Lanark Co.
*Building Products, Ltd.....	Box 2520, Montreal, Que.....	Verona.
Fort William, City of.....	Fort William.....	Fort William.
Hall, R. R., Estate.....	Perry Sound.....	Perry Sound.
*Horne, Wm.....	Butler, via Ignace.....	Butler.
Ontario Rock Co., Ltd.....	1501 Canada Permanent Bldg., Toronto.....	Belmont and Methuen Twps.
<b>MANITOBA—</b>		
*Winnitoba Marble Co., Ltd.....	1180 Wall St., Winnipeg.....	Hawk Lake and Darwin.

\* Firms operating dressing works in conjunction with quarry.



## DIRECTORY OF FIRMS—Continued

## Stone Quarrying Industry—Concluded

Name	Head office address	Location
<b>Granite—Concluded</b>		
<b>BRITISH COLUMBIA—</b>		
*B. C. Monumental Works, Ltd.	27 Kingsway, Vancouver.	Granite Island.
Canadian National Railways.	C.N.R. Station, Winnipeg, Man.	Copper Creek.
Coast Quarries, Ltd.	1840 Georgia St. W., Vancouver.	Burrard Inlet.
Gilley Bros., Ltd.	902 Columbia St. W., New Westminster.	Coquitlam.
Huchcroft, J. F.	Box 54, Cranbrook.	Fort Steel Mining Div.
*Nelson Granite & Monumental Co.	Box 865, Nelson.	Nelson.
*Vancouver Granite Co., Ltd.	1007 Royal Bank Bldg., Vancouver.	Nelson Island.
*Vernon Granite & Marble Co.	Okanagan Landing.	Yale Dist.
*Wilson, James S.	Sirdar.	Sirdar.
<b>Limestone</b>		
<b>NOVA SCOTIA—</b>		
Eastern Lime Co., Ltd.	Windsor.	Windsor.
MacLean & Co.	Oxford.	Nappan.
Mercay Paper Co., Ltd.	Liverpool.	East River.
Nova Scotia Department of Agriculture.	Halifax.	Cape Breton.
Nova Scotia Department of Highways.	Halifax.	Various.
<b>NEW BRUNSWICK—</b>		
Brookville Manufacturing Co., Ltd.	Brookville.	Brookville.
New Brunswick Department of Highways.	Fredericton.	Various.
Randolph & Baker, Ltd.	Randolph.	Randolph.
Saint John Lime Co.	Brookville.	Brookville.
Snowflake Lime, Ltd.	3 Pokiak Rd., Saint John.	Saint John.
<b>QUEBEC—</b>		
Arseneau, Honoré Z.	St. Jean l'Evangeliste.	St. Jean l'Evangeliste.
Baillargeon & Faubert.	62 Union Bldg., St. Lambert.	Caughnawaga.
Beaudet & Bergeron.	St. Antoine de Tilly.	St. Laurent.
*Beaudry, J. Pitre.	Tache St., Joliette.	Joliette.
Boily, Adelard.	Baie St. Paul.	Baie St. Paul.
Boily, Albert.	Baie St. Paul.	Baie St. Paul.
Boivin, Ladislav.	Baie St. Paul.	Baie St. Paul.
Canada Cement Co., Ltd.	Box 290, Station B, Montreal.	Hull.
Canadian Quarries, Ltd.	1740 Iberville St., Montreal.	Montreal.
Canadian Rock Products, Ltd.	2020 Union Ave., Montreal.	South Stukely, St. Timothée.
Cap St. Martin Quarry Reg.	636 Quebec St., Montreal.	Cap St. Martin.
Cercle Agricole de St. Godfroy.	St. Godfroy.	St. Godfroy.
Chenel, Rev. J. E.	Port Daniel.	Port Daniel.
Côté & Gendreau.	St. Pierre, Ile d'Orleans.	Ile d'Orleans.
*Cousineau & Frères.	1261 Van Horne St., Montreal.	Montreal.
Deschamps & Bélanger.	Box 149, Valleyfield.	Nouveau-Salaberry.
*Deschambault Quarry Corp.	52 St. Paul St., Quebec.	St. Marc des Carrières.
Dominion Lime Co.	Lime Ridge.	Lime Ridge.
Drouin, Eva Cimon.	Ste. Justine.	Ste. Justine.
Dufresne Construction Co., Ltd.	1832 Blvd. Pie IX, Montreal.	Rivière des Prairies.
Durocher, Cyrille.	11021 Notre Dame E., Montreal.	Montreal East.
Faubert, Alphonse.	Ville de Lery.	Ville de Lery.
Filion, Adélard.	Lachute.	Lachute.
Fuger & Smith, Ltd.	Pointe Claire.	Pointe Claire.
Gagné, Octave.	St. Ulric.	Matane Co.
Gagnon, Emile.	Jonquière.	Jonquière.
Gaspesian Fertilizer Co.	Port Daniel East.	Port Daniel East.
*Gauthier, Olivier.	St. Marc des Carrières.	St. Marc des Carrières.
*Gauthier, René.	Ville Bélanger.	Laval Co.
*Gingras et Frère Ltée.	St. Marc des Carrières.	St. Marc des Carrières.
Gravel, Edouard Lazare.	Châteauguay Richer.	Châteauguay Richer.
Kennedy Construction Co., Ltd.	407 McGill St., Montreal.	Actonville.
Lalonde & Marchand.	Box 63, Châteauguay Bassin.	Châteauguay.
Lacouline, T.	Châteauguay Richer.	Montmorency Co.
Lagacé, Napoleon.	St. Martin.	St. Martin.
*Lapointe, A. & F.	12034 Lachapelle St., Montreal.	Carrierville.
Lapointe, Emile.	St. Dominique de Bagot.	St. Dominique de Bagot.
Laurentian Stone Co., Ltd.	195 Nicholas St., Ottawa, Ont.	Hull.
Lefebvre, J. J.	Rimouski.	Bonaventure Co.
*Leclerc, Victor.	6858 St. Denis, Montreal.	Cap St. Martin.
Mareil Quarry, Ltd.	St. Michel Station Ste. Clothilde de Châteauguay.	Ste. Clothilde de Châteauguay.
*Martineau & Sons, Ltd.	517 E. Marie-Anne St., Montreal.	Papineau, Pont-Viau.
Matthew Devito Construction, Ltd.	6138 Hamilton St., Montreal.	Pointe Claire.
Miner, R. H., Co. Ltd.	7411 Delaunay St., Montreal.	St. Laurent.
Montreal Quarry, Ltd.	1340 Bellechasse St., Montreal.	Montreal.
National Quarries, Ltd.	6301 Park Ave., Montreal.	Côte St. Michel.

\* Firms operating dressing works in conjunction with quarry.



## DIRECTORY OF FIRMS—Continued

## Limestone—Concluded

Name	Head office address	Location
<b>QUEBEC—Concluded</b>		
*Naud, Oscar	Lacheyrotière	St. Marc des Carrières, Hull.
*Noel, Oscar	44 Wright St., Hull	Charlesbourg West.
*Page, Joseph	Charlesbourg West	St. François de Sales.
*Paquette, Lévis & Co.	Cap St. Martin	Various.
Quebec Department of Highways	Quebec	St. Vincent de Paul.
*Quinlan Cut Stone, Ltd.	1165 Greene Ave., Montreal	Val Brillant.
Rousseau, T. E.	48 Second Ave., Quebec	Côte St. Charles.
Schetagne, Wilfrid	309 Bord du Lac, Pointe Claire	Bedford.
Shawinigan Chemicals, Ltd.	Box 2670, Craig St. Station, Montreal	St. Barthelemi
St. Barthelemi Quarry	St. Barthelemi Village	Réclanzer Tp.
St. Laurent Quarry, Ltd.	299 Blvd. Monkland, St. Laurent	Champlain Co.
St. Louis Quarry (Reg.)	St. Louis de France	St. Louis de France.
St. Maurice Quarry, Ltd.	307 Alexandre St., Three Rivers	St. Dominique de Bagot.
St. Onge, O. F.	St. Dominique de Bagot	St. Vincent de Paul.
*St. Vincent de Paul Penitentiary	St. Vincent de Paul	St. Paul de Joliette.
Standard Lime Co., Ltd.	Joliette	St. Johns Co.
Standard Clay Products, Ltd.	Box 189, St. Johns	St. François de Sales.
*Stone & Quarry, Ltd.	1340 Bellechasse St., Montreal	Beauharnois.
Theoret, Maclaire	Box 128, Bellerive, Valleyfield	Lake St. John.
Trappist Fathers	Village des Pères	Hull.
Tremblay, Napoleon	31 Joffre Ave., Hull	St. Michel de Laval.
Union Quarry, Ltd.	1340 Bellechasse St., Montreal	Gifford Hull.
Verreault, E., Ltd.	194 Bridge St., Quebec	Hull.
Wright Crushed Stone Co., Ltd.	Hull	
<b>ONTARIO—</b>		
American Cyanamid Co.	30 Rockefeller Plaza, New York City, U.S.A.	Oxford Co.
Bourgie, J. B.	Box 50, Embrun	Russell Co.
Brunner, Mond Canada, Ltd.	Canadian Bank of Commerce Bldg., Toronto	Essex Co.
Canada Cement Co., Ltd.	Box 290, Station B, Montreal, P.Q.	Belleville
Canada Crushed Stone Corp., Ltd.	Sun Life Bldg., Hamilton	Hagersville and West
		Flamboro Tp.
Coldwater Crushed Stone, Ltd.	Coldwater	Coldwater.
Decwsville Crushed Stone Co., Ltd.	52 Elgin St., Hamilton	Haldimand Co.
Dibblee Construction Co., Ltd.	246 Albert St., Ottawa	Hawkesbury.
Foster, R. R.	86 Spadina Ave., Ottawa	Ottawa.
Gow, James	Fergus	Fergus.
Grenon, Joseph	Casselman	Casselman.
Gypsum, Lime & Alabastine, Canada, Ltd.	Paris	Oxford and Halton Cos.
Hagersville Quarries, Ltd.	Hagersville	Hagersville.
Haldimand Quarries & Construction, Ltd.	Hagersville	Hagersville.
Halliday, Fred	Cummings Bridge	Cummings Bridge.
Harvey, W. H. & Son, Construction Co., Ltd.	56 Kensington Ave., Kingston	
Henniger, M. G.	Smiths Falls	Leeds Co.
Innerkip Quarries, Ltd.	Fleet and Bathurst Sts., Toronto	Innerkip.
Irvine, Edgar, Co., Ltd.	Alexandria	Alexandria.
*Kingston Penitentiary	Kingston	Kingston.
Kirby, T. Sidney, Co., Ltd.	215 Sussex St., Ottawa	Gloucester Tp.
Kirkfield Crushed Stone, Ltd.	Fleet and Bathurst Sts., Toronto	Kirkfield.
Lake St. John Quarry Co., Ltd.	Longford Mills	Longford Mills.
Lally, Mary F.	Box 39, Smithville	Smithville.
Law Construction Co.	225 Sterling Rd., Toronto	Owen Sound and
		Collingwood.
Limestone Products, Ltd.	1104 Hermant Bldg., Toronto, 2	North Orillia Tp.
MacDonald, A. N.	Bronte	Bronte.
Middleton, J. N.	Ancaster	Ancaster.
Noranda Mines, Ltd.	804 Royal Bank Bldg., Toronto	Halifax.
Ornamental Stone Products	Verona	Portland Tp.
Owen Sound, City of	Owen Sound	Owen Sound.
Pembroke, Town of	Pembroke	Pembroke.
Pirson, John	Stevensville	Stamford Tp.
Paslinch Quarry, Ltd.	Sun Life Bldg., Hamilton	Paslinch.
*Queoston Quarries, Ltd.	Sun Life Bldg., Hamilton	St. Davids.
Rayner Construction, Ltd.	159 Bay St., Toronto	Madoc.
Routly Construction Co.	21 Dundas Square, Toronto	Leeds, Ontario and
		Frontenac Counties.
Walker Bros., Ltd.	Box 586, Thorold	Stamford Tp.
Wehman, John	251 Division St., Kingston	Kingston.
Welland Ship Canal	St. Catharines	St. Catharines.
Wilford, F. R. & Co., Ltd.	Box 119, Lindsay	Tobeygeon.
Windmill Point Crushed Stone Co., Ltd.	225 Sterling Rd., Toronto	Ridgeway.
NOTE.—In addition to the above, counties, townships and the Department of Highways reported production.		
<b>MANITOBA—</b>		
*Gillis Quarries, Ltd.	Richard and Spruce Sts., Winnipeg	Garson.
*Tyndall Quarry Co., Ltd.	1591 Erin St., Winnipeg	Garson.
*Western Stone Co., Ltd.	205 Confederation Life Bldg., Winnipeg	Garson.
Winnipeg, City of	Winnipeg	Stony Mountain.
Winnipeg Supply & Fuel Co., Ltd.	812 Boyd Bldg., Winnipeg	Spearhill.

\* Firms operating dressing works in conjunction with quarry.

## DIRECTORY OF FIRMS—Concluded

## Limestone—Concluded

Name	Head office address	Location
<b>ALBERTA—</b>		
Loder's Lime Co., Ltd.	Kananaskis	Kananaskis.
Summit Lime Works	Box 273, Lethbridge	S. half of Sec. 7, Tp. 8, Rge. 5, W. 5th.
<b>BRITISH COLUMBIA—</b>		
British Columbia Department of Highways	Victoria	Various.
Beale, F. J., Lime Stone Quarries	Van Anda	Van Anda.
Consolidated Mining & Smelting Company of Canada, Ltd.	Trail	Ymir.
Deeks Sand & Gravel Co., Ltd.	101-1st Ave. W., Vancouver	North Vancouver and Coquitlam.
Pacific Lime Co., Ltd.	744 West Hastings St., Vancouver	Texada Island.
Priore & Vannucchi	Fife	Fife.
Trail, City of	Trail	Trail.
Walleen, J. J.	Port Alice	Quatsino Sound.

## Marble

<b>QUEBEC—</b>		
Canada Marble & Lime Co.	4095 St. Catherine St., Montreal	Labelle Co.
*Wallace Sandstone Quarries, Ltd.	1135 Beaver Hall Hill, Montreal	Missisquoi Co.
White Grit Co.	Hurdman Rd., Ottawa, Ont.	Portage du Fort.
<b>ONTARIO—</b>		
Bolender Bros.	Haliburton	Haliburton.
Bonter Marble & Calcium Co., Ltd.	Box 61, Marmora	Marmora.
Lake St. John Quarry Co., Ltd.	Longford Mills	Longford Mills.
Silvertone Black Marble Quarries	53 Queen St., Ottawa	St. Albert.
<b>BRITISH COLUMBIA—</b>		
Canadian Marble & Granite Works, Ltd.	10702-101st St., Edmonton, Alta.	Marblehead.

## Sandstone

<b>NOVA SCOTIA—</b>		
Fairview Crushed Stone Co., Ltd.	609 Gottingen St., Halifax	Halifax Co.
Wallace Sandstone Quarries, Ltd.	1135 Beaver Hall Hill, Montreal, P.Q.	Wallace.
<b>NEW BRUNSWICK—</b>		
*Read Stone Co., Ltd.	Box 549, Sackville	Woodpoint and Beaumont.
*Smith, E. A.	Shediac	Shediac.
<b>QUEBEC—</b>		
Beauharnois Light, Heat & Power Co.	Power Bldg., Montreal	Beauharnois.
Blais, Jos., Reg.	10 Mont Marie Ave., Lévis	Lévis Co.
Citadel Brick, Ltd.	14 St. Joseph St., Quebec	Lauzon.
Gagnon, L. P.	St. David, Lévis	St. David.
Montpetit, Euclide	Melocheville	Melocheville.
Quebec Department of Highways	Quebec	Various.
Rousseau, T. E.	48 Second St., Quebec	Bonaventure and Matane Co's.
Sherbrooke, City of	Sherbrooke	Sherbrooke.
Vézina, Jos., Reg.	Ste. Foy, Quebec	Ste. Foy.
<b>ONTARIO—</b>		
Campbell Sandstone Quarries, Ltd.	143-163 Main St., Westboro	Carleton Co.
Corners, Austin	Terra Cotta	Peel Co.
Eves, C., Stone Quarries	Terra Cotta	Peel Co.
Logan, Harry	Box 400, Georgetown	Georgetown.
McAlpine Bros.	Milton	Halton Co.
Narrie & McHarg	R. R. 4, Acton	R. R. 4, Acton.
Norton, A. W., Stone Quarries	Limehouse	Glen Williams.
Presswood & Gibbs	Box 146, Glen Williams	Halton Co.
Sykes, Thos.	Georgetown	Halton Co.
Terra Cotta Quarries	Terra Cotta	Halton Co.

## Slate

<b>QUEBEC—</b>		
Broughton Soapstone & Quarry Co., Ltd.	Broughton Station	Ste. Hénédiène.
<b>ONTARIO—</b>		
Canadian Slate Mines, Ltd.	Madoc	Madoc.
<b>BRITISH COLUMBIA—</b>		
Kennedy, J. J.	Sooke Lake	Victoria Mining Div.

\* Firms operating dressing works in conjunction with quarry.

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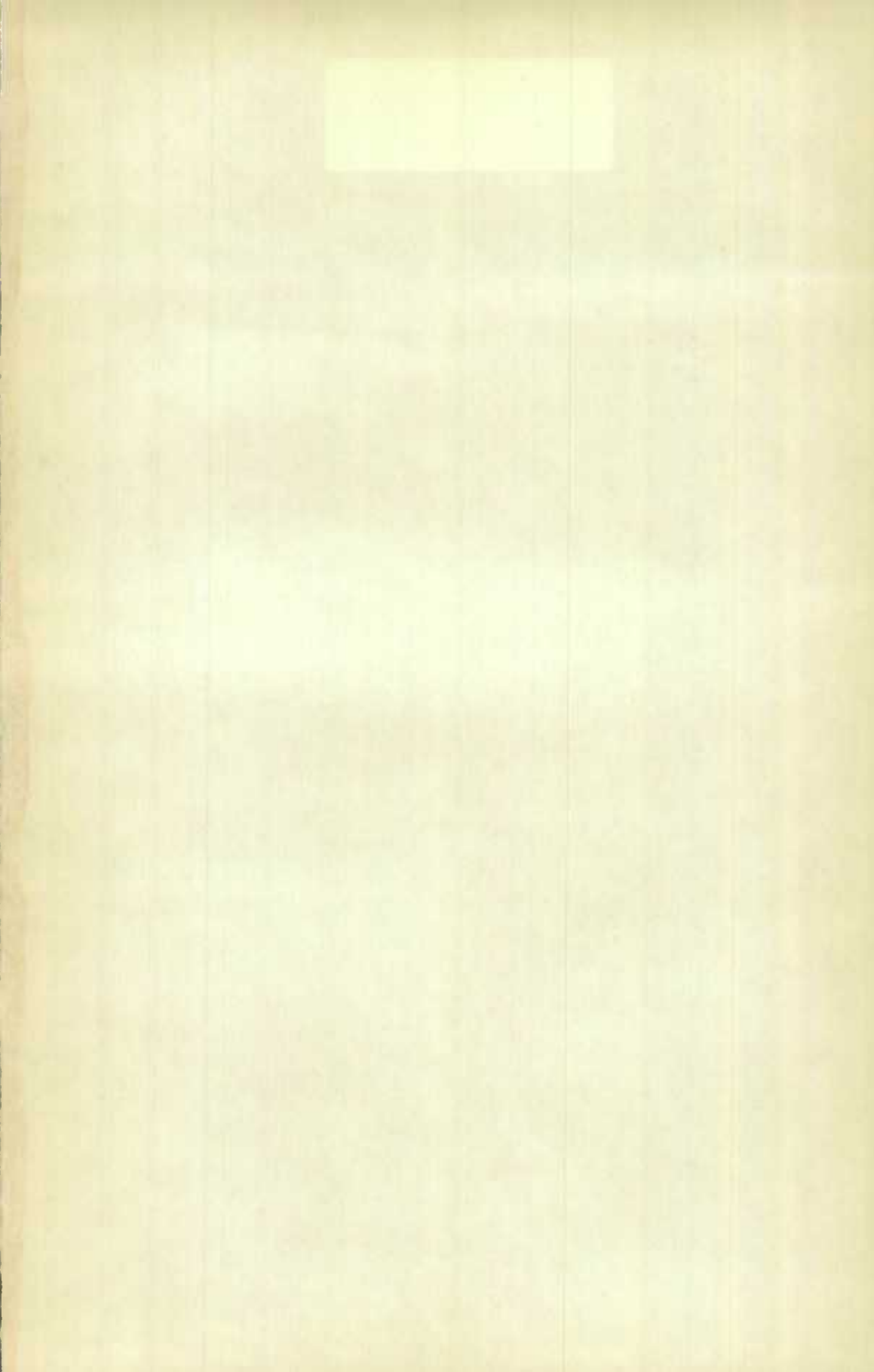
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