

Corrections

CANADA
DEPARTMENT OF MINES
Hon. MARTIN BURRELL, Minister: R. G. McCONNELL, Deputy Minister.

MINES BRANCH
EUGENE HAANEL, Ph.D., Director.

156,000

PRELIMINARY REPORT
OF THE
MINERAL PRODUCTION OF
CANADA

DURING THE CALENDAR YEAR
1918

PREPARED BY
JOHN McLEISH, B.A.,
Chief of the Division of Mineral Resources and Statistics.

FEBRUARY 27, 1919

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1919

PRELIMINARY REPORT

ON

THE MINERAL PRODUCTION OF CANADA DURING THE CALENDAR YEAR 1918.

The usefulness of statistical data on mineral production is greatly increased by the promptness with which the records can be presented to the interested public. For some years past the collection of annual statistics has been supplemented in the case of certain products by monthly or quarterly production records. Thus, during the past three years monthly or quarterly records of the production of pig iron, steel, chromite, coal, pyrites, sulphuric acid, etc., have been collected for the information of various war boards organized by the Government. It was possible on the basis of such records and on other data to present immediately at the close of the year a rough estimate of the production of the more important metals and of fuels. These estimates further revised and supplemented to cover the entire range of mineral production are now presented in the form of a preliminary report, still subject to revision.

A tabulated statement of mineral production is supplemented by a brief review of each of the more important metals and mineral products.

In reviewing the industry as a whole, it is customary to express the total mineral production and to make comparison of production in different years, or districts, in terms of dollars or total values.

On this basis of record and comparison, the total value¹ of the metal and mineral production in 1918 was \$210,204,970. Compared with the production in 1917 valued at \$189,646,821, an increase of \$20,558,149, or 10.8 per cent, is shown, while compared with the production in 1913 valued at \$145,634,812 there is shown an increase of \$64,570,158, or 44.3 per cent.

During the past three years greatly increased prices of metals and mineral products have contributed in large measure toward increasing the total value of the mineral production; nevertheless, it is satisfactory to note that out of about 45 items, or products, included in the mineral record, treating clay products and stone quarries each as a single item, no less than eighteen products have reached their highest production in actual quantity during 1918 or 1917.

The production of cement, clay products, stone quarries and other materials of construction was, as compared with maximum production before the war, reduced almost one-half because of the enforced cessation of building activity, whereas the production of metals and of various non-metals and fuels, most of which entered either directly or indirectly into war's requirements, was greatly increased.

Comparing broadly the production during the past two years, it will be noted that more than half the total increase has been due to the higher prices obtained for coal, and a considerable proportion of the balance of the increase

¹ In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals copper, gold, lead, nickel, silver, and zinc is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued at the average market price of the refined metal in a recognized market. There is thus included in some cases the values that have accrued in the smelting or refining of metals outside of Canada.

Mineral Production of Canada, 1918.

(Subject to revision.)

		Quantity.	Value.
METALLIC.			
Antimony ore (exports).....	*Tons	26	1,430
Cobalt metallic and contained in oxide, etc., at \$2.50 per lb.....	Lbs.	1,347,544	3,368,860
Copper, value at 24-628 cents per lb.....	"	118,415,829	29,163,450
Gold.....	Ozs.	710,526	14,687,875
Iron, pig, from Canadian ore.....	Tons	47,444	1,204,703
Iron ore, sold for export.....	"	112,886	469,352
Lead, value at 9-25 cents per lb.....	Lbs.	43,846,260	4,055,779
Molybdenite, (MoS ₂ contents at \$1.15 per lb.).....	"	877,850	434,528
Nickel, value at 40 cents per lb.....	"	92,076,034	38,830,414
Platinum.....	Ozs.	39	2,560
Silver, value at 96-772 cents per oz.....	"	21,284,607	20,597,540
Zinc, value at 8-159 cents per lb.....	Lbs.	33,663,690	2,746,620
Total.....			113,563,111
NON-METALLIC.			
Actinolite.....	Tons.	228	2,508
Arsenic, white and in ore.....	"	3,498	561,128
Asbestos.....	"	141,463	8,936,805
Asbestos.....	"	16,734	33,974
Chromite.....	"	21,994	867,122
Coal.....	"	14,979,213	55,752,671
Corundum.....	"	137	26,112
Feldspar.....	"	20,232	117,379
Fluorspar.....	"	7,362	135,712
Graphite.....	"	3,051	270,054
Grindstones.....	"	3,072	83,005
Gypsum.....	"	152,287	823,008
Magnetite.....	"	39,365	1,016,765
Magnesium Sulphate.....	"	1,910	11,480
Mica.....	"		268,375
Mineral pigments—			
Barytes.....	"	640	10,165
Oxides.....	"	17,317	112,440
Mineral water.....			155,855
Natural gas.....	M cu. ft.	20,140,315	4,370,622
Petroleum.....	Brls.	304,741	866,554
Phosphate.....	Tons	140	1,200
Pyrites.....	"	413,698	1,688,991
Quartz.....	"	(c) 224,116	708,026
Salt.....	"	131,727	1,585,039
Talc.....	"	18,190	112,727
Tripolite.....	"	500	12,500
Total.....			78,230,195
STRUCTURAL MATERIALS AND CLAY PRODUCTS.			
Cement, Portland.....	Brls.	3,591,481	7,076,503
Clay Products (\$4,599,835).			
Brick, common.....	No.	171,921,837	1,915,490
" pressed.....	"	38,317,751	626,311
" moulded and ornamental; terra cotta.....	"		43,442
Fireproofing.....	Tons	27,912	224,587
Hollow Building Blocks.....	No.		43,087
Kaolin.....	Tons	863	19,299
Pottery.....	"		(a) 131,242
Refractories; fire clay, etc.....	"		(b) 397,458
Sewerpipe.....	"		699,784
Tile, drain.....	No.	19,616,261	499,135
Lime.....	Bus.	6,270,666	1,856,819
Sand-lime brick.....	No.	16,824,858	213,680
Sand and gravel (not complete).....	Tons	5,685,334	1,786,628
Slate.....	Sq.	933	5,124
Stone (\$2,873,175)—			
Granite.....			645,850
Limestone.....			2,134,283
Sandstone.....			93,042
Total structural materials and clay products.....			18,411,664
All other non-metallic.....			78,230,195
Total value metallic.....			113,563,111
Grand Total, 1918.....			210,204,970

(a) Excluding \$537,339 from imported; (b) excluding \$34,018 from imported. * Short tons throughout.

(c) Additional returns of 20,000 tons valued at \$60,000 received since compilation completed.

Increase or Decrease in Principal Products, 1918.

Principal Products.		Increase (+) or Decrease (-) in quantity.		Increase (+) or Decrease (-) in value.	
			%	\$	%
Cobalt.....	Lbs.	+ 267,972	24.8	+ 1,641,545	95.0
Copper.....	"	+ 9,188,497	8.4	+ 524,539	1.8
Gold.....	Ozs.	- 28,305	3.8	- 585,117	3.8
Pig iron from Canadian Ore.....	Tons.	+ 1,422	3.1	+ 435,920	56.7
Lead.....	Lbs.	+ 11,269,979	34.6	+ 427,759	11.8
Molybdenite.....	"	+ 91,145	31.6	+ 145,823	50.5
Nickel.....	"	+ 0,745,734	11.8	+ 3,098,302	9.2
Silver.....	Ozs.	- 936,667	4.2	- 2,505,645	13.8
Zinc.....	Lbs.	+ 4,094,926	13.8	+ 105,803	4.0
Total metallic.....				+ 7,167,964	6.7
Asbestos and Asbestic.....	Tons.	+ 4,415	2.9	+ 1,740,396	24.1
Coal.....	"	+ 932,454	6.6	+ 12,552,840	29.1
Graphite.....	"	- 663	17.9	- 132,838	33.0
Gypsum.....	"	- 184,045	54.7	- 58,978	6.7
Magnesite.....	"	- 18,725	32.2	+ 288,490	39.6
Mica.....	"	-	-	- 90,476	25.2
Natural gas.....	Meu. ft.	- 7,268,625	26.5	- 674,676	13.4
Petroleum.....	Brls.	+ 90,903	42.5	+ 317,752	58.6
Pyrites.....	Tons.	+ 2,949	0.7	+ 78,229	4.9
Quartz.....	"	+ 7,828	3.6	+ 211,844	42.7
Salt.....	"	+ 7,182	5.2	+ 237,147	22.6
Cement.....	Brls.	- 1,177,007	24.8	- 647,743	8.4
Clay products.....	"	-	-	- 179,203	3.8
Lime.....	Bush.	- 296,504	4.5	+ 298,332	19.1
Stone.....	"	-	-	- 366,972	11.3
Total non-metallic.....				+ 13,450,185	16.2
Grand Total Increase.....				+ 20,558,149	10.8

Metal Prices.

(In cents per pound or ounce.)

	1913.	1914.	1915.	1916.	1917.	1918.
Antimony (ordinaries).....Per pound.	7.520	8.763	30.280	25.370	20.690	12.581
Copper, New York.....	15.269	13.602	17.275	27.202	27.180	24.628
Lead, ".....	4.370	3.862	4.673	6.858	8.787	7.413
" London.....	4.072	4.146	4.979	6.715	6.626	6.270
" Montreal*.....	4.659	4.479	5.600	8.513	11.137	9.250
Nickel, New York.....	40.000	40.000	45.000	45.000	50.000	46.250
Silver, ".....Per ounce.	59.791	54.811	49.684	65.081	81.417	96.772
Spelter, ".....Per pound.	5.648	5.213	13.230	12.804	8.901	8.159
Tin, ".....	44.252	34.301	38.500	43.480	61.802	(a) 88.750

* Quotations furnished by Messrs. Thomas Robertson & Company, Montreal, Que.
(a) No regular quotations except for January and February, 1918.

Mineral Production by Provinces, 1917 and 1918.

	1917.		1918.		Increase (+) or Decrease (-)	
	Value of Production.	Per cent of total.	Value of Production.	Per cent of total.	\$	%
Nova Scotia.....	21,104,542	11.13	22,754,780	10.83	+ 1,650,238	7.82
New Brunswick.....	1,435,024	0.76	2,111,816	1.06	+ 676,792	47.16
Quebec.....	17,400,077	9.18	19,534,409	9.29	+ 2,134,332	12.26
Ontario.....	89,086,600	46.96	94,084,420	44.76	+ 5,017,820	5.63
Manitoba.....	2,028,264	1.39	3,197,697	1.52	+ 569,433	21.67
Saskatchewan.....	860,651	0.45	894,591	0.43	+ 33,940	3.94
Alberta.....	16,527,535	8.71	23,298,118	11.08	+ 6,770,583	40.97
British Columbia.....	36,141,926	19.06	42,080,741	20.02	+ 5,938,815	16.43
Yukon.....	4,482,202	2.36	2,248,398	1.07	- 2,233,804	49.83
Dominion.....	189,646,821	100.00	210,204,970	100.00	+ 20,558,149	10.8

to higher prices of silver, cobalt, and asbestos, though each of these products, with the exception of silver, was also produced in greater quantity than in the previous year.

The metal production in 1918 was valued at \$113,563,111, an increase of \$7,107,964, or 6.7 per cent.

The metals cobalt, lead, molybdenum, nickel, silver and zinc all show increases in production. Gold and silver were less in quantity than in 1917 by very small percentages, while in total value gold and copper also exhibited a decline.

The total value of the non-metallic production, including clay and quarry products, in 1918 was \$96,641,859, as compared with \$83,191,674 in 1917, showing an increase of \$13,450,185, or 16.2 per cent. Excluding clay and stone quarry products, an increased production of which was hardly expected, almost every product on the list was obtained in greater quantity and value than during 1917. The principal exceptions were: natural gas, mica, gypsum, and graphite.

COPPER.

The production of copper in 1918 amounted to 118,415,829 pounds, which at the average price in New York of 24,628 cents per pound, would be worth \$29,163,450 as against 109,227,332 pounds, valued at \$29,687,989, or an average of 27.180 cents per pound in 1917, an increase of 8.4 per cent in quantity, but a decrease of 1.8 per cent in value. Thus the 1918 production exceeded the high mark of 117,150,028 pounds which was produced in 1916.

The electrolytic copper refinery installed at Trail, B.C., by the Consolidated Mining and Smelting Company, began operations about November, 1916, with a capacity of 10 tons of refined copper per day, which was increased to 20 tons per day in 1917 and is to be enlarged to 50 tons per day in 1919.

Of the total production 92,769,167 pounds were contained in blister copper and in matte produced in Canada, part of which was refined at Trail, B.C., and 25,646,662 pounds estimated as recovered from ores exported.

The production in Québec from pyritic ores was 5,869,649 pounds valued at \$1,445,577, as against 5,015,560 pounds valued at \$1,363,229 in 1917. These are the quantities reported as being paid for, the actual contents were much higher.

The production in Ontario amounted to 47,047,801 pounds valued at \$11,586,932 as against 42,867,774 pounds valued at \$11,651,461 in 1917, an increase of 9.7 per cent in quantity.

The production in Ontario is derived chiefly from the nickel-copper ores of the Sudbury district, and of the Alexo mine in Timiskaming, supplemented by a small recovery from the silver ores of the Cobalt district, and by shipments from a few copper properties under development.

The production in Manitoba amounted to over two million pounds and was derived from the ore deposits at Schist Lake, northwest of the Pas. Much development and exploration work has been carried on in this district during the last few years and it promises to become an important contributor to the metal production of the country.

The British Columbia production was 62,858,628 pounds, valued at \$15,480,823 as against 57,730,959 pounds, valued at \$15,691,275 in 1917, an increase of about 9.0 per cent in quantity. The production included 43,429,172 pounds recovered in matte, blister, and as refined copper, and 19,429,456 pounds being the estimated recovery from ores exported to American smelters.

The production from the Yukon is estimated at 300,000 pounds valued at \$73,884 as against 2,460,079 pounds, valued at \$668,650. The great falling off is due to the closing up of the Pueblo mine and also to the very high costs of labour and supplies.

Prices:—The New York price of electrolytic copper as fixed by the United States War Industries Board remained at 23½ cents per pound for the first six months of the year, and was increased in June to 26 cents which remained the ruling price until December.

The exports in 1918 were; copper, fine, in ore, matte, regulus, etc., 36,698 tons valued at \$9,221,681; in pigs, bars, sheets, etc., 23,390 tons valued at \$11,378,440 and copper "old and scrap", 448 tons valued at \$171,988, giving a total of 60,536 tons valued at \$20,772,109. The total exports in 1917 were 59,961 valued at \$23,256,278.

GOLD.

The total production of gold in 1918 amounted to 710,526 fine ounces, valued at \$14,687,875 as compared with 738,831 fine ounces, valued at \$15,272,992 in 1917.

Of the total production in 1918 \$2,411,245 or 16.4 per cent was derived from placer or alluvial mining; \$9,080,826 or 61.8 per cent was in the form of bullion and refined gold; and \$3,195,804 or 21.8 per cent contained in matte, blister copper, residues and ores exported.

The production in Nova Scotia was only 1,195 ounces, valued at \$24,700, the smallest ever recorded. The decrease is mostly attributed to the great increase in cost of labour and material.

The production in Quebec is derived partly from the pyrites ores of the Eastern Townships and partly from the zinc-lead ores of Notre Dame des Anges, Portneuf county, and amounted to 1,855 ounces, valued at \$38,346. Much of this gold is not paid for by the smelters.

The Ontario production was 411,270 ounces, valued at \$8,501,705 being about 57.8 per cent of the total production for Canada. The production in 1917 was reported as \$8,749,581 and in 1916, the highest recorded, it was \$10,180,485.

The decrease of the last two years is attributed to the high cost of labour and supplies, but an increased production in 1919 may be anticipated with more labour available and lower costs of materials.

The production from Manitoba was 6,755 ounces, valued at \$139,638, as against 440 ounces valued at \$9,095 in 1917, and was derived from the gold and copper ores of Herb and Schist lakes in the new Pas mining division in northern Manitoba.

The production in British Columbia in 1918 was 187,069 ounces, valued at \$3,867,059 as against 133,742 ounces, valued at \$2,764,693 in 1917, an increase of about 40.0 per cent, due to increased activity at the Rosland mines and to the entry of the Belmont Surf Inlet Mines at Surf Inlet on the list of important producers. Nevertheless it is much below the usual production of five to six million dollars a year.

The production from the Yukon Territory amounted to 102,382 ounces, valued at \$2,116,424, a decrease of 42.0 per cent from that of 1917 and is much below the average output of this district during the last ten years. In addition to the alluvial gold there is included a small recovery from the gold and copper-gold ores of the Conrad and Whitehorse districts.

The exports of gold bullion, gold-bearing dust, nuggets, gold in ore, etc., in 1918 are recorded by the Customs Department as \$10,040,813 as against \$15,929,051 in 1917.

LEAD.

The production of lead in 1918 is estimated at 43,846,260 pounds, which at the average price of lead in Montreal 9.250 cents per pound would be worth \$4,055,779. The corresponding production in 1917 was 32,576,281 pounds valued at \$3,628,020, an average price of 11.137 cents, showing an increase of 34.0 per cent in quantity, and 12.0 per cent in total value.

This lead production as in the past ten years, represents the quantity of refined lead and lead bullion produced in Canada from Canadian ores, together with the lead estimated as recoverable from ores exported.

There is such a divergence between the records of lead contents of ores and concentrates shipped, and recoveries at smelters from domestic and imported ores that the following records are presented for comparison.

	1916.	1917.	1918.
	Lbs.	Lbs.	Lbs.
1) Production : Smelter recoveries from Canadian ore and recoverable lead in ore exported	41,497,615	32,576,281	43,846,260
(2) Lead contents of ores and concentrates shipped from mines in Canada	54,124,628	38,696,116	47,673,353
(3) Total production of lead bullion in Canada (including lead from imported ores)	43,100,236	41,427,304	*

*Complete smelter records not yet received.

The 1918 production included 14,724 tons of lead in bullion produced at the smelters at Trail, B.C., and Galetta, Ont., from Canadian ores.

The lead ores exported amounted to 23,003 tons with a metal content of 13,398,574 pounds and were derived from Notre Dame des Anges, Que.; the Sullivan mine, Kimberley, the Surprise mine, Saudon, and a few other mines in British Columbia.

The total mine shipments of lead ores and concentrates were about 76,057 tons, containing 47,673,353 pounds of lead ore compared with 46,799 tons, containing 38,696,116 pounds of lead in 1917.

The exports of lead in 1918 were: Lead contained in ores, concentrates, etc., 22,684,100 pounds, valued at \$1,321,890 and pig lead, 7,461,700 pounds, valued at \$668,807, as against 13,410,400 pounds of lead in ores, etc., valued at \$925,056, and 1,004,500 pounds of pig lead valued at \$62,453 in 1917.

The heavy exports in 1917 and 1918 are partly due to the fact that a few thousand tons of base bullion were exported from Trail, B.C., for refining in the United States.

The average Montreal price of lead in January was 8.42 cents per pound advancing to a maximum of 9.86 cents in July and remained at that price until December when it showed a slight drop, the average for the year being 9.25 cents. This is the producer's price for lead in car lots as per quotations furnished by Messrs. Robertson & Company.

MOLYBDENUM.

The total production in 1918 representing the quantity paid for of the molybdenite (MoS_2) contents of the ores and concentrates shipped, amounted to 377,850 pounds, which at \$1.15 per pound would be worth \$434,528, as against 288,705 pounds valued at \$288,705, or \$1 per pound in 1917.

The total shipments of ores and concentrates amounted to 430.3 tons valued by the operators at \$428,704, as against 1,554.3 tons, valued at \$320,006 in 1917.

The amount of ores treated in the concentrating plants was about 33,958 tons, as compared with 22,605 tons in 1917, and 9,106 tons in 1916. ✓

Quebec produced in 1918 about 88 per cent of the total, the balance being derived from Ontario, including a very small production from British Columbia.

The price of molybdenite in New York averaged about \$2.25 in January, dropped to \$2.15 in February, and gradually decreased to \$1.80 in March, \$1 in August, and finally 87 cents in December.

NICKEL.

The total production of nickel in 1918 was 92,076,034 pounds, worth at 40 cents per pound \$36,830,414, as compared with 84,330,280 pounds valued at \$33,732,112 in 1917.

This production is derived as usual, from the ores of the Sudbury district supplemented by the recovery of a small quantity of metallic nickel, nickel oxides and other nickel salts, as by-products in the treatment of the silver-cobalt-nickel ores of the Cobalt district.

Sudbury District: The production of nickel-copper matte at the smelters of the International Nickel Company of Canada, and the Mond Nickel Company was 86,773 tons, containing 45,670 tons of nickel, and 23,472 tons of copper, the average percentage of the combined metals in the matte being about 80.0. The ore smelted included, as usual, a small tonnage from the Alexo mine in the Timiskaming district.

The production in 1917 was 78,897 tons of matte derived from 1,453,661 tons of nickel-copper ores, the matte containing 41,887 tons of nickel and 21,196 tons of copper.

The new refinery erected at Port Colborne, Ont., by the International Nickel Company of Canada, started operations on July 1, 1918.

The British America Nickel Corporation continued the active development of its nickel-copper properties particularly at the Murray mine and much progress was made in the construction of the mine plant. At the smelter plant many buildings were erected and some of the machinery installed. All the buildings at the new refinery located at Deschenes, Que., were completed. The internal equipment of these buildings was begun and it is hoped to have all the above plants in operation before the close of 1919.

As in past years nickel was recovered as a by-product in the smelters of the Coniagas Reduction Company, Thorold, Ont., the Deloro Smelting and Refining Company, Deloro, Ont., and the Metals Chemical Company, Welland, Ont.

The smelters which are treating the silver cobalt-nickel ores of the Cobalt district report a production in 1918 of 243,186 pounds of metallic nickel, valued at \$88,720 and 962,309 pounds of nickel-oxide, nickel carbonate and sulphate of nickel, valued at \$215,277, the total production of nickel and nickel salts having a value of \$303,997 and containing approximately 736,005 pounds of nickel.

The products recovered in 1917 included 265,896 pounds of metallic nickel, valued by the operators at \$108,334, and 657,549 pounds of nickel oxides and nickel sulphate, valued at \$122,963, the total value being \$231,297 and the estimated nickel content 556,961 pounds.

The exports as reported by the Customs Department were: fine nickel 1,710,800 pounds valued at \$707,206 or an average of 41.3 cents per pound, and of nickel in ore, matte, speiss, 85,767,700 pounds, valued at \$10,556,040 or 12.3 cents per pound, as against a total of 81,272,400 pounds valued at \$8,708,650 or 10.72 cents per pound in 1917.

The imports of nickel into the United States during 1918 which included small quantities from other sources as well as from Canada, are recorded in the reports of the Department of Commerce, Washington, as 73,193,205 pounds, contained in ore, matte, or other form valued at \$11,517,546 or an average of 15.7

cents per pound. The exports of nickel and nickel oxide, etc., during the same period were 17,469,500 pounds, valued at \$6,927,041, or an average of 39.7 cents per pound, of which 44.7 per cent were consigned to Russia in Europe, 29.2 per cent to Italy, 12.8 per cent to France, 11.8 to Great Britain, and the balance 1.5 per cent to other countries.

The values per pound of these exports to different countries ranged from 35.1 cents to 53.4 cents per pound. The average value per pound of exports in 1917 was 40.65 cents, the range being from 38.51 cents to 48.79 cents. The average export value in 1916 was 38.78 cents.

The price of electrolytic nickel in New York according to quotation published by the "Engineering & Mining Journal" was 50 cents per pound for the first three months of 1918, 40 to 45 cents for the second quarter and 45 cents for the balance of the year—or an average of a little over 45 cents for the year.

PLATINUM.

The recorded production of platinum in 1918 was 39 crude ounces (25 fine ounces) valued at \$2,560, as against a production in 1917 of 57 crude ounces, valued at \$3,823, and was all obtained from the placer gravels of the Similkameen district, British Columbia.

Undoubtedly the most important sources of the metals of the platinum group in Canada are the nickel-copper ores of the Sudbury district, in Ontario, which are smelted at Copper Cliff and Coniston, and refined at Port Colborne Ont.; New Jersey, United States; and Wales, Great Britain.

A definite record of the total recovery of the metals of the platinum group and of gold and silver from these ores has not been obtained. Unquestionably there is, at least, a partial recovery of these metals in connection with the refining operations. The International Nickel Company reported for the years 1907 to 1916 a recovery of approximately 1,000 ounces per year of platinum and palladium, but the production record is qualified by the explanation that materials from other sources were treated along with the residues resulting from the refining of the Sudbury mattes, so that the whole of the recoveries could not be attributed to the Canadian ores.

The Canadian Copper Company reports¹ that the average content of precious metals per ton of matte for the three years ending 1915 was roughly as follows: Gold, 0.05 ounces troy; silver, 1.75 ounces; platinum, 0.10 ounces; palladium, 0.15 ounces.

On the basis of this average metal content the total matte shipments in 1918, 86,773 tons, would contain 4,338 ounces of gold, 151,852 ounces of silver, 8,677 ounces of platinum, and 13,016 ounces of palladium. With silver at nearly \$1 per ounce, platinum at \$105 per ounce, and palladium at \$135 per ounce, it will be noted that a very considerable value would accrue to these metals even if only a small percentage of the total content were recoverable.

Platinum exports in 1918 included: platinum in ore, concentrates, etc., 12 ounces, valued at \$1,798; old and scrap platinum, 185 ounces, valued at \$20,094. The exports of 1917 were: platinum in concentrates, etc., 136 ounces, valued at \$11,309; old and scrap platinum, 195 ounces, valued at \$18,290.

The price of platinum, which averaged \$105.92 per ounce in January, reached a maximum of \$108 in March and April. The United States Government fixed the price at \$105 in June, and this remained the ruling price until December.

SILVER.

The production of silver in 1918 is estimated at 21,284,607 fine ounces, valued at \$20,597,540, as against 22,221,274 fine ounces, valued at \$18,091,895 in 1917,

¹ Report of the Royal Ontario Nickel Commission, Toronto, 1917, page 484.

a decrease of 4.2 per cent in quantity, but an increase of 13.8 per cent in value, and exceeded in value the previous maximum reached in 1912.

The production in Ontario amounted to 17,109,389 ounces, valued at \$16,557,098, or 80.4 per cent of the total silver production for Canada. In 1911, when the Cobalt district production was at its maximum, the percentage was 93.8.

The production was derived from the ores of Cobalt and adjoining silver districts, with the exception of 63,677 ounces credited to the gold mines.

Of the total Ontario production, 9,410,435 ounces, or 55 per cent, were recovered in the mills of Cobalt; 4,992,469 ounces, or 29.2 per cent were recovered in southern Ontario smelters; and 2,706,485 ounces, or 15.8 per cent, were recovered from ores treated in the United States.

The production for Ontario in 1917 was 19,301,835 ounces, valued at \$15,714,975. Of this production, 51.1 per cent was recovered in the district and 33.9 per cent in the smelters of southern Ontario, leaving a balance of 15.0 as recovered from ores treated in the United States.

The production in Quebec was 147,316 ounces, valued at \$142,561, as against 136,194 ounces, valued at \$110,885, in 1917, and is derived from the pyritic ores of the Eastern Townships and the zinc-lead ores of Notre Dame des Anges, Port-neuf county.

The Manitoba production amounted to 14,033 ounces, valued at \$13,580, as against 7,201 ounces, valued at \$5,865, in 1917, and was derived from the gold and copper ores of the new Pas district.

In British Columbia the production was 3,965,828 ounces, valued at \$3,837,811, as against 2,655,994 ounces, valued at \$2,162,430, in 1917, showing an increase in quantity of 49.3 per cent and in value of 77.5 per cent. This production includes refined silver, silver contained in smelter products, and estimated recoveries from ores exported.

The Yukon production was 48,041 ounces, valued at \$46,490 as against 119,605 ounces, valued at \$97,379 in 1917.

The New York price of silver in 1918 which averaged 88.7 cents per ounce for January, gradually increased to a little over one dollar in August, when by an Act of the United States Congress, it was fixed at \$1.01-1/8 per ounce, and remained at this price until the close of the year. The average for the year was 96.772 cents per ounce.

TUNGSTEN.

There was a small production of tungsten from Canadian sources during 1918. Over six tons of ore were received for treatment at the ore testing laboratories of the Mines Branch, Department of Mines, Ottawa. These ore shipments included about two tons from the Yukon district, four tons from Manitoba and a small shipment from Nova Scotia. The total metal content was 3,415 pounds of WO_3 , having a net value of \$3,007.

There was also a production during 1917 of about 17 tons of wolframite concentrates by the Acadia Tungsten Company at Burnt Basin, New Brunswick, and it is understood that these concentrates were shipped during January of 1918.

The average price of scheelite at New York during 1918 was \$24.96 per unit of WO_3 , with no quotations for the months of November and December.

ZINC.

Previous to 1916 all zinc ores mined in Canada were exported for both smelting and refining, but during the last three years much of the ore has been treated in Canada, following the establishment of the electrolytic zinc refinery at Trail,

B.C., by the Consolidated Mining and Smelting Company. The production of refined zinc was 2,974 tons in 1916; 9,985 tons in 1917 and about 12,278 tons in 1918.

The total production of zinc during 1918 from Canadian ores—including, in addition to the above refined production, the estimated recovery from ores exported (20 per cent allowed for smelter losses) amounted to 33,663,690 pounds, which at the average price of spelter in New York, 8.159 cents per pound, would have a total value of \$2,746,620, as against 29,668,764 pounds, valued at \$2,640,817, or an average value of 8.901 cents per pound in 1917.

Quebec in 1918 is credited with 2,652,526 pounds, and British Columbia with 31,011,164 pounds.

The total zinc ore shipments in 1918 amounted to 121,363 tons, with a metal content of 62,361,486 pounds; as against total shipments of 116,489 tons and containing 64,655,713 pounds of zinc.

During the last nine months of 1917, the exports of zinc in ores, concentrates etc., were 5,972 tons valued at \$320,296, while in 1918 the exports were 10,545 tons valued at \$476,791.

IRON ORE.

The total shipments of iron ores from Canadian mines show a further falling off in 1918, being only 206,820 short tons valued at \$863,186, or an average of \$4.17 per ton as compared with shipments in 1917 of 215,302 tons valued at \$758,621, or an average of \$3.52 per ton. The 1918 shipments included 8,153 tons from Quebec; 197,637 tons from mines in Ontario and about 900 tons mined in British Columbia. The ores comprised 170,907 tons of hematite and roasted hematite and siderite, 28,559 tons of magnetite, 6,324 tons of ilmenite and titaniferous ore, and 900 tons (dry) of bog ore.

The principal operations were as usual in Ontario at Helen and Magpie mines of the Algoma Steel Corporation, Ltd., all the ores mined being first roasted in the rotary kilns at Magpie before shipment. The magnetite properties at Sellwood were operated throughout the year by Moose Mountain, Limited, with an important production of briquettes from the milling and briquetting plant. The ore milled averaged about 33.8 per cent in iron, while the briquettes produced contained about 61.1 per cent iron. Shipments of less than 500 tons were made from two small properties in Eastern Ontario.

In Quebec shipments of ilmenite were made from Ivry-on-the-Lake in Terrebonne county and of titaniferous ore from St. Urbain on the north shore of the St. Lawrence. Some magnetite was also shipped from ore dumps at the old Forsyth mine in Hull township.

In the Great Lakes region ore prices during the first half of 1918 were: Old Range Bessemer, \$5.95 per gross ton; Messabi Bessemer, \$5.75; Old Range Non-Bessemer, \$5.20, and Messabi Non-Bessemer, \$5.05. During the last half of the year these prices were increased by 45 cents per ton.

Mine operators reported approximately 112,886 tons of ore exported to the United States and 93,804 tons shipped to Canadian furnaces. The Customs Department records show exports of iron ores, 130,250 tons, valued at \$650,502 and imports amounting to 2,200,838 tons valued at \$5,895,974.

The quantity of iron ore charged to blast furnaces in 1918 was 2,242,337 tons of which 96,745 tons were of domestic origin and 2,145,592 tons imported. The imported ore included: 754,622 tons of Newfoundland ore and 1,390,970 tons of "Lake ore."

Shipments of iron ore from Wabana mines, Newfoundland, in 1918, by the two Canadian companies operating there, were 848,574 short tons as against 883,346 short tons in 1917, all of which went to Sydney and North Sydney in Cape Breton.

PIG-IRON.

Subject to a possible slight variation when final returns shall have been received the total production of pig-iron in Canada in 1918 excluding the production of ferro-alloys was 1,194,000 short tons (1,066,000 gross tons) having a value of \$33,000,000 as compared with a total production in 1917 of 1,170,480 short tons (1,045,071 gross tons) valued at \$25,025,960. Of the total production 1,163,520 short tons were made in blast furnaces and 30,425 tons were manufactured in electric furnaces from scrap steel, chiefly shell turnings. In 1917 the blast furnace production was 1,156,789 tons and the electric furnace production from scrap steel was 13,691 tons. Thus, although the total production of pig-iron was greater than in any previous year the blast furnace production was less in 1918 than the output of 1916. The recovery of high grade low phosphorous pig-iron in electric furnaces from steel turnings was in 1918 nearly two and a half times the production in 1917, the first year that these operations were undertaken.

The production of blast furnace pig iron in Nova Scotia in 1918 was 415,870 tons as against 472,147 tons in 1917 and with the exception of the year 1914 was the smallest production in this province since 1911. In Ontario the production of blast furnace pig-iron was 748,258 tons as against 684,642 tons in 1917 and was the largest production made in this province.

Pig-iron was made from scrap in electric furnaces in three provinces: 7,449 tons in Quebec and 22,976 tons in Ontario and British Columbia, the production in the latter province being a little over 1,000 tons.

By grades the 1918 production included: Basic, 966,409 tons; Bessemer, 15,415 tons; foundry and malleable, etc., 181,696 tons; low phosphorous iron (electric furnace), 30,425 tons. The 1917 production included: Basic, 961,656 tons; Bessemer, 14,092 tons; foundry and malleable, 181,041 tons; low phosphorus (electric furnace), 13,691 tons.

The old furnace plant at Midland was reconstructed and placed in operation during the year. The blast furnace plants operated included those of the Dominion Iron and Steel Company at Sydney, N.S., the Nova Scotia Steel and Coal Company at North Sydney; the Standard Iron Company at Deseronto, Ont., the Steel Company of Canada at Hamilton, Ont., the Canadian Furnace Company at Port Colborne, Ont., the Algoma Steel Corporation, Ltd., at Sault Ste. Marie, Ont., and the Midland Iron and Steel Company at Midland.

Electric furnaces were operated for the production of pig iron from scrap at Hull and Shawinigan Falls, Que., at Orillia, Collingwood, St. Catharines, Toronto, Belleville and Bowmanville, Ont., and at Port Moody, B.C.

The production of ferro-alloys in Canada in 1918, chiefly ferro-silicon but including also spiegeleisen, ferro-molybdenum and ferro-phosphorus, all with the exception of the spiegeleisen being made in electric furnaces reached a total of 44,700 tons valued at \$4,730,000. In 1917 the production was 43,465 tons valued at \$3,549,814.

The exports of pig iron during 1918 were 2,130 tons valued at \$169,495, or an average of \$79.57 per ton, and of ferro-alloys 23,781 tons valued at \$2,671,434 or an average of \$112.33 per ton.

The imports during 1918 included 67,396 tons of pig iron valued at \$2,102,406, or an average of \$31.19 per ton and 35,284 tons of ferro-alloys valued at \$4,283,133 or an average of \$121.39 per ton making a total import of pig iron and ferro-alloys of 102,680 tons valued at \$6,385,539. The United States trade records show exports to Canada during 1918 of pig iron and ferro-alloys amounting to 122,325 gross tons (137,004 short tons) valued at \$5,661,228, a figure considerably higher than the Canadian record.

STEEL.

The estimated production of steel ingots and direct steel castings in 1918, final returns for all operations not yet having been received, was 1,893,000 short tons (1,690,178 gross tons), of which 1,820,000 tons were ingots and 73,000 tons direct steel castings.

The total production in 1917 was 1,745,734 short tons (1,558,691 gross tons) of which 1,691,291 tons were ingots and 54,443 tons were castings.

The production of steel in electric furnaces in 1918 was about 120,000 tons as against 50,467 tons in 1917; 19,639 tons in 1916; 5,625 tons in 1915 and 61 tons in 1914.

The total production of pig iron ferro-alloys and steel in electric furnaces in 1918 was about 194,000.

The exports of steel during 1918 as per Customs Department records included: billets, blooms and ingots 61,782 tons, valued at \$2,645,943, or an average of \$42.83 per ton; bars and rods 105,285 tons valued at \$10,312,657, or an average of \$97.95 per ton; steel rails 12,952 tons valued at \$575,062 or an average of \$44.40 per ton; wire and wire nails valued at \$6,294,195; scrap iron and steel 51,544 tons valued at \$853,097, or an average of \$16.55 per ton together with a large quantity of manufactured iron and steel goods.

The recorded imports of iron and steel ingots and billets during the year were 3,409 tons valued at \$262,210. This item evidently does not include steel billets imported for the use of the Imperial government. The United States trade record shows exports to Canada during the same period of 247,332 gross tons (277,012 short tons), of billets, ingots and blooms of steel valued at \$19,787,779 an average of \$80 per gross ton.

ARSENIC.

The demand for arsenic has been particularly strong. The Canadian production includes arsenious oxide refined and crude produced in the smelting of the arsenical silver-cobalt-nickel ores of the Cobalt district, in addition to which arsenic has been recovered at Tacoma, Wash., from the arsenical gold concentrates shipped from the Hedley gold mine at Hedley, B.C.

The total production in 1918 was 2,483 tons of arsenious oxide and approximately 1,015 tons of arsenic in concentrates having a total valuation of \$561,128. The production in 1917 was 2,656 tons of arsenious oxide and 280 tons of arsenic in concentrates having a total value of \$669,431.

The exports of arsenic in 1918 were 2,672 tons valued at \$393,883. The imports of white arsenic were 995 pounds valued at \$222; imports of sulphide of arsenic 301,985 pounds valued at \$33,351; and imports of arsenate, bi-arsenate and stannate of soda 121 pounds valued at \$34.

ASBESTOS.

The production of asbestos has increased very greatly during the past four years, and average prices in 1918 were about three to four times those of 1914. As usual the production has all been derived from Black Lake, Thetford, Robertsonville, Coleraine, East Broughton and Danville in the Eastern Townships, Province of Quebec.

There was a falling off in 1918 of 1,955 tons in the output and 1,691.8 tons in the sales of crude asbestos, but an increase in average price of crude, from \$510.47 per ton in 1917, to \$671.35 in 1918. The shipments of mill stock were increased in 1918 by 7,660 tons and the average price was increased from \$34.08 in 1917 to \$46.87 in 1918.

The total value of the shipments of asbestos and asbestic in 1918 was \$8,970,779 as against \$7,230,383 in 1917.

The average number of men employed in mining was 1,674 and in milling 1,400, or a total of 3,074, and the total wages paid were \$2,871,643. The tonnage of rock mined and quarried was 2,462,381 and the tonnage milled was 2,185,572.

OUTPUT, SALES, AND STOCKS OF ASBESTOS.

	Output.		Sales.			Stocks on hand December 31.		
	Tons.	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.	
1918.								
Crude.....	4,313	3,691.6	\$2,478,363	\$671 35	1,685 5	\$1,109,402	\$658 20	
Mill stock.....	139,143	137,770.0	6,458,442	46 87	12,560.0	941,612	74 97	
Asbestic.....	143,456	141,461.6	8,936,805	63 07	14,245 5	2,051,014	143 98	
1917.								
Crude.....	6,268	5,383.4	2,748,071	510 47	1,322.6	738,195	558 14	
Mill stock.....	135,475	130,119.0	4,435,028	34 08	11,917.0	47,289	40 05	
Asbestic.....	141,743	135,502.4	7,183,099	53 01	13,239.6	1,215,484	91 81	
		18,279.0	47,284	2 59				

Exports of asbestos during 1918 were 119,454 tons valued at \$7,786,710, or an average of \$65.19 per ton and of asbestic sand and waste, 22,144 tons valued at \$228,059, or an average of \$12.99 per ton. There was also an export of manufactures of asbestos valued at \$40,763.

The exports in 1917 were: Asbestos, 93,932 tons valued at \$4,903,326; asbestic sand and waste, 52,088 tons, valued at \$430,956; manufactures of asbestos, valued at \$55,666.

The imports of asbestos and manufactures of asbestos in 1918 were valued at \$604,703 as compared with imports of 1917, valued at \$537,431.

CHROMITE.

The production of chromite from the Eastern Townships, Province of Quebec was supplemented in 1918 by small shipments from Cascade, a few miles southwest of Rossland, B.C. The total shipments of ores and concentrates from Canadian sources in 1918 were 21,994 short tons, valued at \$867,122, or an average of \$39.40 per ton, the total content of Cr_2O_3 , being 8,526 tons.

In 1917 the total shipments of ore and concentrates were 23,712 tons valued at \$581,796 or an average of 24.54 per ton, with total content of Cr_2O_3 of 8,472 tons. Thus the 1918 production while slightly less in tonnage of ore and concentrates shipped, really exceeded that of 1917 in chrome content and in total value.

The 1918 shipments included: Crude ore, 15,605 short tons, valued at \$456,408 or an average of \$28.45 per ton and with an average Cr_2O_3 content of 34.51 per cent; concentrates, 6,389 short tons, valued at \$410,714, or an average of \$64.28 per ton, and with an average Cr_2O_3 content of 49.15 per cent. The crude ore shipped included 1,850 tons sold for consumption in Canada, and 13,755 tons sold for export. All of the concentrates with the exception of about 2 tons were sold for export.

The 1917 shipments included 20,152 tons of ore and 3,558 tons of concentrates.

The production of chromite was undoubtedly stimulated by the control exercised by the War Trade Board and the appointment of Dr. Robert Harvie, of the Geological Survey as resident agent of the Board at Black Lake. With the ces-

sation of hostilities, however, the market collapsed, and during the last two months of the year practically all shipments were in fulfillment of contracts.

The outstanding features of the industry during the year were the increased production of concentrates which contributed 29 per cent of the shipments as against 15 per cent in 1917; the exceptionally high price which the product commanded, the average value of the crude ore shipped in 1918 being greater than the average value of all shipments in 1917; the development of ore reserves which appear to assure continued production provided economic conditions are favourable; and the entry of British Columbia as a producer of chrome ore.

COAL AND COKE.

Coal: Early estimates of coal production during 1918 published in December anticipated a somewhat larger production during the last month of the year than was actually realized. The total production of marketable coal during 1918 (comprising sales, colliery consumption, and coal used in making coke, or used otherwise by colliery operators) was 14,979,213 short tons valued at \$55,752,671, or an average of \$3.72 per ton, and was with the exception of the year 1913 the largest production obtained in any one year from Canadian coal mines.

The production in 1917 was 14,046,759 tons valued at \$43,199,831 compared with which the 1918 production shows an increase of 932,454 tons, or 6.64 per cent and \$12,552,840, or 29.06 per cent in value.

The total output of coal including waste and unmarketable slack in 1918 was 15,405,958 tons as against 14,435,361 tons in 1917.

The 1918 production included 115,405 tons of anthracite, all from one mine in Alberta; 11,532,592 tons of bituminous coal, and 3,331,216 tons of lignite.

The production in 1917 included 108,225 tons of anthracite; 11,154,251 tons of bituminous, and 2,784,283 tons of lignite coal.

The increase in production of coal in 1918 has been obtained chiefly in the Province of Alberta although there were also substantial increases in British Columbia and in New Brunswick. The Nova Scotia production fell off 474,289 tons, or 7.5 per cent as compared with 1917 and was less than the production in 1913 by 2,127,271 tons, or nearly 27 per cent. New Brunswick increased by 78,651 tons, or 41.6 per cent; Saskatchewan fell off 10,135 tons, or 2.85 per cent; Alberta increased 1,205,496 tons, or 25.45 per cent and reached its highest production on record. British Columbia increased by 134,703 tons, or 5.53 per cent but was less than the highest production reached in 1910 by 762,154 tons.

Output¹ and Production² of Coal, 1917 and 1918.

(In short tons).

	1917.				1918.			
	Output.	Production.	Value of production.	Ave per ton.	Output.	Production.	Value of production.	Ave. per ton.
			\$	\$			\$	\$
Nova Scotia	6,345,335	6,327,091	19,410,737	3.068	5,838,520	5,852,802	21,551,551	3.68
New Brunswick . . .	189,668	189,095	708,010	3.744	268,205	267,746	1,317,278	4.92
Saskatchewan	360,623	355,445	662,451	1.86	347,622	345,310	708,192	2.05
Alberta	4,873,637	4,736,368	14,153,685	2.99	6,070,609	5,941,864	20,822,418	3.50
British Columbia . .	2,660,834	2,433,888	8,235,716	3.383	2,878,102	2,568,591	11,341,632	4.42
Yukon Territory . . .	5,264	4,872	29,232	6.00	2,900	2,900	11,600	4.00
Total	14,435,361	14,046,759	43,199,831	3.08	15,405,958	14,979,213	55,752,671	3.72

¹ Output includes waste and unmarketable slack. ² Production includes sales, colliery consumption, and coal used by operators in making coke, or for other uses.

Monthly Production of Coal in Canada by Provinces, 1918.
(In short tons).

Month.	Nova Scotia.	New Brunswick.	Saskatchewan.	Alberta.	British Columbia.	Total.
January.....	509,273	23,846	38,093	615,942	242,767	1,429,921
February.....	433,735	21,997	40,952	467,562	216,657	1,185,903
March.....	444,571	25,231	17,150	424,288	227,472	1,138,712
April.....	465,889	22,450	15,861	334,909	223,360	1,112,469
May.....	476,303	23,467	21,736	417,795	227,361	1,166,662
June.....	487,148	23,626	23,409	500,601	230,150	1,264,934
July.....	491,969	18,729	29,162	549,029	227,466	1,316,355
August.....	518,792	23,455	24,288	556,348	231,268	*1,362,051
September.....	497,150	24,128	25,518	534,242	147,689	1,228,727
October.....	589,557	17,884	31,194	546,753	211,548	1,396,936
November.....	481,578	17,649	36,712	437,615	176,616	1,150,170
December.....	451,837	20,284	41,235	506,780	206,237	1,226,373
	5,852,802	267,746	345,310	5,941,864	2,568,591	*14,979,213

* Includes 2,900 tons produced in the Yukon District.

The exports of coal in 1918 were 1,817,195 tons valued at \$9,405,423, or an average of \$5.17 per ton, as against exports in 1917 of 1,733,156 tons valued at \$7,387,192, or an average of \$4.26 per ton, showing an increase of 84,039 tons, or 4.85 per cent in quantity.

The total imports of coal of all classes in 1918 "entered for consumption" as recorded by the Department of Customs were: 21,678,587 tons valued at \$71,650,584, as against imports in 1917 of 20,857,460 tons valued at \$70,562,357. The record shows an increase in the import of bituminous coal but a falling off in the import of anthracite.

Imports of Coal.

	1917.			1918.		
	Tons.	Value.	Average	Tons.	Value.	Average
Bituminous, round and run of mine.....	12,407,486	\$33,712,894	\$2 72	13,656,360	\$37,291,057	\$2 73
Bituminous slack.....	3,129,776	8,739,877	2 79	3,237,057	8,351,639	2 58
Anthracite coal and dust.....	5,320,198	28,109,586	5 28	4,735,160	26,007,888	5 44
Total.....	20,857,460	70,562,357	3 38	21,678,587	71,650,584	3 30

The estimated consumption of coal based on production, exports, and coal imported as "entered for consumption" amounted in 1918 to 34,840,605 tons as compared with a corresponding consumption in 1917 of 33,123,735 tons.

The 1918 consumption included approximately 4,900,565 tons of anthracite; 26,608,824 tons of bituminous, and 3,331,216 tons of lignite.

The consumption of coal during 1917 included approximately 5,423,423 tons of anthracite; 24,911,029 tons of bituminous, and 2,784,283 tons of lignite.

Coke: The total output of oven coke during 1918 was 1,234,347 short tons made from 1,945,475 tons of coal of which 1,348,232 tons were of domestic origin and 597,243 tons imported. The output thus averaged 0.634 tons of coke per ton of coal charged. The total coke used, or sold by producers during the year was 1,227,292 tons valued at \$10,841,251 (partly estimated) or an average of \$8.83 per ton.

In 1917 the total output was 1,231,865 tons of coke made from 1,928,923 tons of coal, an average of 0.639 tons of coke per ton of coal charged. The coke sold or used by producers was 1,245,862 tons valued at \$6,662,581 or an average of \$5.35 per ton.

By provinces the production was: Nova Scotia 581,870 tons, a decrease of 63,199 tons; Ontario 408,033 tons, an increase of 33,019 tons; Alberta 32,801 tons, an increase of 1,605 tons; and British Columbia 211,643 tons, an increase of 31,057 tons.

The ovens operated during the year were those at Sydney, and Sydney Mines, N.S., Sault Ste. Marie, Ont., Coleman, Alberta; and Fernie, Michel and Union Bay, British Columbia.

At the close of the year 1,560 ovens were in operation; 1,041 were idle and 115 were building. The ovens under construction included 60 Koppers ovens at Sydney; 25 Williputte ovens at Sault Ste. Marie and 30 Lomax regenerative ovens at Anyox, B.C.

The exports of coke in 1918 were 29,612 tons, valued at \$223,629 or an average of \$7.55 per ton as against exports in 1917 of 23,595 tons valued at \$137,318 or an average of \$5.82 per ton. The imports of coke in 1918 were 1,165,590 tons valued at \$8,975,445 or an average of \$7.70 per ton as against imports in 1917 of 970,106 tons valued at \$6,517,260 or an average of \$6.72 per ton.

The estimated consumption of oven coke in 1918 was 2,363,270 tons as compared with 2,192,373 tons in 1917.

Of the total output of coke 879,063 tons, or 71.2 per cent was made in by-product recovery ovens and the recovery of by-products included: ammonium sulphate 10,525 tons, and tar 7,697,435 gallons as against 9,941 tons of ammonium sulphate and 9,012,202 gallons of tar in 1917.

FLUORSPAR.

The production of fluorspar again shows a substantial increase. The principal production from Madoc, Ontario, was supplemented by shipments from a recently opened deposit in Yale district, of British Columbia.

The total shipments during 1918 were 7,362 tons valued at \$135,712, as compared with 4,249 tons valued at \$68,756 in 1917.

Eight properties were operated in the Madoc district and the average value of shipment was \$18.15, as compared with \$16.08 in 1917. Prices have varied with the grade of the product from \$15 to \$30 per ton. In addition to the Madoc occurrences, a small tonnage is reported to have been mined in the township of Cardiff.

The Consolidated Mining & Smelting Company is operating the "Rock Candy" fluorspar deposit on Kennedy Creek, Kettle River, Yale, B.C. The Company reports very favourable indications for a large tonnage in excess of their own requirements, for export.

Canadian steel companies use from 10,000 tons to 15,000 tons per annum.

GRAPHITE.

Notwithstanding the importance of this product as a "war mineral" and the strong demand therefor, the production of graphite in 1918 was considerably less than in 1917. The total shipments were 3,051 tons valued at \$270,054 as against 3,714 tons valued at \$402,892 in the previous year.

By provinces the 1918 shipments included 2,934 tons valued at \$245,550 from Ontario, and 117 tons valued at \$24,504 from Quebec (including a small shipment from Baffin Land).

In 1917 Ontario contributed 3,173 tons valued at \$296,587, and Quebec and Baffin Land 541 tons valued at \$106,305.

The quantity of ore milled during the year was 9,958 tons from which was produced 3,162 tons of milled, or refined graphite.

The total quantity of ore milled during the year 1917 was 19,614 tons, from which was produced 4,003 tons of refined, or milled graphite. From three mills operating on disseminated flake ores, the average recovery of refined graphite was

8.6 per cent of the rock milled. The Black Donald (Calabogie, Ont.) ore consists largely of amorphous graphite from which a large mill recovery is made.

Graphite operators reported that of the total shipments, 2,869 tons valued at \$239,590 were sold for export. The Customs records show exports of plumbago, crude ore and concentrate 664 tons valued at \$32,710, and manufactures of plumbago valued at \$205,993.

GYPSUM.

Because of the general cessation of building activities during the war the production of gypsum has fallen in 1918 to less than one quarter the tonnage mined in 1913. The difficulties in securing boat transportation for shipments from the Maritime Provinces was a contributory cause of decreased output. The total quantity of gypsum rock quarried in 1918 was 155,298 tons, of which 88,748 tons were calcined. The shipments of all grades totalled 152,287 tons valued at \$823,006 and included lump gypsum 43,728 tons valued at \$47,727; crushed, 25,074 tons valued at \$55,079; fine ground, 4,558 tons valued at \$12,621, and calcined, 78,927 tons valued at \$707,579. By provinces the shipments were: Nova Scotia, 49,365 tons valued at \$115,976; New Brunswick, 27,225 tons valued at \$214,114; Ontario, 38,214 tons valued at \$151,564; Manitoba, 37,483 tons valued at \$341,352.

In 1917 the quantity quarried was 365,659 tons, of which 97,667 tons were calcined. The shipments included: Lump, 223,760 tons valued at \$246,774; crushed, 32,305 tons valued at \$51,869; fine ground, 4,843 tons valued at \$19,222, and calcined, 75,424 tons valued at \$564,119, or a total of 336,332 tons valued at \$881,984.

The average number of men employed in 1918 was 435 and wages paid, \$273,728 as compared with 774 men employed and \$445,128 paid in wages in 1917.

Exports of crude gypsum were 67,824 tons valued at \$80,843, and of gypsum ground valued at \$101,618. The corresponding exports in 1917 were: Crude gypsum, 224,423 tons valued at \$245,182, and ground gypsum valued at \$146,384.

The imports of gypsum of all grades during 1917 were valued at \$22,065 and included: Crude gypsum, 112 tons valued at \$2,015; ground gypsum, 79 tons valued at \$1,836, and Plaster of Paris, 1,095 tons valued at \$18,214. The total value of the imports in 1917 was \$35,460.

MAGNESITE.

The production of magnesite which has been obtained entirely from the deposits in Argenteuil county, Quebec, is marketed as crude ore, calcined and dead burnt clinker (the latter being sintered in rotary kilns after mixture with about 5 per cent of iron ore in the form of magnetite). The total shipments in 1918 were 39,365 tons valued at \$1,016,765, as compared with shipments in 1917 of 58,090 tons valued at \$723,275.

The smaller tonnage shipped in 1918 is due to the greater proportion of calcined and dead burnt clinker produced and sold. There were marketed about 16,697 tons of crude ore valued at \$158,380, averaging about \$9.50 per ton. Calcined material sold at \$25 per ton and dead burnt clinker between \$35 and \$40.

In 1918 about 57,799 tons of magnesite rock were quarried and about 49,303 tons were calcined in lime kilns, or sintered in rotary cement kilns. The sintering was done at the plants of the Canada Cement Company at Hull and Montreal.

Exports of magnesite in 1918 were valued at \$816,553.

PETROLEUM.

The past two years have witnessed slight increases in petroleum production in Ontario due to the development of the new Mosa field in the county of Mid-

dlesex, so that the production in 1918 was not only 90,909 barrels, or 42 per cent in excess of that of 1917, but was the largest production that has been reached since 1910. A bounty of $1\frac{1}{2}$ cents per gallon is paid on the marketed production of crude oil from Canadian oil fields, the administration of the "Petroleum Bounty Act" being under the Department of Trade and Commerce. According to the bounty record the production in 1918 in Ontario was 288,692 barrels (10,104,220 imperial gallons), which at the average price per barrel of \$2.70 $\frac{1}{4}$ was worth \$780,912. The New Brunswick production according to bounty payments was 3,009 barrels worth about \$7,402 or an average value of \$2.46. For five years there has been a small but growing production of crude petroleum in Alberta, the greater part of which, however, does not earn the bounty because of its lightness, or low specific gravity. The approximate production in 1918 was 13,040 barrels valued at \$78,240.

The total production in Canada from all sources was therefore 304,741 barrels (10,665,935 imperial gallons) valued at \$866,554, as against 213,832 barrels (7,484,120 imperial gallons) valued at \$542,239 in 1917.

The 1917 production included 2,341 barrels from New Brunswick; 202,991 barrels from Ontario and 8,500 barrels from Alberta.

The price of crude oil at Petrolia was quoted at \$2.48 from August 20, 1917 to February 12, 1918 when the price was increased 10 cents to \$2.58. On March 21, the price was again increased by 10 cents to \$2.68 and on July 10, to \$2.78 remaining at this price to the end of the year. The average monthly price for the year was thus \$2.69 $\frac{3}{4}$, as against an average of \$2.33 $\frac{1}{4}$ in 1917; \$1.98 in 1916 and \$1.39 $\frac{1}{2}$ in 1915.

The production in barrels of the various fields in the Province of Ontario as kindly furnished by the Supervisor of Petroleum Bounties at Petrolia was as follows: Petrolia and Enniskillen 65,467; Oil Springs 44,671; Moore township 6,367; Sarnia township 3,438; Plympton township 412; Bothwell 29,116; Tilbury 25,228; Dutton 1,875; Onondaga 1,186; Belle River 447; Moza township 108,988; Thamesville 1,566.

The production by districts in 1917 was in barrels; Petrolia and Enniskillen 74,267; Oil Springs 46,902; Sarnia township 4,493; Moore township 6,282; Plympton township 579; Bothwell 29,682; Tilbury 10,041; Dutton 2,941; Onondaga 382; Moza township 20,998; and Thamesville 6,420.

In Alberta the production reported was obtained from 5 wells situated in the Turner Valley field, near Black Diamond, about 35 miles southwest of Calgary:

Complete returns of the production of oil refineries have not yet been received, but according to inspection returns of the Inland Revenue Department the total quantity of illuminating oils inspected during the calendar year 1918 was 55,443,056 gallons and the quantity of naphtha or gasoline and other light oils was 74,310,352 gallons.

In 1917 nine oil refineries in Canada used 199,256,799 gallons of crude oil of which 190,822,740 gallons were imported, and 8,434,059 gallons were obtained from Canadian wells. The production of refined oils and petroleum products included gasoline and motor oils, benzoline, benzine and other light oils 54,114,786 gallons; illuminating oils 49,144,564 gallons; lubricating oils 14,332,549 gallons; gas and fuel oils and tar 55,643,707 gallons; wax and eandles 13,517,627 pounds with asphalt and other products. The total value of the products of refineries was \$25,137,143.

Exports of petroleum entered as crude mineral oil in 1918 were 270,302 gallons valued at \$28,415 and of refined oil 1,946,967 gallons valued at \$206,675. There was also an export of naphtha and gasoline of 91,229 gallons valued at \$28,778. The exports in 1917 were: crude oil 2,130 gallons valued at \$183; refined oil 28,212 gallons valued at \$6,558; naphtha and gasoline 24,304 gallons valued at \$7,419.

The total value of the imports of petroleum and petroleum products in 1918 was \$30,649,580 as against a value of \$22,957,688 in 1917 and a value of \$14,705,323 in 1916.

The total quantity of petroleum oils, crude and refined, imported in 1918 was 420,728,933 gallons as compared with 379,148,006 gallons in 1917. A detailed record of the various classes of imports will be found in the accompanying table.

Imports of Petroleum and Petroleum Products During the Calendar Years 1917 and 1918.

	1917.		1918.	
	Gal.	Value.	Gal.	Value.
(a) (1) Crude petroleum in its natural state 7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refineries to be refined in their own factories.....	183,105,102	\$8,411,730	148,537,043	\$8,255,387
(2) Petroleum (not including crude petroleum imported to be refined, or illuminating or lubricating oils). 8235 specific gravity or heavier at 60 degrees temperature.....	142,524,473	5,958,930	229,010,561	13,350,646
(b) Crude petroleum, gas oils (other than benzine, naphtha and gasoline).....	854,778	65,404	65,845	7,584
(c) Coal and kerosene, distilled, purified, or refined.....	13,258,815	978,366	5,241,881	526,606
(d) Illuminating oils composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon.....	198,281	115,194	205,839	152,825
(e) Lubricating oils composed wholly or in part of petroleum, costing less than 25 cents per gallon.....	3,438,430	559,605	2,450,588	476,641
(f) Products of petroleum, n.o.p.....	18,521,574	2,708,395	29,246,143	5,595,425
(g) Lubricating oils, n.o.p.....	1,877,381	650,325	2,849,051	1,203,130
(h) Gasoline.....	15,369,172	3,293,760	3,121,982	798,387
Total.....	379,148,006	22,741,709	420,728,933	30,375,631
	Pounds.		Pounds.	
Paraffin wax.....	1,620,634	140,722	1,755,422	209,016
Paraffin wax candles.....	513,337	75,257	327,657	64,033
		22,957,688		30,649,580

PYRITES.

The shipments of pyrites as sulphur ore from Canadian mines were about 3,000 tons less in 1918 than 1917. The total shipments during the past year were 413,698 tons valued at \$1,688,991 and included 124,871 tons valued at \$507,802 from the province of Quebec; 270,589 tons valued at \$1,117,735 from the province of Ontario, and 18,238 tons valued at \$63,454 from the province of British Columbia. The total sulphur content of shipments was 157,311 tons, or an average of 38 per cent. Of the total shipments 85,951 tons were sold for consumption in Canada and 327,747 tons for consumption in the United States.

In 1917 the total shipments were 416,649 tons valued at \$1,610,762, or by provinces, as follows: Quebec, 122,882 tons valued at \$501,351; Ontario, 288,058 tons valued at \$1,080,866; and British Columbia, 5,709 tons valued at \$28,545. The total sulphur content of the year's shipments was 155,163 tons, or an average of 37.2 per cent, the ores from different properties varying from 29 to 48.6 per cent in sulphur. Of the total shipments in 1917 about 49,320 tons were sold for consumption in Canada and 367,329 tons for export to the United States.

It had been anticipated during the early part of the year that the production of pyrites during 1918 would considerably exceed that of the previous year, but labour shortage, transportation difficulties high costs of supplies and other causes prevented this realization.

The principal shipments were obtained as usual from the same sources as in previous years. In Quebec, practically the same tonnage of cupriferous ores was shipped from the Eustis and Weedon mines in the Eastern Townships. In Ontario the largest shippers for export were the mines at Goudreau on the Algoma Central Railway in Michipicoten district and at North Pines on the Canadian National Railway, northwest of Port Arthur. Mines shipping for domestic consumption were the Helen in Michipicoten, the Sulphide, Queensboro, Craig, Clyde Lake and Bannockburn in Central Ontario; additional trial shipments of car lots were made from three other properties. In British Columbia shipments were made from the Sullivan mine at Kimberley to the sulphuric acid plant at Trail and from Anyox to the acid plant at Barnet, B.C.

Customs records show exports of pyrites during 1918 as 240,453 tons valued at \$949,067 as compared with exports in 1917 of 279,646 tons valued at \$974,200. These figures are much less than those reported directly by the operators and it is possible that some of the exports from Quebec may be entered as a copper ore.

Exports of sulphuric acid during 1918 were 11,199,200 pounds valued at \$165,579, as against 18,955,100 pounds valued at \$197,888 in 1917. Imports of brimstone, or crude sulphur in 1918 were 97,062 tons valued at \$2,058,811 as compared with 82,445 tons valued at \$1,515,309 imported in 1917. Imports of sulphuric acid in 1918 were 5,954 tons valued at \$208,288, as against imports in 1917 of 216 tons valued at \$15,680.

SALT.

In 1918 for the first time since 1907 the quantity of salt sold from Canadian salt wells shows a falling off as compared with the previous year. The total sales in 1918 including the salt equivalent of brine used for chemical manufacturing were 131,727 tons valued at \$1,285,039 as against sales in 1917 of 138,909 tons valued at \$1,047,792. Notwithstanding the decrease of 7,182 tons or 5 per cent in quantity, the total value of the sales it will be noted, shows an increase of \$237,247, or 22.6 per cent. These values as far as possible exclude the value of packages. The value of packages used in 1918 was \$574,033 and in 1917 \$403,879. By grades the production in 1918 included: table and dairy 34,324 tons; common fine 53,908 tons; common coarse 41,454 tons; and land salt 2,041 tons. The production by grades in 1917 was: table and dairy 34,252 tons; common fine 65,117 tons; common coarse 37,398 tons; and land salt 2,142.

The number of men employed in 1918 was 302; wages paid \$286,781 while in 1917 the number of men employed was 309 and wages paid \$249,073.

The Canadian production was obtained as usual entirely from the salt field in southern Ontario. Some years ago there was a small production from brines near Sussex, New Brunswick and at lake Winnipegosis in Manitoba. A deposit of rock salt of considerable thickness is being opened up in the neighbourhood of Malagash, Cumberland county, Nova Scotia. This is the first known discovery of rock salt in the Maritime Provinces and the first in Canada to be discovered at a depth sufficiently shallow to enable it to be won economically by actual mining.¹

The exports of salt in 1918 were 893 tons valued at \$16,743. The imports of salt were 165,494 tons valued at \$1,267,169, and included: 51,450 tons of fine salt in bulk valued at \$294,676; 13,941 tons of salt in packages valued at \$156,736; and

¹ Notes on a Discovery of Rock Salt in Nova Scotia, by L. H. Cole, Mines Branch, Ottawa. *Can. Min. Journal*, January 8, 1919.

100,103 tons of salt imported from Great Britain for the use of fisheries valued at \$815,757.

The exports of salt in 1917 were 8,643 tons valued at \$94,364 and the total imports 170,810 tons valued at \$1,088,205.

The calculated consumption of salt in 1918 was 296,328 tons valued at \$2,535,465 as compared with a consumption in 1917 of 301,076 tons valued at \$2,041,633 (the value of the imported salt being that at point of origin).

Caustic soda and chloride of lime are manufactured by the Canadian Salt Company at their chemical works at Sandwich, Ont. A second plant is under construction and will shortly be completed at Amherstburg, Ont., by the Brunner, Mond Canada, Ltd., in which it is understood the first product to be manufactured will be soda ash.

The imports of salt cake (sodium sulphate) in 1918 were 34,387 tons valued at \$676,571; soda ash (sodium carbonate) 45,569 tons valued at \$1,973,641; caustic soda 6,180 tons valued at \$622,023; sal soda 5,691 tons valued at \$174,555 and of chloride of lime 4,892 tons valued at \$162,748.

CEMENT.

The total quantity of cement sold from Canadian cement mills in 1918 was 3,591,481 barrels valued at \$7,076,503, or an average of \$1.97 per barrel as compared with sales in 1917 of 4,768,488 barrels valued at \$7,724,246, or an average of \$1.62 per barrel, showing a decrease in quantity sold of 1,177,007 barrels, or 24.68 per cent, and a decrease in total value of \$647,743, or 8.38 per cent.

Sales of cement from mills in Quebec in 1918 were 1,564,360 barrels valued at \$3,003,571; in Ontario 1,220,003 barrels valued at \$1,976,815, and from Manitoba, Alberta and British Columbia 807,118 barrels valued at \$2,096,117.

The total quantity of cement made in 1918 was 3,417,660 barrels as compared with 4,987,255 barrels made in 1917, a decrease of 1,569,595 barrels, or 31.47 per cent.

Stocks of cement on hand January 1, 1918, were 1,660,406 barrels and at the end of December had been reduced to 1,480,565 barrels.

The total imports of cement in 1918 were 20,695 cwt. equivalent to 5,913 barrels of 350 pounds each, valued at \$19,851, or an average of \$3.36 per barrel, as compared with imports of 8,580 barrels valued at \$19,646, or an average of \$2.29 per barrel in 1917.

The total consumption of cement therefore, neglecting a small export was 3,603,414 barrels as compared with a consumption of 4,777,068 barrels in 1917, showing a decrease of 1,173,654 barrels, or 24.57 per cent.

Mineral Production of Canada during 1917.

(Revised.)

Product.	Quantity.	Value.	Per cent of Total.
		\$	%
<i>Metallic.</i>			
Antimony ore.	*Tons 361	22,000	.....
Cobalt metallic and contained in oxide, etc.	" 1,079,572	1,727,315	0.91
Copper, value at 27.180 cents per lb.	" 109,227,332	29,687,989	15.65
Gold.	Ozs. 735,831	15,272,992	8.05
Iron, pig, from Can. ore.	Tons 46,022	768,783	0.41
Iron ore sold for export.	" 169,252	590,696	0.31
Lead, value at 11.137 cents per lb.	Lbs. 32,576,281	3,628,020	1.91
Molybdenite, MoS ₂ , contents, valued at \$1.00 per lb.	" 288,705	288,705	0.15
Nickel, value at 40 cents per lb.	" 82,330,280	33,732,112	17.79
Platinum.	Ozs. 57	3,823	.....
Silver, value at 81.417 cents per lb.	" 22,221,274	18,091,895	9.54
Zinc, value at 8.901 cents per lb.	Lbs. 29,668,764	2,640,817	1.39
Total, metallic. ....	.....	106,455,147	56.13

Mineral Production of Canada during 1917—Concluded.

Product.	Quantity.	Value.	Per cent. of Total.
		\$	%
<i>Non-Metallic.</i>			
Actinolite.....	Tons 120	1,320	.....
Arsenic, white and in ore.....	" 2,936	669,431	0.35
Asbestos.....	" 135,502	7,183,099	3.79
Asbestic.....	" 18,279	47,284	.....
Chromite.....	" 36,725	499,682	0.26
Coal.....	" 14,046,759	43,199,831	22.78
Corundum.....	" 188	32,153	.....
Feldspar.....	" 19,462	89,826	.....
Fluorspar.....	" 1,249	68,756	.....
Graphite.....	" 3,714	402,892	0.21
Graphite (artificial).....	" 548	.....	.....
Grindstones.....	" 2,623	45,754	.....
Gypsum.....	" 336,332	831,984	0.47
Magnesite.....	" 58,090	728,275	0.38
Magnesium sulphate.....	" 929	4,645	.....
Manganese.....	" 158	14,836	.....
Mica.....	" 1,166	358,851	0.19
Mineral pigments:—			
Barytes.....	" 3,490	54,027	.....
Oxides.....	" 9,409	87,605	.....
Mineral water.....		145,814	.....
Natural gas.....	M cu. ft. 27,408,940	5,045,298	2.66
Peat.....	Tons.....		
Petroleum.....	Brls. 213,832	542,239	0.28
Phosphate.....	Tons 149	1,486	.....
Pyrites.....	" 416,649	1,610,762	0.85
Quartz.....	" 216,288	496,182	0.26
Salt.....	" 138,909	1,047,792	0.55
Talc.....	" 15,803	76,539	.....
Tripulite.....	" 600	18,000	.....
Total non-metallic.....		63,354,363	33.41
<i>Structural Materials and Clay Products.</i>			
Cement, Portland.....	Brls. 4,768,488	7,724,246	4.08
Clay products, (\$4,779,038) :—			
Brick, common.....	No. 210,630,576	1,999,465	1.06
Brick, pressed.....	" 46,408,946	653,153	0.34
Brick, paving.....	".....	.....	.....
Brick, moulded and ornamental, etc.....	".....	54,234	.....
Fireclay and fireclay products (Refractories).....	".....	326,511	0.17
Fireproofing and hollow blocks, etc.....	".....	394,733	0.21
Kaolin.....	Tons 533	9,594	.....
Pottery.....	".....	122,878	.....
Sewerpipe.....	".....	783,762	0.41
Tile, drain.....	".....	434,708	0.23
Lime.....	Bush 6,567,170	1,558,487	0.82
Sand-lime brick.....	No. 18,001,990	201,355	0.11
Sand and gravel.....	" 9,182,417	2,326,249	1.23
Slate.....	Sq. 1,422	7,789	.....
Stone, (\$3,240,147) :—			
Granite.....	".....	639,412	0.34
Limestone.....	".....	2,283,659	1.20
Marble.....	".....	55,820	0.03
Sandstone.....	".....	261,256	0.14
Total structural.....		19,837,311	10.46
Grand total.....		189,646,821	100.00

* Tons of 2,000 pounds.