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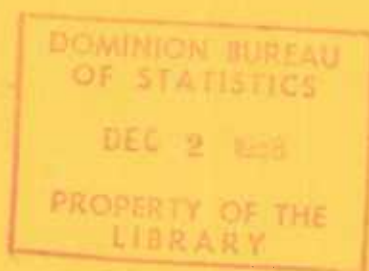
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THE MISCELLANEOUS NON-METAL
MINING INDUSTRY

1957



DOMINION BUREAU OF STATISTICS

Industry and Merchandising Division

Mineral Statistics Section

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1957

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NOTICE

The annual reports prepared by the Industry and Merchandising Division of the Bureau of Statistics are divided into 3 volumes, as follows: **Volume I** – The Primary Industries, including mining, forestry and fisheries; **Volume II** – Manufacturing; **Volume III** – Merchandising and Services. The volumes are made up of parts, and the parts in turn are subdivided according to the industries which they comprise.

Volume I consists of the following parts:

- Part I – Mineral Statistics
- Part II – Forestry Statistics – Operations in the Woods
- Part III – Fisheries Statistics

Part I includes the following reports which constitute the complete series on Mineral Statistics of Canada. Individual reports are issued as the information becomes available; they are arranged in a form suitable for binding.

- A – General Review of the Mining Industry, 50¢
- B – The Gold Mining Industry, 50¢
- C – The Silver-Lead-Zinc Mining Industry, 25¢
- D – The Nickel-Copper Mining, Smelting and Refining Industry, 25¢
- E – The Iron Mining Industry, 25¢
- F – The Miscellaneous Metal Mining Industry, 25¢
- G – The Smelting and Refining Industry, 25¢
- H – The Coal Mining Industry, \$1.00
- I – The Crude Petroleum and Natural Gas Industry, 25¢
- J – The Asbestos Mining Industry, 25¢
- K – The Feldspar and Quartz Mining Industry, 25¢
- L – The Gypsum Industry, 25¢
- M – The Peat Industry, 25¢
- N – The Salt Industry, 25¢
- O – The Talc and Soapstone Industry, 25¢
- P – The Miscellaneous Non-metal Mining Industry, 25¢
- Q – The Cement Manufacturing Industry, 25¢
- R – The Clay and Clay Products Industry, 25¢
- S – The Lime Industry, 25¢
- T – The Sand and Gravel Industry, 25¢
- U – The Stone Industry, 25¢
- V – Contract Drilling in the Mining Industry, 25¢

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SYMBOLS

The interpretation of the symbols used in the tables throughout this publication is as follows:

.. not available

... not applicable

— nil

THE MISCELLANEOUS NON-METAL MINING INDUSTRY

1957

Canadian operators which produce certain industrial or non-metallic minerals, and which are usually too few in number to permit the publication separately of complete details of operations, have been classified for statistical purposes to a group which has been designated as the Miscellaneous Non-metal Mining Industry. Minerals or primary mineral products recovered (or deposits developed) by this industry during 1957 included barite, brucite, diatomite, fluorspar, graphite, grindstones, dolomitic-magnesite, lithia, mineral waters, perlite, phosphate rock, silica brick, sodium carbonate and sodium sulphate. The general statistics also include some data on development work done on potash and pyrite deposits.

During 1957 there were 26 firms which made shipments of materials which are grouped as miscellaneous non-metallics. Gross value of the producer's shipments amounted to \$14,035,393 in 1957

compared with \$15,813,812 in the preceding year. The value of containers was included in these figures. The industry employed an average of 1,571 persons to whom \$5,673,243 were paid as salaries and wages. Fuel cost \$1,316,499 and 56,914,671 kwh. of electricity were purchased for \$593,394. Process supplies cost \$1,354,764 and the containers used were valued at \$242,896. Freight paid amounted to \$46,997.

This report also includes data for arsenious oxide, titanium dioxide, pyrite, pyrrhotite and sulphur in smelter gases; these are by-products of the metal mining and smelting industries, thus output, employment, etc., are credited to the producing industries. Also, for convenience, the statistics for the mica mining industry and for the iron oxides mining industry are published in this report, although they are not included in the figures for the Miscellaneous Non-metal Mining Industry.

TABLE 1. Principal Statistics of the Miscellaneous Non-metal Mining Industry,
Significant Years¹, 1921 - 1957

Year	Establishments	Employees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of production	Net value ² of production
	number		\$	\$	\$	\$	\$
1921 .....	..	..	..	..	..	..	..
1929	38	506	545,216	79,463	..	1,502,574	..
1931	34	275	297,394	205,149	..	1,247,697	..
1933	36	297	241,999	176,512	..	913,380	..
1937	53	530	658,723	321,919	228,953	1,687,317	1,136,445
1939	47	465	539,143	260,652	133,705	1,358,922	964,565
1941	62	683	878,700	482,043	315,521	2,442,748	1,645,184
1944	52	865	1,500,250	706,929	462,999	3,986,579	2,797,719
1946	43	911	1,582,846	822,546	493,642	4,248,107	2,859,009
1949	37	1,160	2,632,808	1,011,021	576,919	6,236,811	4,461,930
1951	39	1,359	3,699,789	1,471,290	1,063,878	8,914,360	6,209,886
1953	40	1,405	4,168,645	1,261,364	1,161,201	9,987,665	7,505,860
1954	47	1,343	4,839,822	1,419,441	1,202,247	10,421,552	7,716,472
1955	73	1,650	5,340,186	1,597,371	1,665,679	10,987,755	7,561,714
1956	60	1,773	6,069,934	2,078,573	1,936,327	15,813,812	11,692,288
1957	50	1,571	5,673,243	1,909,893	1,597,660	14,035,393	10,723,739

¹ During the years under review there have been changes in the methods of compilation. Some commodities have been added to this group and some commodities have been removed to form a separate classification.

² Gross value of production, less the value of fuel, electricity, process supplies, containers and freight.

TABLE 2. Production of Miscellaneous Non-metallic Minerals, 1956 and 1957

Item		1956		1957	
		Quantity	Value	Quantity	Value
			\$		\$
Barite	ton	320,835	3,031,034	228,048	2,992,913
Diatomite	"	2	40	120	2,400
Fluorspar	"	140,071	3,407,582	...	1,756,841
Graphite	"	—	—	—	—
Grindstones	"	—	—	—	—
Dolomitic-magnesite	—	...	2,783,181	...	3,046,298
Lithia	lb.	4,789,360	2,643,950	5,140,257	2,827,143
Mineral waters	Imp. gal.	292,526	149,867	348,710	185,167
Perlite	"	—	—	—	—
Silica brick	M	5,799	736,817	4,308	655,903
Sodium sulphate	ton	181,053	2,838,186	157,800	2,568,728
Total	—	...	15,590,657	...	14,035,393
Pyrite, pyrrhotite	ton	1,046,740	4,538,785	1,166,416	4,808,228
Sulphur ¹	"	236,590	2,323,590	235,123	2,322,067
Arsenious oxide ²	"	895	77,612	1,849	137,112
Titanium dioxide ²	"	157,374	7,682,911	186,422	9,740,570
Iron oxides	"	8,803	186,225	7,518	187,211
Mica	"	922	95,666	—	—

¹ Data for 1956 and preceding years include the sulphur contained in pyrite shipments and in smelter gases which were used to make acid or sulphur dioxide. Data for 1956 and 1957 include sulphur in smelter gases in the form of acid or sulphur dioxide. General statistics relating to production of sulphur are included with those of the metal mining and non-ferrous smelting industries.

² General statistics relating to arsenious oxide and titanium dioxide are included with the smelting industry.

Note: Value of containers is excluded.

TABLE 3. Employees and their Earnings in the Miscellaneous Non-metallic Mining Industry, 1953-1957

	Number of employees					Number of man-hours worked (all employees)	Earnings		
	Office and Administrative		Workmen		Total		Office and Administrative	Workmen	Total
	Male	Female	Male	Female					
							\$	\$	\$
1953	126	20	1, 253	6	1, 405	3, 110, 359	543, 105	3, 625, 540	4, 168, 645
1954	145	17	1, 177	4	1, 343	2, 984, 543	574, 756	4, 265, 066	4, 839, 822
1955	179	19	1, 447	5	1, 650	3, 205, 343	734, 172	4, 606, 014	5, 340, 186
1956	186	21	1, 562	4	1, 773	3, 769, 255	947, 470	5, 122, 464	6, 069, 934
1957	176	20	1, 372	3	1, 571	3, 180, 501	914, 396	4, 758, 847	5, 673, 243

TABLE 4. Workmen, by Months, in the Miscellaneous Non-metal Mining Industry, 1956 and 1957

Month	1956						1957																
	Mine			Mill		Total	Mine			Mill		Total											
	Surface		Under-ground				Surface		Under-ground														
	Male	Female		Male	Female		Male	Female		Male	Female												
number													number										
January	462	2	476	581	2	1,523	474	2	443	552	1	1,472											
February	466	2	476	560	2	1,506	450	2	443	551	1	1,447											
March	429	2	476	566	2	1,475	458	2	426	574	1	1,461											
April	423	2	469	558	2	1,454	498	2	425	557	1	1,483											
May	461	2	468	590	2	1,523	524	2	405	565	1	1,497											
June	468	2	473	598	2	1,543	496	2	403	549	1	1,451											
July	512	2	485	627	2	1,628	462	2	354	530	1	1,349											
August	522	2	498	623	2	1,647	503	2	347	515	1	1,368											
September	486	2	515	613	2	1,618	468	2	352	483	1	1,306											
October	504	2	520	560	2	1,588	442	2	314	461	—	1,219											
November	495	2	501	633	2	1,633	452	2	319	486	—	1,259											
December	507	2	492	628	2	1,631	447	2	248	439	—	1,136											
Average	479	2	488	595	2	1,566	476	2	372	524	1	1,375											
Total man-hours worked						3,419,665						3,180,501											

TABLE 5. Fuel and Electricity Used in the Miscellaneous Non-metallic Mining Industry, 1957

Kind	Quantity	Cost at plant
		\$
Bituminous coal (a) From Canadian mines	short ton	3,385
(b) Imported	"	—
Sub-bituminous coal (from Alberta mines only)	"	—
Anthracite coal	"	4
Lignite coal	"	22,614
Coke (for fuel only)	"	—
Gasoline, (includes gasoline used in cars and trucks)	Imp. gal.	298,407
Kerosene or coal oil	"	33,643
Fuel oil	"	6,455,384
Wood (cords of 128 cubic feet of piled wood)	cord	22
Gas (a) Liquefied petroleum gases (propane, etc.)	Imp. gal.	2,875
(b) Other manufactured gas	M cu. ft.	251,502
(c) Natural gas	"	503,224
Other fuel	—	—
Electricity purchased for power and lighting	kwh.	56,914,671
Electricity purchased for other purposes	"	—
Total (cost only) .....	...	1,909,893
Electricity generated (a) For own use	kwh.	5,781,674
(b) For sale	"	56,982

ARSENIOUS OXIDE

During 1957 the producers of arsenious oxide (arsenic trioxide) shipped 3,697,317 pounds valued at \$137,112. Included in the output was some arsenic which was recovered from foreign ores. The Canadian and foreign ores are mixed for treatment and separate data are not available.

Production in Ontario was at the smelter of Deloro Smelting and Refining Company Limited which treats the cobalt-silver concentrates from Cobalt and Gowganda and imported cobalt ores.

Compounds of arsenic such as lead arsenate and calcium arsenate are used in insecticides,

rodenticides and other pesticides. Other uses are: as a decolourizer in glass, as preservatives and depilatories in the tanning of hides, in the chemical debarking of trees; in pyrotechnics; and in paint pigments.

The auriferous quartz ores exported to the United States from British Columbia mines contain considerable amounts of arsenic, but no data are available on the possible recovery of this arsenic and since the Canadian gold mines receive no payment for the arsenic content, it is not credited as commercial production.

TABLE 6. Production, Imports and Exports of Arsenic, 1956 and 1957

	1956		1957	
	Quantity	Value	Quantity	Value
	lb.	\$	lb.	\$
Production:				
White arsenic (crude and refined) ¹	1,790,381	77,612	3,697,317	137,112
Imports:				
Arsenic acid	408,840	14,490	519,631	18,262
Arsenious oxide and arsenic sulphide	16,320	1,691	1,559	420
Sodium arsenate and sodium stannate	72,320	34,391	156,402	43,885
Arsenate of lead	133,671	26,161	73,056	15,421
Arsenate of lime	12,000	888	81,000	4,952
Exports:				
Arsenic ²	1,168,100	50,482	3,229,800	119,616

¹ Includes some arsenic recovered from foreign ores.

² Includes arsenic content in gold ores exported from British Columbia.

TABLE 7. Production, Imports and Exports of White Arsenic, 1948-1957

Year	Production, crude and refined, but no duplication	Imports ¹	Exports	
			Refined	Crude
pounds				
1948	1, 161, 996	84, 390	170, 800	—
1949	526, 645	256, 957	12, 400	—
1950	794, 091	16, 290	361, 400	—
1951	2, 353, 367	35, 231	1, 508, 200	334, 000
1952	1, 708, 351	19, 249	294, 800	—
1953	1, 403, 740	32, 233	934, 000	—
1954	1, 180, 350	—	1, 422, 600	—
1955	1, 571, 787	—	940, 600	—
1956	1, 790, 381	16, 320	1, 168, 100	—
1957	3, 697, 317	1, 559	3, 229, 800	—

¹ Arsenious oxide and arsenic sulphide.

TABLE 8. Consumption of Refined White Arsenic, 1952-1956

Industry	1952	1953	1954	1955	1956
	pounds				
Glass	340,631	343,279	337,071	356,211	381,547
Insecticides ¹	²	²	²	²	²
White metals	68,127	50,178	59,385	65,899	9,310
Miscellaneous chemicals	114,314	88,804	13,389	11,163	43,135
Total accounted for	523,072	482,261	409,845	433,273	433,992

¹ Does not include arsenic acid (As₂O₅) imported for use in making insecticides, as follows: 1951 - 1,664,855 pounds; 1952 - 670,303 pounds; 1953 - 1,002,424 pounds; 1954 - 1,397,596 pounds; 1955 - 847,413 pounds; 1956 - 408,840 pounds.

² Includes with miscellaneous chemicals total.

TABLE 9. World Production of White Arsenic, by Countries
(Taken from the "Minerals Yearbook", by the United States Bureau of Mines)

Country ¹	1951	1952	1953	1954	1955	1956
	short tons ²					
North America:						
Canada	1,177	854	702	590	786	1,312
Mexico	14,072	3,159	2,204	2,675	3,255	2,913
United States	16,190	15,673	10,873	13,167	10,780	12,701
South America:						
Brazil	1,456	1,062	522	1,275	1,077	³
Peru	—	17	—	105	—	—
Europe:						
Belgium (exports)	358	1,106	1,903	1,979	2,281	3,150 ⁴
France	5,844	6,934	6,217	812	6,393	³
Germany:						
West (exports)	3,862	122	675	239	635	³ 334
Greece	62	97	68	—	42	³
Italy	1,754	2,209	1,179	1,243	1,166	1,100 ⁴
Portugal	618	1,452	1,301	1,196	1,973	1,789
Spain	332	173	60	22	—	³
Sweden	20,427	17,189	569	10,762	13,803	³
United Kingdom	³	³	³	³	³	³
Asia:						
Iran ⁵	—	—	—	³	³	³
Japan	1,515	1,545	1,576	1,583	1,910	1,833
Africa:						
Rhodesia and Nyasaland, Federation of:						
Southern Rhodesia	84	568	417	459	508	1,084
Union of South Africa	—	—	—	—	—	—
Oceania:						
Australia	134	134	—	—	—	—
New Zealand	—	—	—	—	—	—
World total (estimate¹)	69,000	54,000	30,000	38,000	46,000	44,000

¹ Arsenic is also produced in Argentina, Austria, and East Germany, and estimates are included in the total. There is too little information to estimate production in China, Czechoslovakia, Finland, Hungary and U.S.S.R.

² This table incorporates revisions of data published in previous white arsenic chapters.

³ Data not available; estimate included in total.

⁴ Estimate.

⁵ Year ended March 20, of year following that stated.

BARITE

The producers of barite in Canada shipped 228,048 tons valued at \$2,992,913 in 1957 compared with 320,835 tons worth \$3,031,034 in the preceding year. Nova Scotia produced most of the nation's barite. The open pit operation is located near Walton at the head of the Bay of Fundy. Shipments are made by boat from Walton. In British Columbia barite was quarried at Brisco in the East Kootenay district, then shipped to a grinding plant at Lethbridge Alberta.

The principal use of barite is in oil-well drilling muds with bentonite and minor conditioning agents. Barite is used also as a pigment and filler in paints, rubber, linoleum, and papers; in the manufacture of barium chemicals; as an additive to glass

batches; as an aggregate in concrete where additional weight is required (such as coatings for under water pipes), or where shielding is required against radiation such as in X-ray rooms or atomic energy plants.

Barium compounds are used widely in industry. Barium carbonate is used to reduce "dry house" scum on bricks; in pharmaceuticals; as a flux in the enamelling and ceramic trades; and in heat-treatment compounds. The chloride is used as a pigment in lithographic inks; in the purification of salt brine and in water treatment; as a mordant in dyeing textiles; and in many other applications. Other compounds include the hydrate, phosphate, oxide, sulphide, stearate and chlorate.

TABLE 10. Production of Barite, 1948-1957

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1948	95,747	1,073,380	1953	247,227	2,220,292
1949	47,138	557,662	1954	221,472	2,003,796
1950	77,177	750,378	1955	253,736	2,277,166
1951	98,113	1,131,917	1956	320,835	3,031,034
1952	136,002	1,521,162	1957	228,048	2,992,913

TABLE 11. Imports of Barite, 1948-1957

Year	Tons	Value	Year	Tons	Value
		\$			\$
1948	1,263	39,613	1953	1,207	40,143
1949	934	32,269	1954	1,236	39,264
1950	2,089	70,095	1955	1,449	46,017
1951	1,068	37,471	1956	1,475	50,828
1952	1,445	44,488	1957	1,831	58,009

TABLE 12. Consumption of Barite, 1952-1956

	1952	1953	1954	1955	1956
	tons				
(a) By uses:					
Paints	1,051	1,200	1,842	963	869
Rubber goods	513	437	422	537	492
Glass	209	238	237	287	331
Oil-well drilling, estimate ¹	2,000	2,000	2,639	...	...
Miscellaneous	254	279	...	...	...
Asbestos products .....	...	...	41	39	64
Miscellaneous chemicals .....	...	...	134	96	93
Miscellaneous non-metallics .....	...	...	558	...	...
Total accounted for	3,927	4,154	5,873	...	...
(b) By provinces:					
Newfoundland	14	—	...	...	...
Nova Scotia .....	...	...	...	...	...
Quebec	838	780	1,209	...	...
Ontario	932	1,090	1,776	...	...
Manitoba	106	126	103	...	...
Saskatchewan .....	—	—	—	...	...
Alberta	1,986	2,099	2,732	...	...
British Columbia	51	59	53	...	...
Total accounted for	3,927	4,154	5,873	...	...

¹ Reported data unreliable, consumption may be as high as 10,000 tons annually.

TABLE 13. World Production of Barite, by Countries¹
 (Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1952	1953	1954	1955	1956
	short tons ²				
North America:					
Canada	136,002	247,227	221,472	253,736	307,808
Cuba (exports).....	—	4,904	—	—	—
Mexico (exports).....	12,421	63,042	56,871	117,654	235,792
United States.....	1,012,811	920,025	926,036	1,114,117	1,351,913
Total North America	1,161,234	1,235,198	1,204,379	1,485,507	1,895,513
South America:					
Argentina	17,637	16,464	16,500 ⁴	22,046	23,149
Brazil	7,605 ⁵	15,863 ⁵	6,272 ⁵	5,071 ⁵	10,426 ⁵
Chile	2,464	1,556	2,200 ⁴	2,200 ⁴	2,200 ⁴
Colombia	4,480	8,543	9,921	6,614	8,818
Peru	10,035	17,129	12,348	9,410	56,130
Total South America	42,221	59,555	47,000⁴	45,000⁴	101,000⁴
Europe:					
Austria	5,688	2,116	4,802	4,365	3,413
France	47,025	43,869	52,361	60,627	52,911
East Germany ⁴	22,000	27,600	27,600	27,600	27,600
West Germany	314,513	334,422	414,542	449,052	453,836
Greece	23,897	29,655	24,251	21,451	38,581
Ireland	2,008	—	3,031	6,173	5,500 ⁴
Italy	62,558	79,104	81,931	103,819	101,185
Portugal	685	347	385	357	330 ⁴
Spain	17,491	19,727	11,740	9,833	7,420
Sweden	—	—	108	137	—
U.S.S.R. ⁴	110,000	110,000	110,000	110,000	110,000
United Kingdom ³	78,563	77,175	81,967	92,906	86,297
Yugoslavia.....	38,381	89,457	114,640	109,129	71,000 ⁴
Total Europe^{1,4}	730,000	820,000	930,000	1,000,000	960,000
Asia:					
India	11,234	10,528	21,048	8,537	7,700 ⁴
Japan	15,687	19,350	20,815	20,578	20,374
Korea, Republic of	874	1,210	336	933	744
Philippines, Republic of	—	—	—	—	5,045
Total Asia^{1,4}	39,000	42,000	53,000	46,000	56,000
Africa:					
Algeria	12,533	18,821	21,341	33,720	32,843
Egypt	33	33	35	67	60 ⁴
French Morocco.....	3,429	55	10,246	27,170	32,622
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	299	268	—	—	—
Swaziland	445	455	362	449	516
Tunisia	28	—	—	—	—
Union of South Africa	1,894	2,092	2,342	1,892	2,713
Total Africa	18,638	21,724	34,326	63,298	68,754
Australia	5,537	6,358	7,696	7,016	6,629
World total (estimate)¹	2,000,000	2,200,000	2,300,000	2,600,000	3,000,000

¹ In addition to countries listed, barite is produced in China, Czechoslovakia, and North Korea, but production data are not available.

² This table incorporates a number of revisions of data published in previous barite chapters.

³ Includes witherite.

⁴ Estimate.

⁵ Exports.

CORUNDUM

No corundum has been produced in Canada since October, 1946, when treatment of the old tailings at the Craigmont property, Renfrew county, Ontario, for the recovery of corundum was completed. This operation was undertaken during the war at the request of the United States Government. During the two years of operation about 2,600 tons of concentrate were shipped from the Craigmont property to American abrasive Company, Westfield, Massachusetts, the only handler of corundum on the continent.

The main and only zone from which production has been obtained is in a belt 100 miles long and

6 miles wide, in Haliburton, Hastings and Penfrew counties in Ontario. Several of the numerous deposits examined in 1951 contain fair amounts of corundum, the most promising being an extensive deposit in Monteagle township on the east side of the York River, about 10 miles northeast of Bancroft. (For a description of corundum-bearing nepheline syenite belts of south and eastern Ontario, see report No. 820 "The Corundum Mineral Industry in 1945", page 53, issued by the Bureau of Mines, Ottawa.) It is doubtful, however, if the production of corundum alone would be economic and consequently marketable by-products would be necessary.

TABLE 14. World Production of Corundum, by Countries¹

(Taken from the "Minerals Yearbook" published by the United States Bureau of Mines)

Country ¹	1953	1954	1955	1956	1957
	short tons ²				
Argentina	3	3	3	3	3
Australia	—	—	10	—	—
India	363	527	149	395	142
Madagascar	—	—	—	—	—
Malaya, Federation of	—	—	2 ⁴	100 ⁴	3
Mozambique	1	1	9	—	—
Rhodesia and Nyasaland, Federation of:					
Nyasaland	—	17	20	—	—
Southern Rhodesia	843	2,840	1,168	4,448	4,506
South West Africa	—	—	—	—	—
Union of South Africa	1,865	1,443	834	2,068	1,547
World total (estimate)¹	10,000	10,000	8,000	11,000	10,000

¹ In addition to countries listed, corundum is produced in U.S.S.R., but data on production are not available and estimate is included in the total.

² This table incorporates a number of revisions of data published in previous annual reviews of corundum.

³ Data not available.

⁴ Exports.

DIATOMITE

In 1957 the producers shipped 120 tons of diatomite which was valued at \$2,400. In the preceding year the production was only 2 tons valued at \$40. All the diatomite recovered in the past two years came from deposits in British Columbia. The calcining plant in Nova Scotia was dismantled.

Diatomite, also known as diatomaceous earth and keiselguhr, consists of microscopically small, opaline silica, skeletal remains of organisms known as diatoms. The purest varieties of diatomite are chalklike in appearance, free from grit, porous, and friable and an apparent specific gravity under one when dry.

It is the physical properties of porosity and chemical inertness that account for most of the uses of diatomite. The principal uses are as a filtering

medium filler, and as an insulator against heat, cold and sound. Diatomite is important in many industries, such as sugar refining, liquor distilling, dry cleaning and water purification. For filtration the important considerations are size and shape of principal diatoms present, purity, and density of the consolidated material.

Diatomite is used as a filler in rubber, paper, asphalt products, plastics, explosives, insecticides, paints, and many other products. It is used as a concrete admixture and as the mild abrasive in metal polishes and dentrifices. Important properties of diatomite to be considered for such uses include: color, freedom from grit, low density, inertness, and particle size. Diatomite imparts bulk with little increase in weight, along with certain desirable physical properties to the end products.

It is being used successfully as insulation in a wide variety of applications, some of these being: boilers, kilns, furnaces, retorts, anens, fire-resistant safes, chill rooms, ice cellars, cold storage, and building walls. The important properties when used as insulation are porosity and structure and freedom from solid impurities.

Acceptance of diatomite by consumers depends mainly upon the physical properties of the mineral

in relation to its intended use. Microscopic examination can determin, in a general way, to what uses any particular material may be put.

The major Canadian use is in the manufacture of fertilizer, where it is used to coat pellets to prevent caking and sticking. The diatomite should be uncalcined, 95 per cent minus 325-mesh, with less than 5 per cent moisture content. The next major use is in filtration in sugar and brewing industries.

TABLE 15. Production of Diatomite, 1948-1957

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1948	46	1,497	1953	103	12,150
1949	60	1,703	1954	4	192
1950	49	1,665	1955	16	352
1951	92	3,148	1956	2	40
1952	28	1,074	1957	120	2,400

TABLE 16. Consumption of Infusorial Earth in the Sugar Refining Industry, 1948-1957

Year	Tons	Value	Year	Tons	Value
		\$			\$
1948	2,865	167,259	1953	1,944	128,658
1949	2,871	187,508	1954	1,871	126,414
1950	2,989	205,856	1955	2,094	158,960
1951	2,322	169,743	1956	2,196	165,026
1952	2,020	132,796	1957 ¹	—	—

¹ Not yet available.

TABLE 17. Consumption of Diatomaceous Earth in the Manufacture of Fertilizers, 1952-1956

Year	Tons	Value
		\$
1952	7,683	371,124
1953	8,643	427,881
1954	9,384	448,533
1955	9,166	429,149
1956	8,648	427,684

TABLE 18. Exports of Diatomaceous Earth, 1948-1957

Year	Tons	Value	Year	Tons	Value
		\$			\$
1948	17,050	512,115	1953	19,350	670,610
1949	16,914	551,954	1954	19,373	664,016
1950	18,247	599,216	1955	22,158	788,503
1951	21,069	709,433	1956	21,078	888,090
1952	15,888	563,950	1957	25,288	1,077,657

TABLE 19. World Production of Diatomite, by Countries¹
(Taken from the "Minerals Yearbook" by the United States Bureau of Mines)

Country ¹	1952	1953	1954	1955	1956
	short tons ²				
North America:					
Canada	28	103	104	16	—
Costa Rica	750	430	595	3,000	6,737
United States	302,816 ³	302,816 ³	368,426 ⁴	368,426 ⁴	368,426 ⁴
South America:					
Argentina	⁵	⁵	⁵	2,750	2,860
Chile	⁵	⁵	⁵	⁵	⁵
Europe:					
Austria	4,300	3,435	3,532	4,445	5,490
Denmark:					
Diatomite	15,023	12,454	30,337	30,000 ⁶	30,000 ⁶
Moler ^{6,7}	110,000	110,000	120,000	120,000	120,000
Finland	1,236	1,985	1,367	2,059	2,535
France	37,159	58,422	66,690	68,320	66,000 ⁶
Germany, West	52,748	55,501	59,745	67,725	72,890
Italy	10,505	11,023	11,261	11,314	13,244
Sweden	1,733	1,504	1,013	1,625	1,243
United Kingdom, Great Britain	19,040	13,974	10,778	24,656	22,000 ⁶
Northern Ireland	9,742	8,139	4,675	7,293	6,577
Asia:					
Korea, Republic of	—	—	1,377	3,393	3,912
Africa:					
Algeria	22,064	28,162	37,283	30,384	19,200 ⁶
Egypt	784	131	173	220	298
Kenya	6,644	4,903	3,649	3,304	5,418
Union of South Africa	1,190	120	1,047	850	600 ⁶
Oceania:					
Australia	7,130	4,973	6,091	5,647	4,631
New Zealand	228	115	188	623	152
World total (estimate) ¹	660,000	670,000	790,000	810,000	800,000

¹ Diatomaceous earth is believed to be produced also in Brazil, Hungary, Japan, Mozambique, Norway, Portugal, Peru, Rumania, Spain, and U.S.S.R., but complete data are not available; estimates included in total.

² This table incorporates a number of revisions of data published in previous diatomite chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.

³ Average annual production 1951-53.

⁴ Average annual production 1954-56.

⁵ Data not available; estimate.

⁶ Estimate.

⁷ A clay-contaminated diatomite used principally for light weight building brick.

FLUORSPAR

Fluorspar production in Canada decreased in 1957 to \$1,756,841 from \$3,407,582 in 1956. One of the mines in Newfoundland closed about mid-year when it completed an export contract. There are substantial reserves of fluorspar at this mine. The output from Ontario deposits increased during 1957.

In Canada fluorspar is consumed chiefly by the aluminum industry. The fluorspar is used to make hydrofluoric acid, which in turn is used to make a flux (artificial cryolite). The flux, together with a small amount of fluorspar, dissolves alumina, and from this solution aluminum is recovered electrolytically. Fluorspar finds its other major use as a flux in the steel industry. In smaller but increasing amounts, fluorspar is used in the heavy-chemical, glass, enamelling, glazing, white-metal alloy and metal-refining industries.

In the United States the largest consumer is the steel industry, which is followed by the hydrofluoric-acid manufacturers. Hydrofluoric acid is used in large amounts by the aluminum, fluorine, chemical and uranium industries. It is worth noting that despite the steel-production increase of recent years,

the rate of fluorspar consumption is growing faster in the manufacture of hydrofluoric acid than in the use of fluorspar as a flux in steel plants.

Standard fluxing gravel or lump grade for metallurgical purposes is usually sold on a specification of a minimum of 85 per cent CaF_2 and a maximum of 5 per cent SiO_2 (silica) and 0.3 per cent sulphur. Fines should not exceed 15 per cent.

Ceramic or glass and enamel grades call for not less than 94 per cent CaF_2 with a maximum 3.5 per cent CaCO_3 (calcium carbonate), 3 per cent SiO_2 and 0.1 per cent Fe_2O_3 (ferric oxide). The material must be in mesh sizes ranging from coarse to extra fine.

Acid grade has the most rigid specifications. It must be over 97 per cent CaF_2 and not over 1 per cent SiO_2 . Like ceramic grade, it is used in powdered form.

Exports of fluorspar in 1956 amounted to 78,380 tons valued at \$1,941,500 and in 1957 the exports were 23,630 tons valued at \$590,750.

TABLE 20. Production of Fluorspar, 1948-1957

Year	Short tons	Selling value f.o.b. works	Year	Short tons	Selling value f.o.b. works
		\$			\$
1948	11,340	344,834	1953	88,569	2,670,585
1949	64,477	1,592,908	1954	118,969	2,987,026
1950	64,213	1,553,004	1955	128,114	2,708,437
1951	74,211	2,189,875	1956	140,071	3,407,582
1952	82,187	2,523,408	1957 .....	...	1,756,841

TABLE 21. Imports of Fluorspar, 1948-1957

Year	Tons	\$	Year	Tons	\$
1948	48,925	1,105,190	1953	20,161	546,915
1949	2,510	81,650	1954	16,240	382,935
1950	1,572	66,823	1955	21,774	518,002
1951	8,188	239,120	1956	28,148	690,779
1952	22,714	684,968	1957	14,547	377,706

TABLE 22. Consumption of Fluorspar, 1952-1956

	1952	1953	1954	1956	1956
	tons				
(a) By uses:					
Steel	22,576	22,730	16,002	18,610	18,979
Glass	642	672	757	592	669
Enamelling and glazing	131	152	85	97	—
Heavy chemicals	45,399	59,556	63,751	68,592	76,452
White metal alloys	—	6	15	36	26
Total accounted for	68,748	83,116	80,610	87,927	96,126
(b) By provinces:					
Nova Scotia	9,477	10,071	7,765	7,808	6,268
Quebec	42,546	57,077	61,338	65,888	74,086
Ontario	16,242	15,566	11,082	13,721	15,241
Manitoba	370	247	255	317	295
Alberta	63	100	103	123	191
British Columbia	50	55	67	70	45
Total accounted for	68,748	83,116	80,610	87,927	96,126

TABLE 23. World Production of Fluorspar, by Countries¹
(Taken from the "Minerals Yearbook" by the United States Bureau of Mines)

Country ¹	1952	1953	1954	1955	1956	1957
	short tons ²					
North America:						
Canada	82,187	88,569	118,969	128,114	140,071	68,463
Mexico (exports)	198,680	173,163	146,198	200,220	360,117	389,807
United States (shipments)	331,273	318,036	245,628	279,540	329,719	328,872
Total North America	612,140	579,768	510,795	607,874	829,907	787,142
South America:						
Argentina (shipments)	7,882	8,000 ³	14,308	14,991	12,983	16,500 ³
Bolivia (exports)	88	21	213	569	300	...
Brazil	—	—	487 ⁴	—	—	—
Total South America	7,970	8,000³	15,008	15,560	13,283	16,500³
Europe:						
Belgium	5	5	5	5	5	5
France	78,836	69,702	81,788	94,863	89,287	88,185
Germany, East ⁵	90,000	90,000	90,000	90,000	90,000	90,000
Germany, West	161,566	177,719	190,916	170,816	160,937	154,323
Italy	63,546	83,544	85,041	110,694	136,675	158,915
Norway	750	777	488	317	193	331
Spain	68,899	56,426	81,032	73,653	81,281	88,200 ³
Sweden (sales)	4,926	4,773	4,140	1,459	976	1,100 ³
United Kingdom	84,922	88,624	92,607	96,235	102,536	104,467
Total Europe³	560,000	575,000	630,000	645,000	665,000	690,000
Asia:						
Japan	4,356	7,206	6,771	5,738	8,911	8,404
Korea, Republic of	6,121	12,139	9,360	11,105	3,431	5,644
Turkey	277	110	—	—	—	—
U.S.S.R. ^{3,6}	90,000	90,000	110,000	110,000	165,000	165,000
Total Asia^{1,3}	110,000	140,000	170,000	180,000	245,000	245,000
Africa:						
French Morocco	3,642	3,188	1,188	11	170	—
Rhodesia and Nyasaland, Federation of:						
Southern Rhodesia	—	373	120	480	943	97
South West Africa	4,870	5,641	3,063	675	—	24
Tunisia	2,723	2,249	—	—	—	—
Union of South Africa	11,343	16,029	21,996	32,839	35,065	35,106
Total Africa	22,578	27,480	26,367	34,005	36,178	35,227
Oceania: Australia	96	373	21	316	834	305
World total (estimate)^{1,2}	1,300,000	1,330,000	1,350,000	1,485,000	1,790,000	1,775,000

¹ In addition to countries listed, fluorspar is produced in China and North Korea. Estimates are included in the total.² This table incorporates a number of revisions of data in previous fluorspar chapters.³ Estimate.⁴ Exports.⁵ Data not available; estimates included in total.⁶ U.S.S.R. in Europe included in U.S.S.R. in Asia as deposits are predominantly in Asiatic Russia.

GARNET

No production of garnet was reported in 1957 in Canada. There was intermittent production during 1940-1950 from a deposit near River Valley in Dana township, Ontario. The ore was crushed and concentrated at the firm's mill located at Sturgeon Falls.

The garnet group of minerals are aluminum silicates containing variable amounts of iron, magne-

sium, manganese calcium and chromium. They are common constituents of many rocks, particularly metamorphic types, and some beach sands.

Garnet is used for making abrasive-coated papers and cloth, which in turn are used mainly in the wood-working and shoe-leather industries. Garnet flour of superfine grade is used as a partial substitute for corundum flour for polishing optical lenses.

GRAPHITE

During 1957 there was no production of natural graphite. There have been no production since the Black Donald Mine in Renfrew county, Ontario closed in 1954. In recent years there was some development work done on properties in eastern Ontario and in Quebec.

Graphite has many uses, but is employed principally in foundry facings, lubricants, crucibles, re-ports and stoppers, packings, pencils and crayons, paints and stove polish. Important quantities, mostly amorphous or artificial, are used in dry batteries, electrodes and commutator brushes. Flake from the Black Donald deposit is too small for crucible use

and finished products consist mainly of amorphous foundry grades, but include high-grade fine flake and dust sold for use in lubricants, packings and polishes. Prepared facings for the domestic foundry trade also are made.

In Canada, graphite is used chiefly in the foundry, dry battery, packings, lubricants and paint trades. Foundry needs are met in part by domestic production, and in part by plumbago from Ceylon. The battery trade uses mainly Mexican amorphous, and paint requirements are filled largely by low-grade amorphous flake. American imports of Canadian graphite are used chiefly in foundry facings, lubricants and pencils.

TABLE 24. Producers' Shipments of Graphite, 1946-1957

Year	Short tons	\$	Year	Short tons	\$
1946	1,975	180,405	1951	1,569	231,167
1947	2,398	207,364	1952	2,040	255,732
1948	2,539	239,931	1953	3,466	366,528
1949	2,147	212,496	1954	2,463	254,534
1950	3,586	390,815	1955-1957	—	—

TABLE 25. Imports and Exports of Graphite¹, 1955-1957

	1955	1956	1957
	\$	\$	\$
Imports:			
Plumbago, notground	64,793	87,926	74,089
Crucibles, plumbago, and covers	202,864	260,000	237,333
Plumbago, ground, and manufactures of	561,394	815,384	748,732
Exports:			
Graphite, crude and refined	761	200	160
Carbon and graphite electrodes	2,945,511	2,802,932	3,666,570

¹ Includes artificial graphite.

TABLE 26. Available Data on the Consumption of Graphite, 1952-1956

	1952	1953	1954	1955	1956
	pounds				
By industries:					
Polishes and dressings	45,415	20,859	22,164	22,536	19,810
Paints	138,379	108,870	104,703	109,994	173,520
Brass and copper products	75,495	46,747	48,096	39,846	45,385
Electrical apparatus	700,619	586,397	711,235	1,369,345	616,828
Heavy chemicals	617,644	635,134	496,753	687,303	754,042
Boilers and platework	11,130	6,699	7,021	8,185	16,780
Steel ingots and castings	2,048,000	2,208,000	1,074,000	1,616,000	2,216,000
Farm implements	8,100	5,412	2,700	10,739	—
Railway rolling stock	165,278	103,911	419,598	77,800	256,041
Machinery	144,085	100,717	118,212	178,246	77,095
Iron castings	609,155	755,041	506,081	803,313	1,014,378
Cooking and heating equipment	33,128	28,769	38,036	29,353	7,229
Ferro-alloys	358,000	484,000	6,100,000	...	...
Asbestos products	473,882	28,678	14,439	28,714	34,678
Explosives	2,896	23,269	42,188	2,822	3,165
Miscellaneous non-metallics	113,556	435,740	192,952	419,951	487,382
Miscellaneous iron and steel	144,537	51,586	168,827	53,103	178,630
Miscellaneous non-ferrous .....	...	10,917	538	725	...
Petroleum refining .....	...	...	77,090	62,800	...
Machine tools .....	...	...	6,900	5,500	5,000
Clay products .....	...	...	...	200,000	250,000
Miscellaneous chemicals .....	...	...	...	...	784
Total for above industries	5,689,299	5,640,746	10,151,533	5,726,275	6,156,747
By provinces:					
Newfoundland	} 11,601	9,537	5,372	3,628	4,560
Nova Scotia					
New Brunswick	2,119	4,986	5,151	996	1,893
Quebec	943,936	1,220,558	1,166,692	1,226,110	1,177,615
Ontario	4,341,686	4,126,939	8,704,037	3,563,490	4,567,547
Manitoba	122,856	35,783	118,835	216,659	150,293
Saskatchewan	2,765	4,300	400	2,195	2,080
Alberta	41,580	18,300	17,650	565,516	161,391
British Columbia	222,756	220,343	133,396	147,681	91,368
Total accounted for	5,689,299	5,640,746	10,151,533	5,726,275	6,156,747

TABLE 27. World Production of Natural Graphite, by Countries

(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1952	1953	1954	1955	1956	1957
	short tons ²					
North America:						
Canada	2,040	3,466	2,463	—	—	...
Mexico	26,623	33,433	24,013	32,342	32,655	25,938
United States	5,606	6,281	s	s	s	s
South America:						
Argentina	s	s	s	2	572	550 ⁴
Brazil	938	648	1,008	859	579	550 ⁴
Europe:						
Austria	21,728	16,185	19,184	19,637	20,597	20,860
Czechoslovakia	s	s	s	s	s	s
Germany, West	9,880	8,222	10,448	11,556	12,878	13,200 ⁴
Italy	4,837	5,731	4,165	2,595	3,262	3,649
Norway	4,542	3,255	3,993	5,970	5,562	5,500 ⁴
Spain	863	352	451	349	331	304
Sweden	—	—	—	309	440	440 ⁴
U.S.S.R.	s	s	s	s	s	50,000 ⁵
Yugoslavia	757	—	—	1,033	—	—
Asia:						
Ceylon (exports)	8,578	8,084	8,655	11,064	10,312	9,172
Hong Kong	—	220	2,061	1,722	2,734	3,703
India	2,405	859	1,657	1,807	1,650 ⁴	1,650 ⁴
Japan	5,126	4,488	4,515	3,385	3,757	5,278
Korea, Republic of	16,601	21,416	15,344	99,228	67,367	162,703
Taiwan (Formosa)	772	—	—	—	2,285	s
Africa:						
Egypt	—	—	—	—	—	—
Kenya	39	205	347	241	619	1,056
Madagascar	20,368	14,847	13,284	17,443	17,451	17,600
Morocco:						
Northern Zone	13	—	—	129	137	—
Southern Zone	130	108	—	—	—	—
Mozambique	—	—	—	—	—	—
South West Africa	1,305	—	115	1,011	—	—
Tanganyika	—	21	—	—	26	—
Union of South Africa	389	413	1,396	1,829	1,862	1,750
Australia	89	17	78	24	11	s
Total world (estimate)³	205,000	200,000	185,000	290,000	270,000	230,000

¹ In addition to countries listed, graphite has been produced in China, North Korea but production data are not available; estimates included in total.

² This table incorporates a number of revisions of data published in previous graphite chapters.

³ Production included in total; Bureau of Mines not at liberty to publish separately.

⁴ Estimate.

⁵ Data not available; estimate included in total.

GRINDSTONES, PULPSTONES AND SCYTHESTONES

Sandstone beds in Nova Scotia, New Brunswick and British Columbia contain material suitable for grindstones. The output is only from the New Brunswick coast where the stones are removed along the

shore area of the Bay of Chaleur. There were 10 tons of grindstones valued at \$1,500 shipped in 1955, but none has been reported since.

TABLE 28. Production of Grindstones, Pulpstones and Scythestones, 1948 - 1957

Year	Tons	\$	Year	Tons	\$
1948	220	20,100	1953	15	900
1949	195	12,450	1954	—	—
1950	100	10,000	1955	10	1,500
1951	60	6,000	1956	—	—
1952	42	5,720	1957	—	—

TABLE 29. Purchases of Pulpstones by the Canadian Pulp and Paper Industry, 1948 - 1956

Year	Number for 2 ft. wood	Value \$	Number for 2.5 ft. wood	Value \$	Number for 4 ft. wood	Value \$
1948	201	146,328	38	34,339	127	372,453
1949	105	102,685	26	29,650	95	295,664
1950	136	101,029	12	8,773	124	378,050
1951	107	111,295	25	34,251	155	511,676
1952	82	104,718	11	21,057	179	605,840
1953	100	107,291	16	33,503	160	588,329
1954	78	120,549	18	41,158	201	703,596
1955	83	130,247	15	35,464	168	665,581
1956	109	152,475	15	37,517	200	841,206

IRON OXIDES

The shipments of ochreous iron oxides in 1957 amounted to 7,518 tons valued at \$187,211 compared with 8,803 tons valued at \$186,225 in 1956. All production came from deposits in Quebec.

The ochreous iron oxide used in the manufacture of paints is largely in the calcined form. However, a small quantity of natural iron oxides associated with clay-like materials in the form of umbers and siennas is also used as pigments in paints, both in the raw and calcinated state.

Iron oxide pigments are used also as colouring agents and fillers in the manufacture of imitation leather, shade cloth, shingle stain, paper and cardboard. Siennas and umbers are used in wood stains and wood fillers. The natural ochre is used as a pigment for linoleum and oilcloth; as a pigment in wood stains and wood fillers; and in colouring cement, stuccos and mortar.

A portion of iron oxide mined in Quebec was used for the purification of illuminating gas.

TABLE 30. Principal Statistics of The Natural Iron Oxides Industry, Significant Years, 1921-1957

Year	Estab- lish- ments	Em- ployees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of products	Net value of production ¹
	number		\$	\$	\$	\$	\$
1921	4	32	42,693	10,858	..	93,610	..
1929	4	48	47,324	13,564	..	115,932	..
1931	4	30	29,194	8,560	..	49,205	..
1933	4	22	15,631	5,755	..	53,450	..
1937	6	50	35,368	13,368	510	83,640	69,762
1939	7	38	26,916	8,094	100	88,418	80,224
1941	4	44	42,152	15,697	5,697	142,069	120,675
1944	6	55	49,876	19,115	6,700	150,250	112,765
1946	5	60	77,727	16,656	4,200	152,268	116,251
1949	8	44	73,111	20,692	4,424	207,887	167,481
1951	5	43	87,283	22,896	3,651	262,277	219,852
1953	4	37	83,095	23,776	2,250	195,801	152,958
1954	3	31	67,564	21,322	3,904	186,856	150,871
1955	4	33	71,781	21,931	3,931	165,928	121,772
1956	3	29	49,669	6,055	545	191,145	152,400
1957	3	26	64,011	22,402	450	192,388	141,288

¹ Gross value of production, less the value of fuel, electricity, process supplies, containers and freight.

TABLE 31. Production of Natural Iron Oxides, 1948-1957

Year	Quantity	Value	Year	Quantity	Value
	short tons	\$		short tons	\$
1948	13,181	203,391	1953	10,308	195,801
1949	13,625	207,887	1954	5,798	183,507
1950	13,696	262,632	1955	7,702	162,512
1951	13,342	262,277	1956	8,803	186,225
1952	11,487	194,922	1957	7,518	187,211

TABLE 32. Imports and Exports of Ochres and Colours, 1956 and 1957

	1956		1957	
	Quantity	Value	Quantity	Value
	tons	\$	tons	\$
Imports:				
Ochres, ochrey earths, siennas and umbers	1,162	90,773	946	75,309
Oxides, fireproofs, rough stuff, fillers and colours, dry, n.o.p.	6,237	3,600,975	4,826	3,352,422
Exports:				
Iron oxides	3,203	448,432	3,440	397,484

TABLE 33. Consumption of Iron Oxides in Specified Canadian Industries, 1951-1956

Year	Coke and gas		Paints and varnishes			
			Iron oxide pigments		Ochres, siennas and umbers	
	Quantity	Value	Quantity	Value	Quantity	Value
	tons ¹	\$	tons	\$	tons	\$
1951	10,310	105,709	2,946	467,059	249	50,851
1952	8,302	81,822	2,442	406,781	227	49,738
1953	7,989	85,579	2,456	450,031	243	54,180
1954	9,167	100,240	2,190	389,588	212	52,691
1955	6,835	70,675	2,298	407,762	221	55,745
1956	8,745	89,107	2,166	430,797	220	52,053

¹ Oxide and purifying materials.

TABLE 34. Employees and Their Earnings in the Natural Iron Oxides Industry, 1953-1957

	Number of employees					Number of man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and administrative	Workmen	Total
	Male	Female	Male	Female					
							\$	\$	\$
1953	1	1	35	—	37	72,008	6,273	76,822	83,095
1954	2	1	28	—	31	55,327	9,661	57,903	67,564
1955	1	1	31	—	33	55,934	7,473	64,308	71,781
1956	1	1	27	—	29	44,056	7,473	42,196	49,669
1957	1	1	16	—	18	56,185	8,460	55,551	64,011

TABLE 35. Workmen in the Natural Iron Oxides Industry, by Months, 1956 and 1957

Month	1956			1957		
	Quarry	Mill	Total	Quarry	Mill	Total
	Male	Male		Male	Male	
	number					
January	2	18	20	2	114	16
February	2	17	19	2	18	20
March	2	17	19	2	17	19
April	3	6	9	1	13	14
May	13	18	31	8	18	26
June	12	18	30	12	19	31
July	12	18	30	10	17	27
August	13	19	32	14	22	36
September	12	20	32	14	20	34
October	14	18	32	12	16	28
November	14	17	31	8	19	27
December	14	15	29	—	13	13
Average	10	17	27	7	17	24
Man-hours of labour			40,056			52,185

LITHIA

During 1957 the producers of lithia shipped 5,140,257 pounds valued at \$2,827,143 compared with 4,789,380 pounds worth \$2,643,950 in 1956. These figures on quantities are the lithia or lithium oxide content of spodumene concentrates exported for processing.

Lithium compounds find their most important applications in the ceramic industry and in the manufacture of lubricating greases. Practically all lithium concentrates are converted chemically to

lithium carbonate or hydroxide, the usual basic compounds used in industry. For chemical processing, the only specification available is for the spodumene that Quebec Lithium Corporation is exporting. Four and a half per cent lithia is required as a minimum in the concentrate. However, practically all producers of lithium compounds either own or have a share in mining properties from which they obtain concentrates; standard specifications have, therefore, not been established and grades are a matter of individual negotiation.

Lithium greases, first evolved in 1943, came to play an important role in lubrication wherever operational extremes of temperature were experienced, as they maintain their lubricating qualities between -60°F and $+320^{\circ}\text{F}$ and, moreover, have excellent water-insolubility characteristics. In wartime, lithium greases were invaluable for aircraft engines. Since the war their industrial use has grown rapidly, as their unique properties make possible the production of multi-purpose greases, simplifying both manufacture and application.

In ceramics, lithia serves primarily as a flux, permitting the development of low-temperature ceramic bodies with the attendant benefits of refractoriness, fuel economies and wider colour use. It also makes possible the production of glass transparent to ultraviolet light for use in germicidal lamps. Lithium compounds reduce the maturing temperature and increase the fluidity and gloss of glass, glazes and enamels, facilitate production of certain glasses of high electrical resistance and have many other desirable effects that render them of great benefit in the field of ceramics.

Lithium as a metal has so far had limited application. Its principal use appears to be as a scavenger of impurities in refining non-ferrous metals and as a grain-refining agent. Only very small amounts are added for these purposes. Lithium alloys of magnesium, aluminum, copper, lead and zinc

are under development and have promise. The Aluminum Company of America announced during the year the development of a lithium-aluminum alloy which will maintain high strength up to 400°F .

The use of lithium in nuclear-energy production and as a source of fuel for rockets and guided missiles has received much publicity, and speculation as to its exact function has been widespread. Little information is available in either case, but from scientific publications it has become generally known that tritium, a reported constituent of the hydrogen bomb, is obtained by bombarding the lithium-6 isotope with neutrons. The association of lithium with solid fuels is in the form of lithium hydride. The chemical compound furnishes a readily available source of hydrogen, which is a high-energy fuel.

Other common applications include the use of lithium hydroxide as a constituent of the electrolyte in alkaline storage batteries; of lithium chloride and bromide in air-conditioning units, and in refrigeration systems; of lithium fluoride as a flux in the welding and brazing of aluminum; and of compounds in the production of single-crystal optical units, in the control of reactions leading to the formation of alkyd resins for use in paints and in the manufacture of dry-cell batteries which will function at extremely low temperatures where normal cells are inoperative.

TABLE 36. Producers' shipments of Lithia, 1954 - 1957

Year	Pounds	Value \$	Year	Pounds	Value \$
1954	17,052	6,300	1956	4,789,380	2,643,950
1955	162,512	114,376	1957	5,140,257	2,827,143

MAGNESITE AND BRUCITE

Dolomitic magnesite is quarried at Kilmar, Argenteuil county, Quebec, by Canadian Refractories Limited, and is processed there into basic refractory products. These include dead burned grain material, bricks and shapes (burned and unburned), and finely-ground refractory cements.

Brucitic limestone, a rock composed of granules of the mineral brucite (magnesium hydroxide) thickly distributed throughout a matrix of calcite, is quarried from large deposits near Wakefield, Quebec,

by Aluminum Company of Canada, Limited, and is processed there for the recovery of magnesia and lime. The magnesia was used in part by the company for making magnesium metal at Arvida, Quebec, but the major part of the output is sold for the manufacture of basic refractories and for use as soil conditioner. Hydrated lime, the co-product, is produced in the process of recovering the magnesia and is sold for the various purposes for which lime is used.

TABLE 37. Production of Magnesitic Dolomite, 1948 - 1957

Year	Value \$	Year	Value \$
1948	1,587,709	1953	2,016,640
1949	1,536,200	1954	1,909,163
1950	1,717,879	1955	2,151,820
1951	2,148,940	1956	2,783,181
1952	2,161,472	1957	3,046,298

Note: Above figures include the value of brucite shipped, dead burned magnesitic dolomite and serpentine used or sold.

TABLE 38. Magnesite and Dolomite Used in the Canadian Primary Iron and Steel, 1952 - 1956

Year	Calcined dolomite		Dolomite, crude		Magnesite	
	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$
1952	37,129	870,888	343,241	780,777	24,472	1,506,382
1953	66,586	1,562,163	400,923	817,999	14,184	821,769
1954	48,266	1,165,247	355,505	673,437	9,940	546,026
1955	86,420	2,118,600	388,535	711,310	10,353	619,131
1956	95,703	2,407,384	422,888	803,730	10,784	676,943

TABLE 39. World Production of Magnesite, by Countries¹
(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1953	1954	1955	1956	1957
	short tons ²				
North America:					
United States	553,147	284,015	486,088	686,569	678,489
Total^{1,3}	880,000	760,000	720,000	990,000	970,000
South America:					
Brazil ³	11,000	11,000	11,000	11,000	11,000
Venezuela	—	—	—	—	—
Total³	11,000	11,000	11,000	11,000	11,000
Europe:					
Austria	895,971	925,006	1,093,173	1,194,502	1,292,567
Czechoslovakia	4	4	4	4	4
Germany, West	—	—	—	—	—
Greece	117,879	114,410	66,980	71,650	71,650 ³
Italy	2,269	3,348	4,527	5,448	8,512
Norway	2,049	915	874	880 ³	880 ³
Spain	16,653	32,399	29,973	26,891	42,355
Yugoslavia	168,121	153,572	129,114	214,260	233,983
Total^{1,3}	3,100,000	3,100,000	3,200,000	3,400,000	3,500,000
Asia:					
Cyprus (exports)	22	—	—	—	—
India	103,878	78,968	64,470	102,717	96,161
Korea, Republic of	—	—	—	—	—
Turkey	386	1,174	—	937	998
Total^{1,3}	340,000	420,000	530,000	570,000	670,000
Africa:					
Egypt	—	—	—	—	—
Kenya	—	—	—	—	117
Rhodesia & Nyasaland, Federation of:					
Southern Rhodesia	10,824	7,792	11,610	8,611	2,910
Tanganyika (exports)	64	87	367	272	284
Union of South Africa	25,229	26,874	19,753	33,485	35,414
Total	36,117	34,753	31,730	42,368	38,725
Oceania:					
Australia	51,965	48,331	64,595	72,447	88,200 ³
New Zealand	579	807	434	818	770
Total	52,544	49,138	65,029	73,265	88,970³
World total (estimate)^{1,2}	4,400,000	4,400,000	4,600,000	5,100,000	5,300,000

¹ Unless otherwise stated, quantities in this table represent crude magnesite mined. In addition to countries listed, magnesite is also produced in Canada, China, Mexico, North Korea, Poland and U.S.S.R., but data on tonnage output are not available; estimates.

² This table incorporates a number of revisions of data published in previous Magnesium Compounds chapters.

³ Estimate.

⁴ Data not available; estimate included in total.

TABLE 40. Calcined Magnesite Used by the Artificial Abrasives Industry, 1952-1956

Year	Tons	Value \$
1952	2,396	288,941
1953	3,644	412,281
1954	4,271	511,683
1955	N. A.	589,825
1956	3,639	440,559

MAGNESIUM SULPHATE

Natural hydrous magnesium sulphate (Epsom salts or Epsomite) occurs in deposits in lake bottoms or in solution in brine lakes in British Columbia. In Saskatchewan it is found associated with sodium sulphate. Attempts have been made to produce refined salts, and a number of years ago there was a considerable production from several of the "lakes" in British Columbia. Experimental shipments have been made also from one of the lakes in Saskatchewan.

Canada's output of magnesium sulphate has come chiefly from a deposit in Basque, British Columbia, production from which was discontinued in the autumn of 1942. The salt was refined at Ashcroft, 15 miles south of the deposit, and the grade of the product was high. The refinery, now owned by Ashcroft Salts Company, Limited, had a capacity of 10 tons of salt a day. There are a number of other occurrences in British Columbia, near Clinton, north of Kamloops, and in Kruger's Pass, south of Penticton.

In Saskatchewan two lakes south of Wiseton contain brines high in magnesium sulphate, and

Muskiki Lake, just north of Dana, contains brine high in magnesium and sodium sulphates, which at certain times of the year crystallizes into a bedded deposit with layers of both salts.

In the chemical industries Epsom salts has many uses. It is employed for tanning and in dyeing, and for textile and medicinal use. Magnesium sulphate is used in the paper industry for weighting paper. In the sole leather industry it is used to obtain a clean shiny cut, and it also helps to retain moisture in the leather and increases its weight. Magnesium salt is used to a small extent in the dyeing industry. In some cases it is used in the treatment of leather to increase the fastness of the colour in washing. It is used extensively and in large quantities in medicine and for various purposes in the manufacture of textiles. In bleaching wool, magnesium sulphate is added to destroy the corrosive effect of sodium peroxide. It is also used for weighting textile fabric, especially silk. Mixed with gypsum and ammonium sulphate, it is used in the manufacture of non-inflammable fabrics.

TABLE 41. Production of Natural Magnesium Sulphate¹, 1941-1957

Year	Tons	Value \$
1941	265	7,343
1942	1,140	38,760
1943-1957	—	—

¹ Produced entirely in British Columbia.

TABLE 42. Imports of Magnesium Sulphate, 1948-1957

Year	Tons	Value \$	Year	Tons	Value \$
1948	2,797	118,792	1953	2,761	80,885
1949	2,783	120,881	1954	2,365	70,374
1950	2,793	100,644	1955	2,376	69,009
1951	3,065	95,005	1956	2,614	69,517
1952	2,186	76,419	1957	2,558	71,295

TABLE 43. Available Data on Consumption of Magnesium Sulphate, 1952-1956

Industry	1952	1953	1954	1955	1956
	tons				
Leather tanneries	582	642	515	534	533
Medicinals	622	649	488	505	568
Fertilizers	50	471	21	30	43
Textiles	—	—	9	1	—
Total accounted for	1,254	1,762	1,033	1,070	1,194

MICA

Amber mica or phlogopite is mined in Quebec and Ontario. The major portion of the output is derived from Quebec mines. Muscovite production

is from Ontario mines. The mica obtained from the schist rock in British Columbia is included for statistical purposes in the muscovite class.

TABLE 44. Principal Statistics of the Mica Mining Industry, Significant Years, 1921-1957

	Estab- lish- ments	Em- ployees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of production	Net value ¹ added
	number		\$	\$	\$	\$	\$
1921	20	104	74,432	4,404	..	70,063	..
1929	14	83	47,362	355	..	118,549	..
1931	11	28	22,556	444	..	54,066	..
1933	15	41	25,007	80	..	49,284	..
1937	34	199	97,547	3,768	13,778	133,731	116,185
1939	61	224	112,653	7,570	11,444	147,321	128,307
1941	81	246	181,800	17,705	21,824	335,288	295,759
1944	70	178	359,797	23,586	33,038	841,026	784,402
1946	27	129	153,616	20,308	17,778	199,039	160,953
1949	34	96	115,667	14,490	6,026	108,458	87,942
1951	31	138	182,033	14,580	18,148	447,650	414,922
1953	44	105	152,284	14,811	11,540	161,128	134,777
1954	32	44	59,194	7,778	6,154	85,139	71,207
1955	33	31	42,495	6,491	5,157	78,375	66,727
1956	23	23	37,673	4,796	4,045	97,049	88,208
1957	25	47	66,283	5,585	7,411	113,458	100,462

¹ Gross value of production, less the value of fuel, electricity, process supplies, containers and freight.

TABLE 45. Mica Production (Primary Sales), by Classes, 1956 and 1957

Grade	1956		1957	
	Pounds	Total value f.o.b. shipping point	Pounds	Total value f.o.b. shipping point
		\$		\$
Rough, mine-run or rifted	40,826	841	2,577	1,085
Mica sold for mechanical splitting	16,000	4,160	65,612	17,946
Splittings	2,000	3,480	16,385	3,568
Ground or powdered	1,493,410	58,083	911,138	37,226
Scrap, mine or shop waste and mica mined and sold for grinding	269,220	2,461	243,193	4,252
Trimmed mica	22,355	26,641	40,165	47,231
Unspecified	—	—	3,346	275
Total mica shipments	1,843,811	95,666	1,282,416	111,583
Varieties:				
Phlogopite mica (amber) and biotite	1,663,803	94,396	1,265,929	107,642
Muscovite mica (white) and schist	180,008	1,270	16,487	3,941

TABLE 46. Production of Mica, by Provinces and by Varieties, 1957

Province	Phlogopite and biotite		Muscovite and schist		Total	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
Quebec	1,191,500	105,310	—	—	1,191,500	105,300
Ontario	74,429	2,332	16,487	3,941	90,916	6,273
British Columbia	—	—	—	—	—	—
Total Canada	1,265,929	107,642	16,487	3,941	1,282,416	111,573

TABLE 47. Production of Mica, 1948 - 1957

Year	Short tons	\$	Year	Short tons	\$
1948	3,951	219,948	1953	1,133	161,128
1949	1,745	108,458	1954	853	85,139
1950	1,940	252,611	1955	820	77,541
1951	2,481	447,650	1956	922	95,666
1952	1,007	194,106	1957	641	111,583

TABLE 48. Imports and Exports of Mica, 1955 - 1957

	1955		1956		1957	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
Imports:						
Mica, unmanufactured	198,900	105,810	324,900	200,779	501,900	234,004
Mica, manufactures of, n.o.p. ....	...	482,853	...	538,227	...	438,782
Exports:						
Mica, scrap and waste	313,000	4,060	119,500	3,236	184,700	6,403
Mica splittings	—	—	—	—	—	—
Mica manufactures .....	...	42	...	1,919	...	11,400
Mica, rough, untrimmed	2,000	195	24,500	6,059	87,500	28,666
Mica, trimmed	46,900	41,318	41,800	39,981	66,000	79,266
Mica, ground	900	45	92,000	5,520	24,000	1,455
Total mica exports reported .....	...	45,660	...	56,715	...	127,190

TABLE 49. Consumption of Mica, in Specified Industries, as Reported to The Annual Census of Industry, 1952 - 1956

	1952	1953	1954	1955	1956
	pounds				
By industries:					
Paints	1,503,321	1,686,228	1,802,747	1,721,152	1,652,031
Electrical apparatus	520,957	498,433	473,352	492,589	515,960
Rubber goods	308,795	364,685	322,247	484,985	543,940
Roofing	782,000	836,000	674,000	480,000	1,220,000
Paper goods	98,000	62,500	56,000	38,000	494,000
Asbestos .....	...	...	...	26,157	16,800
Non-metallic mineral products	62,203	106,801	85,000	101,219	79,719
Cencrete products .....	...	...	...	4,700	...
Miscellaneous	148,795	231,674	16,502	8,102	2,360
Total accounted for	3,424,071	3,786,321	3,429,848	3,356,904	4,524,810
By provinces:					
Quebec	1,553,133	1,669,777	1,772,025	1,701,766	1,662,528
Ontario	1,358,778	1,517,168	1,214,578	1,361,430	1,779,940
Manitoba	11,222	9,883	8,455	13,392	14,556
Alberta	—	—	—	—	762,000
British Columbia	500,938	589,493	434,790	280,316	305,786
Canada	3,424,071	3,786,321	3,429,848	3,356,904	4,524,810

TABLE 50. World Production of Mica by Countries¹
 (Taken from the "Minerals Yearbook" published by the United States Bureau of Mines)

Country ¹	1953	1954	1955	1956	1957
	thousands of pounds ²				
North America:					
Canada (sales): Block	280	71	57	79	1,426
Splittings	9	2	—	2	
Ground	666	937	944	1,493	
Scrap	1,312	699	639	269	
United States (sold or used): Sheet	849	669	642	888	690
Scrap	146,518	162,146	190,884	172,618	184,956
Total	149,634	164,524	193,146	175,349	187,072
South America:					
Argentina: Sheet	540	529	99	322	310 ³
Scrap			139	2	—
Brazil	4,347	3,962	3,051	2,926	3,100 ³
Uruguay	2	—	—	—	—
Total	4,889	4,491	3,289	3,250	3,410
Europe:					
Austria	—	—	—	—	—
Italy	—	—	—	—	—
Norway, including scrap	2,185	3,968	3,086	2,646	2,205
Spain	29	260	443	227	26
Sweden: Block	7	4	—	—	—
Ground	379	331	368	392	400 ³
Total^{1,3}	58,000	60,000	60,000	60,000	60,000
Asia:					
Ceylon	13	—	4	—	—
India (exports): Block	3,840	3,609	4,802	6,065	67,983
Splittings	12,211	10,855	16,479	14,663	
Scrap	11,444	23,031	25,699	27,282	
Taiwan (Formosa): Sheet	53	44	—	29	11
Scrap					
Total^{1,3}	32,000	48,600	62,400	63,500	90,000
Africa:					
Angola: Sheet	42	24	33	53	46
Scrap and splittings	243	362	518	968	844
Kenya	—	—	—	—	—
Madagascar (phlogopite): Block	115	101	62	77	2,100 ³
Splittings	1,684	1,056	534	1,109	
Morocco:					
Sheet	4	11	—	—	—
Scrap	29	18	—	—	—
Mozambique, including scrap	7	2	29	26	66
Rhodesia and Nyasaland, Federation of:					
Northern Rhodesia, sheet	18	7	4	7	4
Southern Rhodesia: Block	148	183	141	123	71
Scrap	201	—	—	—	—
South West Africa (scrap)	—	—	—	—	—
Tanganyika (exports): Block	165	174	146	128	150
Ground	—	—	—	—	—
Scrap	115	62	613	280	—
Uganda	—	—	—	—	—
Union of South Africa: Sheet	11	4	11	4	2
Scrap	4,284	4,107	7,818	5,038	4,226
Total	7,062	6,111	9,911	7,809	7,505
Oceania: Australia⁵	1,069	1,316	1,054	1,087	1,371
World total (estimate)^{2,3}	255,000	285,000	330,000	310,000	350,000

¹ In addition to countries listed, mica is also produced in China, Korea, Rumania and U.S.S.R., but data on production are not available; estimates are included in total.

² This table incorporates a number of revisions of data published in previous mica chapters.

³ Estimate.

⁴ Less than 0.5 ton.

⁵ These figures include the following tonnages of damourite produced in South Australia, in thousands of pounds: 1953: 996; 1954: 1,151; 1955: 977; 1956: 1,058; 1957: 1,294.

TABLE 51. Employees and their Earnings in the Mica Mining Industry, 1953-1957

Year	Number of employees					Number of man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and adminis- trative	Workmen	Total
	Male	Female	Male	Female					
							\$	\$	\$
1953	3	2	69	31	105	205,419	8,396	143,888	152,284
1954	1	1	36	6	44	77,423	3,550	55,644	59,194
1955	1	—	28	3	32	44,117	3,600	38,895	42,495
1956	1	—	22	—	23	39,322	3,600	34,073	37,673
1957	2	—	32	13	47	78,251	4,500	61,783	66,283

TABLE 52. Workmen in the Mica Mining Industry, by Months, 1956 and 1957

Month	1956				1957				
	Mine	Mill or shop		Total	Mine		Mill or shop		Total
	Male	Male	Female		Male	Female	Male	Female	
	number								
January	14	5	—	19	9	—	1	—	10
February	14	5	—	19	9	—	1	1	11
March	12	5	—	17	9	—	5	4	18
April	13	5	—	18	15	—	10	7	32
May	16	9	—	25	32	3	11	9	55
June	18	8	—	26	32	3	14	16	65
July	19	7	—	26	43	3	10	15	71
August	10	9	—	19	43	3	8	10	64
September	10	9	—	19	37	3	8	10	58
October	11	7	—	18	42	3	6	9	60
November	8	6	—	14	27	—	9	8	44
December	10	5	—	15	14	—	5	3	22
Average	15	7	—	22	26	2	7	8	43
Total man-hours worked	37,122				75,951				

NATURAL MINERAL WATERS

Most of the bottled natural mineral waters are obtained from springs in Quebec. Among the larger producers are Orange Crush Limited at Varennes, Sources Abenakis Ltée at St-Francois du Lac, Eau Minerale Naturelle St-Leon at St-Leon and Usine d'Embouteillage Maski Enrg. at St-Justin.

The directory at the end of this bulletin gives the location of other springs of natural mineral waters.

There were 9 firms reporting production of natural mineral waters in Canada in 1957. Eight of these firms were in Quebec and 1 in Ontario.

TABLE 53. Shipments of Natural Mineral Waters from Canadian Springs, 1948 - 1957

Year	Quebec		Ontario		Canada	
	Imp. gal.	Value	Imp. gal.	Value	Imp. gal.	Value
		\$		\$		\$
1948	190, 136	109, 789	2, 400	470	192, 539	110, 259
1949	304, 216	145, 830	2, 475	410	306, 691	146, 240
1950	316, 654	158, 457	2, 175	440	318, 829	158, 897
1951	322, 800	146, 521	2, 500	450	325, 300	146, 971
1952	309, 125	165, 593	2, 370	440	311, 495	166, 033
1953	309, 285	165, 334	300	150	309, 585	165, 484
1954	282, 078	147, 307	2, 000	750	284, 078	148, 057
1955	303, 110	158, 495	3, 573	2, 015	306, 683	160, 510
1956	290, 526	148, 167	2, 000	1, 700	292, 526	149, 867
1957	346, 210	183, 155	2, 500	2, 012	348, 710	185, 167

PERLITE

Perlite is a volcanic glass characterized by a concentric "onion skin" fracture and usually a 2 to 5 per cent water content. When heated rapidly in a furnace it expands into a frothy material of low density.

Commercially-expanded perlite is granular material and is generally white. Because of its cellular nature it is light in weight and has good insulating and sound-proofing qualities. Expanded perlite is used chiefly in lightweight concrete aggregates, insulating and sound-proofing pre-cast wallboard, and in lightweight plaster. A sack of

expanded perlite containing 3 cubic feet weighs approximately 30 to 36 pounds.

Development work has been done on deposits of perlite at Francois Lake, British Columbia, about eighteen miles by road from Burns Lake on the C.N.R. Other deposits have been found in British Columbia at Empire Valley northwest of Clinton.

Shipments of 1,112 tons of perlite valued at \$11,120 were made from the British Columbia deposits to the expanding plant of Western Gypsum Products Ltd., Calgary, Alberta, during 1953. There was no production reported since.

PHOSPHATE

Phosphate in the form of apatite was mined in Canada on a fairly substantial scale up to 1895, but since then the production has been small and spasmodic. In 1951 about 6 tons were shipped but there were no shipments in subsequent years.

For many years, the Electric reduction Company Limited, Buckingham, Québec, has purchased most of the small output for use in the production of

elemental phosphorus and various phosphorus compounds. This company, however, obtains most of its phosphate rock requirements from Florida. That state and Montana supply the great bulk of the phosphate rock which Canada imports for the manufacture of fertilizer, occasional shipments being obtained also from North Africa. Rock low in fluorine is obtained from Curacao, Netherlands West Indies, for use in stock feeds.

TABLE 54. Production of Phosphate Rock, 1947-1957

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1947	—	—	1952	—	—
1948	—	—	1953	—	—
1949	20	291	1954	—	—
1950	129	1,070	1955	—	—
1951	6	94	1956-1957	—	—

TABLE 55. Imports of Phosphate Rock, 1948-1957

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1948	482,008	2,911,168	1953	576,500	3,951,318
1949	620,808	3,879,523	1954	644,860	4,577,633
1950	491,026	3,296,341	1955	588,209	4,512,833
1951	499,711	3,178,899	1956	627,648	5,185,597
1952	470,913	3,130,306	1957	723,220	5,897,784

TABLE 56. Consumption of Phosphate Rock, 1952-1956

	1952	1953	1954	1955	1956
	tons				
(a) By uses:					
Fertilizers	418,495	416,714	506,241	465,129	417,910
Chemicals	65,394	78,408	100,642	97,716	109,524
Steel and iron	—	532	1,081	128	276
Refractories	—	—	—	—	—
Stock and poultry feeds	17,615	15,986	19,582	21,919	24,596
Miscellaneous	9,582	450	515	434	340
Total	511,086	512,090	628,061	585,326	552,646
(b) By provinces:					
Prince Edward Island	489	410	476	319	278
Nova Scotia					
New Brunswick	433	674	509	455	631
Quebec	127,330	122,206	148,254	140,602	160,536
Ontario	93,197	89,694	105,507	106,579	97,484
Manitoba	846	798	1,031	765	802
Saskatchewan	289	165	208	311	240
Alberta	607	625	697	655	6,604
British Columbia	287,895	297,518	371,379	335,640	286,071
Canada	511,086	512,090	628,061	585,326	552,646

TABLE 57. World Production of Phosphate Rock, by Countries¹
 (Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1953	1954	1955	1956	1957
thousand long tons					
North America:					
United States	12,504	13,821	12,265	15,747	13,976
West Indies:					
Jamaica (guano)	1	1	'	'	'
Netherlands Antilles (exports)	95	124	109	104	105
Total	12,600	13,946	12,374	15,851	14,081
South America:					
Brazil	12 ⁴	64 ⁴	123 ⁴	123 ⁴	123 ⁴
Chile (apatite)	58	41	52	58	54 ⁴
(guano)	30 ⁴	30 ⁴	30 ⁴	30 ⁴	30 ⁴
Peru	257	289	285	331	280
Venezuela	—	—	—	30	30
Total⁴	357	424	490	572	517
Europe:					
Belgium	35	26	19	13	16
France	86	117	101	66	69 ⁴
Spain	22	22	23	8	1
Sweden (apatite)	9	—	—	—	—
U.S.S.R.: Apatite ⁴	2,760	3,100	3,445	3,690	3,940
Sedimentary rock ⁴	1,205	1,330	1,425	1,575	1,720
Total^{1,4}	4,370	4,850	5,260	5,600	6,000
Asia:					
British Borneo (guano)	1	1	'	'	'
China ⁴	150	200	250	250	300
Christmas Island (exports) (Indian Ocean)	280	351	390	341	336
India (apatite)	4	2	6	9	9
Indonesia	1	6	6 ⁴	6 ⁴	6 ⁴
Israel	23	54	84	118	148
Jordan	39	74	161	205	258
Philippines (guano)	1	2	'	8	4
Total^{1,4}	510	710	910	960	1,080
Africa:					
Algeria	609	761	746	596	596
Egypt	477	526	636	605	590 ⁴
French West Africa (aluminum phosphate)	93 ⁶	77 ⁶	111 ⁶	72 ⁶	89 ⁶
Madagascar	2	1	2	3	3 ⁴
Morocco	4,090	4,940	5,245	5,435	5,480
Seychelles Islands (exports)	9	12	4	4	6
South West Africa (guano)	2	1	2	1	3
Tunisia	1,691	1,795	2,067	2,644	2,035
Uganda	5	3	3	3	3
Union of South Africa	79	93	134	154	166
Total	7,057	8,209⁴	8,944	8,917	8,970⁴
Oceania:					
Angaur Island (exports)	111 ⁴	122	137	—	—
Australia	3	6	6	7	10 ⁵
Makatea Island (French Oceania) (exports)	247	225	216	250	300
Nauru Island (exports)	1,160	1,178	1,401	1,333	1,105
Ocean Island (exports)	282	292	309	297	292
Total	1,803	1,823	2,069	1,887	1,707
World total (estimate)^{1,2}	26,750	29,950	30,050	33,750	32,350

¹ In addition to countries listed a negligible amount is produced in Angola, British Somaliland, Canada, Japan, Southern Rhodesia and Tanganyika. Estimate for Austria, Ireland, North Korea and Poland are included in the total.

² This table incorporates a number of revisions of data published in previous chapters.

³ Less than 500 tons.

⁴ Estimate.

⁵ Exports.

⁶ Includes calcium phosphate, production of which is reported in thousand long tons as follows: 1953, 41; 1954, 5; 1955, 5; 1956, 5; 1957, 1.

POTASH

There was no commercial production of potash in Canada during 1957. In recent years many millions of dollars have been expended in developing the extensive potash deposits in Saskatchewan. Core drilling has indicated that these beds of sylvite and carnallite extend westward from the Manitoba

border through the Saskatoon area to Unity, a distance of nearly 400 miles. Firms which are experienced potash producers were sinking shafts to mine these deposits which lie at depths of from 2,550 to 3,500 feet.

TABLE 58. World Production of Potash (marketable, unless otherwise stated) in Equivalent K₂O, by Countries¹, 1953-1957, in Short Tons²

(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1953	1954	1955	1956	1957
North America:					
United States	1,911,891	1,948,721	2,066,706	2,171,584	2,266,481
Crude (including Brines) ³	2,098,736	2,170,969	2,326,946	2,479,463	2,498,558
South America:					
Chile	330	550	11,000	12,000	11,000 ⁴
Europe:					
France	996,575	1,192,087	1,310,961	1,462,722	1,529,000 ⁴
Crude ³	1,135,657	1,361,734	1,490,764	1,653,465	1,736,800
Germany: East ⁴	1,488,000	1,488,000	1,580,000	1,593,000	1,650,000
Crude ^{3,4}	1,720,000	1,720,000	1,320,000	1,340,000	1,900,000
West	1,459,309	1,783,394	1,870,848	1,823,221	1,862,000
Crude ³	1,742,752	2,134,072	2,226,666	2,166,039	2,212,000
Spain	202,764	243,166	242,539	256,525	282,800 ⁴
U.S.S.R. ⁴	430,700	593,700	870,500	983,600	1,040,000
Asia:					
Israel	3,415	12,000 ⁴	12,000 ⁴	31,000 ⁴	50,000 ⁴
Japan	283	454	461	475	440 ⁴
Africa: Eritrea	—	—	—	—	—
Oceania: Australia	—	—	—	—	—
World total (marketable estimate)¹	6,500,000	7,300,000	7,900,000	8,300,000	8,700,000

¹ In addition to countries listed, China, Ethiopia, Italy and Korea, are reported to produce potash salts, but statistics of production are not available; estimates included in totals.

² This table incorporates a number of revisions of data published in previous potassium salts chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.

³ To avoid duplication of figures, data on crude potash are not included in the total.

⁴ Estimate.

PYRITE, PYRRHOTITE

Pyrite and pyrrhotite are by-products which are produced from the processing of the metal sulphide ores of Noranda, Quemont, Waite Amulet, Normetal, West MacDonald, East Sullivan and Weedon Pyrite Mines in Quebec and Britannia mine in British Columbia. Buchans mine in Newfoundland shipped pyrite to the paper mills in that province. At Kimberley the waste iron sulphides are used to produce acid for the fertilizer plant. Shipments of pyrite were made to pulp and paper mills and chemical plants in Canada and abroad. Pyrite mined in the Beaverlodge area of Saskatchewan is used to pro-

duce acid which is used in the treatment of uranium ores.

At Port Robinson, Ontario the pyrite and pyrrhotite concentrates from Noranda Mines are treated to produce sulphur dioxide which is sold to acid plant and the iron residue is sold as feed for iron and steel furnaces. At Copper Cliff a plant of the International Nickel Co. of Canada Ltd. treats pyrrhotite, containing some nickel, to produce iron oxide pellets and nickel carbonate. It is expected that the sulphur content of the pyrrhotite will be recovered.

TABLE 59. Producers' Shipments Pyrite and Pyrrhotite, 1948-1957

Year	Gross weight	Sulphur content	Value	Year	Gross weight	Sulphur ¹ content	Value
	tons		\$		tons		\$
1948	184,070	87,126	412,988	1953	408,257	186,650	1,450,698
1949	250,476	117,581	596,154	1954	687,928	311,159	2,663,499
1950	312,614	150,487	682,810	1955	878,452	403,986	3,740,383
1951	444,948	215,363	1,556,510	1956	1,046,740	473,605	4,538,785
1952	553,987	263,241	2,245,713	1957	1,166,416	515,096	4,808,228

¹ Data for 1952-1955 include sulphur content of acid made from roasting zinc sulphide concentrates at Arvida.

TABLE 60. World Production of Pyrites (Including Cupreous Pyrites), by Countries¹

(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1953		1954		1955		1956	
	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content
	long tons ²							
North America:								
Canada	364,515	166,651	517,856	277,820	739,968	355,185	483,928	232,274
Cuba	50,000 ³	24,200 ³	118,105	56,690	127,497	62,473	65,230	31,832
United States	922,647	379,545	908,715	405,310	1,006,943	409,826	1,069,904	431,687
South America: Brazil	...	...	...	...	...	...	...	...
Europe:								
Austria	69	26	...	...	...	...	...	...
Finland	255,095	108,263	248,528	105,310	298,064	126,963	289,440	127,554
France	293,293	132,395	294,612	135,264	300,176	126,074	299,054	125,603
Germany; West	506,375	180,073	556,480	193,868	579,796	206,021	634,241	253,405
Greece	233,576	102,000 ³	206,503	90,200 ³	229,127	100,000 ³	232,274	102,200
Italy	1,215,072	546,827	1,231,193	562,988	1,291,212	592,494	1,349,384	634,225
Norway	733,095	332,105	782,362	343,697	830,453	361,776	827,327	364,158
Poland .....	...	...	...	...	...	...	...	...
Portugal	709,810	288,385	641,803	258,822	724,693	297,071	659,200	355,968
Spain	1,773,374	860,000	1,864,233	913,100	2,289,606	1,099,000 ³	2,247,258	1,078,700 ³
Sweden	382,848	189,178	392,896	193,563	387,852	191,009	485,672	238,950
United Kingdom	10,244	4,134	7,011	2,756	5,514	2,165	5,514	2,165
Yugoslavia	170,271	77,000 ³	159,718	71,800 ³	223,103	116,014	251,906	130,990
Asia:								
Cyprus	994,345	477,342	1,103,367	529,500	1,318,363	632,800 ³	1,603,340	769,700 ³
India	277	120 ³	...	...	800	300 ³	...	...
Japan	2,306,260	963,938	2,635,564	1,106,281	2,692,939	1,131,034	2,955,846	910,135
Korea, Republic of	765	350 ³	...	...	...	...	...	...
Philippines	1,945	680	5,205	2,080	30,296	13,600	...	...
Taiwan (Formosa)	24,892	8,961	23,857	9,543	28,559	10,700	29,914	11,122
Turkey ⁴	22,727	11,300 ³	33,935	16,928	16,137	8,100 ³	18,793	9,400 ³
Africa:								
Algeria	29,290	12,915	33,012	14,668	21,328	9,380	5,968	2,507
French Morocco	2,005	799	1,537	575	4,007	600	1,524	600 ³
Rhodesia and Nyasaland Federation of:								
Southern Rhodesia	36,086	15,517	36,387	15,283	21,268	8,933	18,674	7,843
Tunisia .....	...	...	...	...	...	...	...	...
Union of South Africa	92,362	38,259	225,534	86,809	351,650	137,882	429,964	163,400 ³
Oceania: Australia	167,008	77,812	206,780	97,649	223,477	105,837	187,212	88,138
Total (estimate)⁵ ..	1,340,000	5,640,000	14,400,000	6,000,000	16,000,000	6,700,000	16,300,000	6,800,000

¹ In addition to countries listed, China Czechoslovakia East Germany Kenya Korea and U.S.S.R. produce or have produced pyrites, but production data are not available; estimates are included in total.

² This table incorporates a number of revisions of data published in previous Sulphur and Pyrites chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.

³ Estimate.

⁴ Data not available; estimate included in total.

SILICA BRICK

The manufacture of silica brick for refractory use was confined to the plants of the Dominion Steel and Coal Company, Limited, Sydney, Nova Scotia, and the Algoma Steel Corporation Limited,

Sault Ste-Marie, Ontario. The brick manufactured by both these firms are processed from crushed silica rock and are utilized in furnace construction and repairs.

TABLE 61. Production of Silica Brick, 1948-1957

Year	M	Value	Year	M	Value
		\$			\$
1948	3,464	393,821	1953	3,720	712,271
1949	3,663	453,797	1954	3,578	465,157
1950	3,126	408,813	1955	4,763	602,625
1951	3,510	465,229	1956	5,799	736,817
1952	3,544	606,394	1957	4,308	655,903

Note: Quantities are shown as 9" equivalent.

SODIUM CARBONATE (NATURAL)

Deposits of natural sodium carbonate in the form of "natron" (sodium carbonate with 10 molecules of water) and of brine occur in a number of small "lakes" throughout the central part of British Columbia, chiefly in the Clinton mining division and in the neighbourhood of Kamloops. As the deposits are far from the main eastern Canadian mar-

kets, production is restricted to the requirements of consumers within economical rail haul.

Sodium carbonate has many industrial uses, notably in the manufacture of glass and soap, in the purification of oils, in the production of aluminum, in the flotation of minerals, in the refining of metals and in the production of caustic soda.

TABLE 62. Production of Sodium Carbonate (Natural), 1945-1957

Year	Tons	Value	Year	Tons	Value
		\$			\$
1945	286	3,146	1950	—	—
1946	—	—	1951	—	—
1947	163	1,793	1952	—	—
1948	—	—	1953	—	—
1949	47	513	1954-1957	—	—

SODIUM SULPHATE (NATURAL)

All the natural sodium sulphate produced in Canada was obtained from the brine lakes in Saskatchewan. Producers shipped 157,800 tons valued at \$2,568,728 in 1957 compared with 181,053 tons valued at \$2,838,186 in the preceding year.

Sodium sulphate occurs as crystals or in the form of highly concentrated brines in many lakes and deposits throughout Western Canada. From

these, hydrated sodium sulphate, known as Glauber's salt, and anhydrous sodium sulphate, known to the trade as "salt cake", are produced in Canada.

Glauber's salt is used widely in the chemical industries and the demand is increasing. Sodium sulphate is used chiefly in the sulphate process for the manufacture of kraft pulp. It is used in the glass, dye and textile industries, and to a smaller extent for medicinal purposes and for tanning.

TABLE 63. Principal Statistics of the Sodium Sulphate Mining Industry, Significant Years, 1921 - 1957

Year	Estab- lish- ments	Em- ployees	Salaried and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of production	Net value ¹ of production
	number		\$	\$	\$	\$	\$
1921	2	..	..	..	..	18,850	..
1929	3	29	46,637	32,038	..	64,112	..
1931	5	83	101,026	144,512	..	267,863	..
1933	7	116	92,065	135,546	..	485,416	..
1937	6	122	153,181	159,673	26,459	618,028	431,896
1939	7	102	136,416	146,692	32,917	628,151	448,542
1941	7	125	193,298	231,964	50,128	931,554	649,462
1944	6	158	264,004	253,043	39,722	987,842	695,077
1946	4	167	251,887	254,450	66,423	1,118,783	797,910
1949	5	212	492,277	399,355	58,891	1,616,631	1,158,385
1951	5	225	671,878	662,601	113,806	2,391,813	1,615,406
1953	4	157	478,374	291,639	77,923	1,685,148	1,315,586
1954	4	173	553,911	449,207	78,819	2,394,473	1,866,447
1955	5	235	824,393	577,842	124,552	2,805,507	2,093,113
1956	5	207	721,432	600,182	175,828	2,841,816	2,065,806
1957	5	180	628,876	469,756	84,663	2,574,152	2,014,309

¹ Gross value of production, less the value of fuel, electricity, process supplies, containers and freight.

TABLE 64. Production of Natural Sodium Sulphate, 1948 - 1957

Year	Short tons	Selling value f.o.b. shipping point	Year	Short tons	Selling value f.o.b. shipping point
		\$			\$
1948	153,698	2,136,276	1953	115,565	1,631,258
1949	120,259	1,614,731	1954	158,417	2,385,573
1950	130,730	1,615,867	1955	178,888	2,799,715
1951	192,371	2,388,770	1956	181,053	2,838,186
1952	122,590	1,708,807	1957	157,800	2,568,728

TABLE 65. Production of Manufactured Sodium Sulphate¹, 1946 - 1957

Year	Salt cake		Year	Salt cake	
	Tons	Value		Tons	Value
		\$			\$
1946	2,584	33,333	1951	3,297	72,206
1947	3,175	51,047	1952	2,382	54,956
1948	3,198	69,876	1953	2,345	59,793
1949	3,738	83,996	1954 - 1957 .....	..	..
1950	3,674	74,555			

¹ Salt cake produced as a by-product is not included.

TABLE 66. Imports of Sodium Sulphate, 1948-1957

Year	Salt cake		Glauber's salt	
	Tons	Value	Tons	Value
		\$		\$
1948	12,394	240,228	1,472	52,212
1949	4,294	65,722	1,996	59,959
1950	15,705	201,260	2,256	62,996
1951	19,432	340,740	3,234	102,930
1952	19,576	313,739	4,577	122,294
1953	32,802	516,863	5,493	150,263
1954	30,235	482,652	5,134	144,979
1955	29,928	574,440	3,888	131,447
1956	30,319	558,656	2,768	91,330
1957	28,086	511,457	1,512	50,527

TABLE 67. Exports of Sodium Sulphate, 1948-1957

Year	Long tons	Value	Year	Long tons	Value
		\$			\$
1948	26,439	468,561	1953	17,975	298,374
1949	18,830	294,367	1954	58,972	1,039,284
1950	25,335	302,329	1955 ¹	67,762	1,263,911
1951	56,416	735,902	1956 ¹	60,579	985,801
1952	24,236	382,274	1957 ¹	37,023	593,390

¹ Source: "Trade of Canada, Exports"—quantity is shown in short tons.

Note: Exports from Canada were not recorded separately prior to 1955 in the official trade statistics of Canada, but the imports into the United States from Canada are shown as above in the "U.S. Imports for Consumption of Merchandise" by the U.S. Department of Commerce.

TABLE 68. Available Data on Consumption of Sodium Sulphate (Salt Cake) in Canada, by Industries, 1952-1956

Industry	1952	1953	1954	1955	1956
			short tons		
Pulp and paper	113,322	125,332	134,533	137,575	156,698
Glass, including glass wool	1,976	2,662	2,276	2,722	2,922
Medicinals	25	20	17	37	54
Soaps	1,463	1,504	1,264	1,555	1,335
Total accounted for	116,786	129,518	138,090	141,889	161,009

TABLE 69. Employees and their Earnings in the Sodium Sulphate Mining Industry, 1953-1957

Year	Number of employees					Number of man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and administrative	Workmen	Total
	Male	Female	Male	Female					
							\$	\$	\$
1953	12	—	144	1	157	341, 265	56, 296	422, 078	478, 374
1954	12	2	158	1	173	335, 078	45, 670	508, 241	553, 911
1955	18	2	214	1	235	544, 272	93, 012	731, 381	824, 393
1956	19	3	184	1	207	439, 105	100, 812	620, 620	721, 432
1957	19	2	159	—	180	353, 219	104, 569	524, 307	628, 876

SULPHUR

Native sulphur deposits of commercial grade have not been found in Canada, but large tonnages of metal sulphide ores are smelted. In smelting these ores sulphur dioxide gas is produced, some of which is recovered to make sulphuric acid or liquid sulphur dioxide. At Trail, British Columbia the sulphur dioxide generated by smelting lead-zinc sulphide ores is converted into sulphuric acid. At Copper Cliff, Ontario, the Canadian Industries Limited uses the smelter gases from the International Nickel plant to make sulphuric acid and sulphur dioxide. Zinc sulphide concentrates are shipped to Arvida where the concentrates are calcined to produce sulphur dioxide which is used to make sulphuric acid. The roasted material is exported to smelters for the recovery of zinc and other metals.

Sour natural gas in Alberta contains varying percentages of hydrogen sulphide. Before the distribution of natural gas the hydrogen sulphide is removed and it is converted into elemental sulphur. Statistical data for these operations are included in the manufacturing industries under sub-group classification of absorption gasoline industry.

TABLE 70. Sulphur in Smelter Gases 1948-1956

Year	Quantity	Value	Year	Quantity ¹	Value
	tons	\$		tons	\$
1948	142,337	1,423,370	1953	172,200	1,722,000
1949	144,290	1,442,900	1954	221,247	2,212,470
1950	150,685	1,506,850	1955	224,457	2,244,570
1951	156,427	—	1956 ²	236,088	2,323,590
1952	160,547	1,605,470	1957 ²	235,123	2,322,067

¹ Does not include in 1952-1955 sulphur in acid made from roasting zinc sulphide concentrates at Arvida.

² Includes sulphur in acid made from zinc sulphide at Arvida.

TABLE 71. Sulphur (elemental) Made from Natural Gas 1952-1957

Year	Pincher Creek	Jumping Pound	Redwater	Turner Valley	Total
					short tons
1952	—	5,650	—	3,281	8,931
1953	—	8,954	—	9,344	18,298
1954	—	11,986	—	10,334	22,320
1955	—	17,842	—	11,251	29,093
1956	—	21,672	152	11,640	33,464
1957	58,614	27,799	2,492	11,801	100,706

TABLE 72. Imports of Sulphur, 1948-1957

Year	Tons	Value	Year	Tons	Value
		\$			\$
1948	354,622	5,528,740	1953	359,205	8,526,804
1949	280,557	5,213,921	1954	310,127	7,816,301
1950	390,333	7,730,126	1955	373,373	9,386,983
1951	395,928	8,959,677	1956	474,117	11,857,556
1952	415,185	8,376,824	1957	416,930	9,752,368

TABLE 73. Available Data on the Consumption of Sulphur (Brimstone),¹ 1952-1956

	1952	1953	1954	1955	1956
	tons of 2,000 pounds				
(a) By industries:					
Pulp and paper	290,607	258,172	268,607	300,899	313,851
Heavy chemicals	88,332	85,479	80,871	82,947	108,300
Rubber goods	2,269	2,475	2,360	2,783	2,905
Explosives	1	1	1	1	1
Medicinal .....	...	...	21	27	126
Adhesives	72	85	73	29	41
Starch	328	256	328	340	27
Fruit and vegetable preparations	5	4	5	6	7
Sugar refining	171	358	168	168	140
Petroleum refining	258	190	287	255	225
Steel and iron	95	101	50	65	86
Miscellaneous chemicals	5,464	5,329	6,155	5,591	5,473
Asbestos products	16	17	5	8	10
Miscellaneous non-metallics .....	...	...	23	24	...
Glass .....	...	...	...	6	11
Total accounted for	387,617	352,466	358,953	393,148	431,202
(b) By provinces:					
Newfoundland	17,082	18,078	20,492	20,088	21,440
Nova Scotia	6,505	6,092	5,865	6,567	6,105
New Brunswick	35,819	34,718	41,459	42,671	41,304
Quebec	136,077	111,891	110,439	124,762	136,909
Ontario	145,861	136,988	125,597	129,836	145,309
Manitoba and Saskatchewan	2,378	2,288	2,618	6,099	15,753
Alberta	91	78	201	2,344	5,660
British Columbia & Northwest Territories	43,404	42,333	52,282	60,781	58,722
Canada	387,617	352,466	358,953	393,148	431,202

¹ Included in miscellaneous chemical industry.

TABLE 74. Exports of sulphur and Pyrite, 1953-1957

Year	Pyrite	Sulphur	
	\$	tons	\$
1953	1,034,228	4,633	106,748
1954	1,566,571	3,339	90,158
1955	2,001,575	3,051	94,141
1956	2,852,753	12,364	293,042
1957	2,649,349	4,331	128,116

TABLE 75. World Production of Native Sulfur by Countries¹
(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1951	1952	1953	1954	1955	1956
	long tons ²					
North America:						
Mexico	11,375	11,784	5,900	52,407	475,487	758,415
United States	5,279,614	5,295,342	5,193,599	5,578,973	5,799,880	6,484,285
South America:						
Argentina	7,560	15,000	16,000	17,000	17,651	23,038
Bolivia (exports)	9,100	5,497	2,458	2,565	3,975	3,418
Chile	29,752	47,821	32,275	39,075	54,132	3
Colombia	2,479	2,974	2,657	5,118	5,413	4,921
Ecuador	1	2,353	100	64	1,550	—
Peru	2,251	5,066	4,916	...	...	—
Europe:						
France (content of ore)	10,905	17,692	10,710	...	...	...
Greece (content of ore)	—	—	1,200	2,507	3,600	3,600
Italy (crude) ³	197,382	232,706	224,161	200,215	176,917	170,094
Spain ⁴	6,700	4,800	5,100	5,400	6,500	5,900
Asia:						
Japan	140,181	176,652	186,556	184,745	199,676	243,312
Philippines .....	...	...	1,089	761	3,700 ⁴	—
Taiwan (Formosa)	2,732	5,001	3,423	5,873	4,854	7,864
Turkey	7,273	8,232	9,626	9,862	11,313	3,722
Total (estimate)¹	5,900,000	6,000,000	5,800,000	6,300,000	7,000,000	8,000,000

¹ Native sulphur believed to be produced also in U.S.S.R., but complete data are not available; estimates are included in the total.

² This table incorporates a number of revisions of data published in previous sulphur chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.

³ Data not available. Estimate by senior author of chapter which will appear in Minerals Yearbook, 1956, included in total.

⁴ Estimate.

⁵ In addition the following tonnages of ground sulfur rock (30 per cent) were produced and used as insecticides: 1952, 21,482 tons; 1953, 16,940 tons; 1954, 22,803 tons; 1955, 21,560 tons; 1956, 22,219 tons.

STRONTIUM MINERALS

In Ontario, several occurrences of celestite are known in the general Ottawa region, but very little mining has been undertaken for the mineral, and production has been small and intermittent.

Between 1918 and 1920, about 250 tons of white, fibrous celestite were mined from a deposit in Bagot township, Renfrew county, and after grinding in a small mill erected on the property, were sold for use in paint. The material was not very pure and contained about 18 per cent of barium sulphate. The old pit was pumped out in 1941 and a few tons of ore were scaled down from a small

drift. This, together with some stockpile material from the earlier work, was shipped to Montreal for grinding and pigment use. The property has since been idle. The above comprises the only production of strontium minerals in Canada of which there is any official record.

In British Columbia, celestite occurs near Birch Island, North Thompson River, Kamloops mining division. The deposit is reported to contain a large tonnage of ore consisting of a fine-grained inter-growth of fluor spar, celestite, feldspar, quartz, mica and pyrite.

VERMICULITE

Vermiculite, a hydrated magnesian aluminum silicate, resembles mica closely but is softer and inelastic. Colours range from black through brown and dark green to almost colourless. Its principal characteristic is its ability to expand many times on heating, and in its expanded form it possesses low bulk density, low thermal conductivity, high heat resistance, chemical inertness and acoustic properties. Vermiculite is generally regarded as a product of alteration and is usually associated with metamorphosed ultra-basic rocks.

At Perth, Ontario the Northern Vermiculite Co. Ltd. was treating some test lots of vermiculite with the expectation of commercial production in the near future.

Known deposits of vermiculite in Canada are located at Stanleyville, near Perth, Ontario and

at Blue River, Kamloops mining division, British Columbia.

The principal uses for vermiculite are loose insulation in buildings; concrete and plaster aggregate; lightweight fire-resistant and acoustic tile and wallboard; rooting medium; and soil amendment. It is also used in lubricants, dry chemicals, (as a diluent), combination refractory and insulating brick, as a pigment and extender in paint and as decorative filler in wallpaper. Vermiculite has been used as fireproof deck covering and partitions on ships, as loose insulation in fire and sound-proof partitions in vehicles and aircraft, as filler for life jackets and in finely-powdered forms, for oil-less bearings.

In 1956 there were 8 plants in Canada making insulation aggregates, etc., from imported vermiculite.

TABLE 76. World Production of Vermiculite, by Countries¹

(Taken from the "Minerals Yearbook" by the United States Bureau of Mines)

Country ¹	1952	1953	1954	1955	1956	1957
	short tons ²					
Argentina	—	—	—	551	1,323	1,100 ³
Australia	69	32	—	—	1	—
Egypt	66	100 ³	—	—	—	—
India	24	—	3	138	1,038	1,100 ³
Kenya	—	82	807	380	497	33
Morocco	—	—	—	—	—	147
Rhodesia, Nyasaland, Federation of:						
Southern Rhodesia	—	—	—	—	305	460
Union of South Africa	39,918	33,844	45,633	57,482	58,717	62,619
United States (sold or used by producers)	208,906	189,535	195,538	204,040	192,628	183,987
Total^{1,2}	248,983	223,593	241,981	262,591	254,509	249,446

¹ In addition to countries listed, vermiculite is produced in Brazil and U.S.S.R., but data are not available, and no estimates are included in the total.

² This table incorporates a number of revisions of data published in previous vermiculite chapters.

³ Estimate.

VOLCANIC DUST

Volcanic dust (pumice or pumice dust) is a natural glass or silicate, atomized by volcanic explosions and thrown into the air in great clouds which ultimately settle forming beds of varying thickness, often hundreds of miles from its source. In many instances the dust has been washed down from higher levels and redeposited by the agency of waters, in which case the beds are stratified and mixed with foreign substances. It consists of aluminum silicate (80 to 90 per cent) and of oxides and silicates of iron, sodium, magnesium, calcium, etc.

During 1924 to 1933 the annual production varied from 30 to 485 tons. There has been no production in recent years. The last recorded shipments were 50 tons in 1943.

Volcanic dust deposits have been found in Alberta, Saskatchewan and British Columbia. Pumice dust is used for concrete aggregate, acoustic plaster, cleansing compounds, paint fillers absorbents, etc.

TABLE 77. World Production of Pumice, by Countries¹
(Taken from the "Minerals Yearbook" published by the United States Bureau of Mines)

Country ¹	1953	1954	1955	1956	1957
	short tons ²				
Argentina ³	—	—	49,604	15,708	22,000 ⁴
Austria: Trass	44,100 ⁴	51,601	52,935	37,499	38,875
Egypt	761	441	181	170 ⁴	170 ⁴
France:					
Pumice	11,464	11,133	9,921	14,330	11,000 ⁴
Pozzolan	232,903	296,207	242,508	243,611	242,500 ⁴
Germany, West (marketable)	2,489,378	2,218,950	3,105,207	3,966,111	3,261,735
Greece:					
Pumice	47,179	34,409	33,069	27,558	28,000 ⁴
Santorini earth	44,092	38,581	40,234	44,000 ⁴	44,000 ⁴
Iceland	—	12,125	14,600 ⁴	19,000 ⁴	19,000 ⁴
Italy:					
Pumice	192,132	166,915	198,614	168,969	2,800,000 ⁴
Pumicite	37,148	40,400		17,196	
Pozzolan	1,392,703	1,657,290	1,452,282	2,567,280	
Kenya	—	—	—	1,831	2,319
New Zealand	2,254	9,916	8,670	8,527	16,991
Spain (Canary Islands)	612	529	944	—	—
United States (sold or used)	1,348,136 ⁵	1,647,397 ⁵	1,804,488 ⁵	1,482,214 ⁵	1,826,978 ⁵
World total (estimate)^{1,2}	5,900,000	6,200,000	7,100,000	8,700,000	8,400,000

¹ Pumice is also produced in Canada, Mexico, Japan, U.S.S.R. and a few other countries, but data on production are not available; estimates are included in total.

² This table incorporates a number of revisions of data published in previous pumice chapters.

³ Includes volcanic ash and cinders, and pozzolan.

⁴ Estimate.

⁵ Includes in 1953, 560,502 tons; 1954, 690,056 tons; 1955, 961,526 tons; 1956, 594,661 tons; and in 1957, 772,384 tons of volcanic cinder and scoria, used for railroad ballast or similar purposes.

Directory of Firms in the Miscellaneous Non-metal Mining Industry, 1957

Name of operator	Head office address	Plant or mine location
BARITE		
Nova Scotia:		
Fluor-Bar Mines Ltd. ¹	1980 Sherbrooke At. W., Montreal, Quebec	Lake Ainslie
Magnet Cove Barium Corp.	Walton	Pembroke
Quebec:		
Beach, Mahlon W. ²	Box 9, Barrie, Ontario	Woodbridge Twp.
Roy, Phillippe ²	62' L'Eveche, Rimouske	St-Fabien
British Columbia:		
Mountain Minerals Ltd.	Box 273, Lethbridge, Alberta	Brisco
Larabee Mining Exploration Ltd. ¹	221 - A - 8th Ave W. Calgary, Alta.	Athalmer
BRUCITE		
Quebec:		
Aluminum Company of Canada Ltd.	Sun Life Bldg., Montreal	Wakefield
DIATOMITE		
Nova Scotia:		
Wightman, Mrs. G.W. ²	Smith's Cove	Digby Co.
Ontario:		
P.B.S. Organic Minerals Ltd. ²	153 Sheridan Ave., Toronto	McKee Twp.
British Columbia:		
Fairey and Co.	661 Taylor St., Vancouver	Quesnel
FLUORSPAR		
Newfoundland:		
Newfoundland Fluorspar Ltd.	Bank of Montreal Bldg., St. John's	St. Lawrence
St. Lawrence Corporation of Nfld., Ltd.	120 Broadway, New York, U.S.A.	St. Lawrence
Ontario:		
Huntingdon Fluorspar Mines Ltd.	Madoc	Huntingdon Twp.
Quebec:		
Yates Uranium Mines Inc. ¹	132 St. James St. W., Montreal	Huddersfield Twp.
Lake Otter Uranium Mines Ltd. ¹	132 St. James St. W., Montreal	Sandy Creek
White River Exploration Ltd.	507 Place d'Armes, Montreal	St. Ubald
GARNET		
Ontario:		
Niagara Garnet Co. ²	c/o Wm. A. Yarwood, 8373 Krull Parkway, Niagara Falls, New York, U.S.A.	River Valley
GRAPHITE		
Quebec:		
Holland, A.A. ¹	1705 North 12 Ave., Pensacola, Florida, U.S.A.	McGill Twp.
Quebec Graphite Corp. ¹	233 Notre Dame ouest, Montreal	Labelle
Ontario:		
Krefeld Graphite Gold Mines Ltd. ²	R.R. No. 2, Malton	Vogt Twp.
GRINDSTONES		
New Brunswick:		
Read, H.C. ²	Bathurst	Stonehaven
Bay of Chaleur Grindstone Co. ²	1434 Ste-Catherine St.W., Montreal Quebec	Gloucester Co.

¹ Active but not producing.² Holds dormant property.

Directory of Firms in the Miscellaneous Non-metal Mining Industry, 1957 — Continued

Name of operator	Head office address	Plant or mine location
IRON OXIDE		
Quebec:		
Argall, Mrs. Thomas H.	1695 boul. St-Louis, Trois-Rivières	Pointe-du-Lac
Gélinas, Bruno ¹	1521 Notre Dame, Trois-Rivières	Portneuf Co.
Girardin, Chas. D.	Yamachiche	Almaville en Haut
The Sherwin-Williams Co. of Canada	2875 Centre St., Montreal	Red Mill, Champlain Co.
LITHIUM MINERALS		
Quebec:		
American Lithium Co. Ltd. ¹	200, ouest rue St-Jacques, Montreal	Lacorne
Consolidated Negus Mines Ltd. ¹	85 Richmond St. W., Toronto	Lamotte Twp.
Glenmar Lithium Mines Ltd. ¹	100 Adelaide St. W., Toronto, Ontario	Lamotte Twp.
International Lithium Mining Corp. ¹	25 Adelaide St. W., Toronto, Ontario	Lamotte Twp.
Iso Uranium Mines Ltd. ¹	100 Adelaide St. W., Toronto, Ontario	Lacorne
La Corne Lithium Mines Ltd. ¹	25 King St. W., Toronto, Ontario	Lamotte Twp.
Major Lithium Mines Ltd. ¹	67 Yonge St., Toronto, Ontario	Lacorne Twp.
Massberyl Lithium Co. Ltd. ¹	100 Adelaide St. W., Toronto, Ontario	Lacorne Twp.
Quebec Lithium Corp.	1403 Edifice Aldred, Montreal	Barraute
Société d'Exploration Minière Cossette-Martel ¹	Première ave ouest, Amos	Lamotte Twp.
Tide Lake Lithium Mines Ltd. ¹	100 Adelaide St. W., Toronto, Ontario	Figury Twp.
United Lithium Corp. ¹	28 St. James St. W., Montreal	Lacorne Twp.
Vallee Lithium Mining Corp. ¹	80 Richmond St. W., Toronto, Ontario	Fredmont Twp.
Valor Lithium Mines Ltd. ¹	100 Adelaide St. W., Toronto, Ontario	Vauquelin Twp.
Ontario:		
Alba Exploration Ltd. ¹	119 Adelaide St. W., Toronto	Barbara Lake
Capital Lithium Mines Ltd.	100 Adelaide St. W., Toronto	Kenora
Jean Lake Lithium Mines Ltd.	44 King St. W., Toronto	Cosgrave Lake
Lun Echo Gold Mines Ltd.	67 Yonge St., Toronto	Nipigon
Dunvegan Mines Ltd. ¹	357 Bay St., Toronto	Cosgrave Lake
Lithifan Mines Ltd.	44 King St. W., Toronto	Barbara Lake
Manitoba:		
Lithium Corp. of Canada Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Lac du Bonnet
Viola Mac Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Cat Lake
Green Bay Mining & Exploration Ltd.	100 Royal Trust Bldg., Edmonton	Herb Lake
Northwest Territories:		
Boreal Rare Metals	414 St. James St. W., Montreal, Quebec ..	Hearn Channel
MAGNESITIC DOLOMITE		
Quebec:		
Canadian Refractories Ltd.	1050 Canada Cement Bldg., Montreal	Kilmar
MINERAL WATERS		
Quebec:		
Brevages Lazure	1395 Choquette, St-Hyacinthe	St-Hyacinthe
Eau Minérale Etoile	Ste-Geneviève de Batiscan	Batiscan
Gauthier, Chas.	1, rue St-Laurent, Louisville	Maskinongé
King's Court Beverages Co. Ltd.	2901 Sherbrooke St. E., Montreal	Chambly
Orange Crush Ltd.	1590 O'Connor Drive, Toronto, Ontario ..	Varenes
Montclair-Richelieu Spring Water Co. Ltd.	1521 Mountain St., Montreal	Chambly
Sources Abenakis Ltée	St-François-du-Lac	St-François-du-Lac
Radnor Beverages	St-Maurice	St-Maurice
Usine d'Embouteillage Maski Enrg.	400 rue Mailhot, Trois-Rivieres	St-Justin
Ontario:		
Carlsbad Springs, The	Carlsbad Springs	Gloucester Twp.
Excel Beverages Ltd.	Bourget	Bourget
MICA		
Quebec:		
Blackburn Bros. Ltd.	85 Sparks St., Ottawa, Ontario	Cantley
Cameron, P.U., & Sons	Box 806, Buckingham	Portland West
Cross, W.C.	209 Bridge St., Hull	
Côté, W.R. & Cartier, J.	62 Filiatrault, Ville St-Laurent	Wentworth
Boland, C.W.	Old Chelsea	West Hull

¹ Active but not producing.

Directory of Firms in the Miscellaneous Non-metal Mining Industry, 1957 - Continued

Name of operator	Head office address	Plant or mine location
MICA—Concluded		
Quebec—Concluded:		
Deziel, Alexandre.....	Wilson's Corners, RR No. 1.....	Wakefield East
Giroux, A.....	421 McArthur Rd., Ottawa.....	Wright Twp.
Holt, R.J.....	674 Cooper St., Ottawa, Ontario.....	Wakefield
Lavigne, E.....	St-Pierre de Wakefield.....	Wakefield
Larmont, Ed.....	Buckingham.....	Buckingham
Law & Co.....	209 Eddy St., Hull.....	Hull, Twp.
McAra, Cecil.....	Beechgrove.....	North Onslow
Mica Co. of Canada Ltd.....	2 Lois St., Hull.....	
Poirier, A.....	Wilson's Corners.....	Wakefield Nord
Poirier, C.....	St-Pierre de Wakefield.....	Portland West
Poulin, Oscar.....	Hull.....	Hull Twp.
Renaud, E.....	Eddy St. Hull.....	Wilson's Corners
Sargent, Fred.....	Cascades.....	Hull
Siscoe Vermiculite Mines Ltd.....	Cornwall, Ontario.....	Suzar Twp.
Wallingford, J.H.....	15 Main St. Hull.....	Papineau
Wallingford, E., Ltd.....	Perkins.....	Templeton
Wallingford, G.E.....	63 Pinehurst Ave., Ottawa.....	Templeton
Ontario:		
Armstrong, Percy.....	Nobal.....	Parry Sound
Buchanan, Geo.....	31 South St., Perth.....	Lanark
Bedard, M.....	Maberly.....	Bathurst
Donnelly, J.C.....	RR #1 Stanleyville.....	Lanark
Green, W.E. and E.C.....	Perth Road.....	North Burgess
Mahon, Joseph.....	10 N. Burgess St., Perth.....	North Burgess
Mid Bay Mica Syndicate.....	North Bay.....	Nipissing
McGlade, W.A.....	8 Church St., Perth.....	Burgess Twp.
Watts, R.W.....	21 Isabella St., Perth.....	Lanark
British Columbia:		
Fairey & Co.....	661 Taylor St., Vancouver.....	Vancouver
PERLITE		
British Columbia:		
Western Gypsum Products Ltd. ²	Childs Building, Winnipeg, Manitoba.....	Francois Lake
Perlite Mining Corp. Ltd. ²	44 King St. W., Toronto, Ontario.....	Uncha Lake
PHOSPHATE		
Quebec:		
Bigelow, Robert ¹	Buckingham.....	Bowman Twp.
Blackburn Bros. Ltd. ²	85 Sparks St., Ottawa, Ontario.....	Perkins
Quebec Smelting & Refining Ltd. ²	215 St. James St. W., Montreal.....	Notre Dame de la Salette
Industrial Phosphate Mines Ltd. ²	18 Toronto St., Toronto, Ontario.....	Portland East Twp.
Ontario:		
Ontario Phosphate Industries Ltd. ²	Room 1101—62 Richmond St. W., Toronto.....	Bedford Twp.
McGlade, W.A. ²	8 Church St., Perth.....	Burgess Twp.
POTASH		
Saskatchewan:		
Continental Potash Corp. Ltd. ¹	508 Credit Foncier Bldg., Vancouver.....	Unity
Duval Sulphur and Potash Co. ¹	Mellie Esperson Bldg., Houston Texas.....	Saskatoon
International Minerals & Chemical Corp. ¹	1540 Winnipeg St., Regina.....	Yarbo
Southwest Potash Corp. ¹	61 Broadway, New York 6.....	Saskatoon
United States Borax & Chemical Corp. ¹	630 Shatto Place, Los Angeles, Calif.....	Saskatoon
Potash Co. of America Ltd.....	Box 509 Saskatoon.....	Patience Lake
S.A.M. Explorations Ltd.....	1168 Albert St., Regina.....	Riddle-Tidewater
PYRITE, PYRRHOTITE		
Newfoundland:		
Buchans Mining Co. Ltd. ¹	Water St., St. John's.....	Buchans
New Brunswick:		
Middle River Mining Co. Ltd. ¹	42 Princess St., Saint John.....	Gloucester
Texas Gulf Sulphur Co. ¹	75 East 45th St. New York 17.....	Gloucester

¹ Active but not producing.² Holds dormant property.

Directory of Firms in the Miscellaneous Non-Metal Mining Industry, 1957 - Concluded

Name of operator	Head office address	Plant or mine location
PYRITE, PYRRHOTITE—Concluded		
Quebec:		
East Sullivan Mines Ltd.	1604 Aldred Bldg., Montreal	Bourlamaque Twp.
Queumont Mining Corp. Ltd.	350 Bay St., Toronto, Ontario	Rouyn Twp.
Noranda Mines Ltd.	Royal Bank Bldg., Toronto, Ontario	Noranda
Normetal Mining Corp. Ltd.	44 King St. W., Toronto, Ontario	Normetal
Waite-Amulet Mines Ltd.	Noranda	Duprat Twp.
Weedon Pyrite & Copper Corp. Ltd.	507 Place d'Armes, Montreal	Weedon
West MacDonald Mines Ltd.	1434 Ste-Catherine St. W., Montreal	Dufresnoy
Sulgas Properties Ltd. ¹	744 W. Hastings St., Vancouver, British Columbia	Ascot Twp.
Ontario:		
International Nickel Company of Canada Ltd. ..	Copper Cliff	Copper Cliff
Saskatchewan:		
Lorado Uranium Mines Ltd.	80 Richmond St. W., Toronto, Ont.	Beaverlodge
British Columbia:		
Consolidated Mining & Smelting Company of Canada Ltd.	Trail	Kimberley
Britannia Mining & Smelting Co. Ltd.	Britannia Beach	Britannia Beach
SILICA BRICK		
Nova Scotia:		
Dominion Steel & Coal Corp. Ltd.	Sydney	Sydney
Ontario:		
Algoma Steel Corp. Ltd.	Sault Ste. Marie	Sault Ste. Marie
SODIUM CARBONATE (Natural)		
British Columbia:		
Bishop, V.C. (Mrs.) ²	c/o Boyd's Garage, Clinton	Clinton area
SODIUM SULPHATE (Natural)		
Saskatchewan:		
Ormiston Mining & Smelting Co. Ltd.	Ormiston	Ormiston
Midwest Chemicals Ltd.	Box 446, Edmonton Alberta	Whiteshore Lake
Sybouts Sodium Sulphate Co. Ltd.	Gladmar	Gladmar
Saskatchewan Minerals (Sodium Sulphate Div.)	Chaplin	Chaplin, Bishoperic
SULPHUR (in smelter gas)		
Quebec:		
Aluminum Co. of Canada Ltd. ³	Sun Life Bldg., Montreal	Arvida
Ontario:		
Canadian Industries Ltd.	Box 10, Montreal	Copper Cliff
British Columbia:		
Consolidated Mining & Smelting Company of Canada Ltd.	Trail	Trail

¹ Active but not producing.² Holds dormant property.³ Produces acid by calcining zinc sulphide concentrates.

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