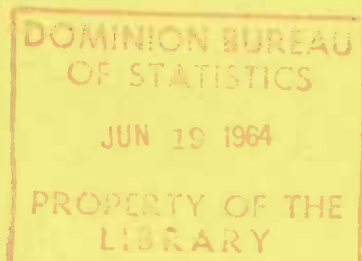


CATALOGUE No.

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ANNUAL

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THE MISCELLANEOUS NON-METAL MINING INDUSTRY

1961

DOMINION BUREAU OF STATISTICS

Industry Division

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THE MISCELLANEOUS NON-METAL
MINING INDUSTRY

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EXPLANATORY NOTES

Establishment

The reporting unit in the Census of Manufactures is the **establishment**. Beginning with the 1961 Census, the establishment is defined as follows:

The smallest unit which is a separate operating entity capable of reporting all the following:

- Materials and supplies used,
- Goods purchased for resale as such,
- Fuel and power consumed,
- Number of employees and their pay,
- Inventories,
- Shipments or sales.

The establishment is to be distinguished from smaller subdivisions or departments which do not have records which permit them to report all items required of an establishment. Prior to 1961, some establishments were required to submit two or more separate reports when they were engaged in operations which were classifiable to different industries. Beginning with 1961, separate reports for such operations will be required only in cases where accounting records can provide all the elements of principal statistics enumerated above. Special reporting arrangements were made with respondents when the acceptance of combined reports would have seriously affected the statistics for particular industries or

areas. Where continuity of industry statistics was affected by this change in reporting procedures, adjustments to the data were made back to 1957 in order to maintain comparability of the series for recent years.

A manufacturing establishment is typically a factory, mill or plant principally engaged in manufacturing operations. Prior to 1961, the Census of Manufactures attempted to cover the manufacturing activities of all establishments, whether or not they were principally engaged in manufacturing operations. Beginning with the 1961 Census, establishments (accounting entities) which are not primarily engaged in manufacturing are no longer included as manufacturing establishments in the basic industry statistics. Again adjustments to the industry statistics were made to reflect the removal of such reporting units for the period 1957-1960. These reporting units are now listed as establishments in other Bureau industry surveys, such as Wholesale Trade, Construction, etc. In order, however, to maintain complete coverage of certain commodity items produced mainly in manufacturing establishments, many non-manufacturing establishments are now surveyed for commodity shipments only and the latter are included in those tables of industry reports showing shipments of certain commodities "from all industries".

SYMBOLS

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

- .. figures not available.
- ... figures not appropriate or not applicable.
- nil or zero.
- † revised figures.

THE MISCELLANEOUS NON-METAL MINING INDUSTRY

1961

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 1961 included barite, brucite, diatomite, fluorspar, garnet, graphite, grindstones, iron oxides, magnesitic dolomite, lithia, potash, pozzolana, and sodium sulphate. The general statistics also include some data on development work done on pyrite deposits.

During 1961 there were 21 firms which made shipments of materials which are grouped as miscellaneous non-metallics. Gross value of the producer's shipments amounted to \$11,457,737 in 1961

compared with \$10,773,462 in the preceding year. The value of containers was included in these figures. The industry employed an average of 1,098 persons to whom \$4,682,743 were paid as salaries and wages. Fuel cost \$1,149,114 and 53,866,746 kwh. of electricity were purchased for \$619,593. Process supplies cost \$1,435,546 and the containers used were valued at \$90,157. Freight paid amounted to \$300,263.

The 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 are published in this report, although they are not included in the figures for the Miscellaneous Non-metal Mining Industry.

**TABLE 1 A. Principal Statistics of the Miscellaneous Non-metal Mining Industry,
Significant Years,¹ 1921-59**

Basis: Standard Industrial Classification in use prior to 1960

Year	Mines or plants	Em- ployees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of production	Net value of production ²
	number				dollars		
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
1954	47	1,343	4,839,822	1,419,441	1,202,247	10,421,552	7,716,472
1956	60	1,773	6,069,934	2,078,573	1,936,327	15,813,812	11,692,288
1957	53	1,597	5,737,254	1,932,295	1,598,110	14,227,781	10,665,027
1958	43	1,240	4,838,000	1,696,159	1,087,789	12,058,468	9,208,809
1959	39	1,425	5,756,818	1,876,804	1,564,067	13,965,675	10,456,674

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 1 B. Principal Statistics of the Miscellaneous Non-metal Mining Industry, 1957-61¹

Basis: Revised Standard Industrial Classification and New Establishment Concept

Year	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 of production ²
	number			dollars			
1957	53	1,597	5,737,254	1,932,295	1,598,110	14,227,781	10,865,027
1958	43	1,240	4,838,000	1,696,159	1,087,789	12,058,468	9,208,809
1959	39	1,425	5,756,818	1,876,804	1,564,067	13,965,675	10,456,674
1960	46	1,122	4,548,789	1,859,585	1,004,699	10,773,462	7,600,509
1961	35	1,098	4,682,743	1,768,707	1,525,703	11,457,737	7,863,064

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. Natural Iron Oxides Industry figures were included in 1957-61.

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

TABLE 2. Producers' Shipments of Miscellaneous Non-metallic Minerals, 1960 and 1961

Item		1960		1961	
		Quantity	Value	Quantity	Value
			\$		\$
Barite	ton	154,292	1,462,212	191,404	1,799,119
Diatomite	"	44	1,430	214	8,817
Fluorspar	"	..	1,921,820	..	1,990,200
Garnet	ton	32	4,480	80	3,200
Graphite	"	—	—	1	146
Grindstones	"	10	2,000	10	2,000
Iron oxides	"	909	76,780	808	68,199
Lithia	lb.	204,666	84,135	536,190	392,871
Magnesitic dolomite, brucite .....		...	3,279,021	..	3,064,403
Mineral waters	Imp. gal.	375,425	201,764	...	...
Potash, K ₂ O .....		..	178,700	—	—
Pozzolana		—	—	..	2,000
Sodium sulphate	ton	214,208	3,449,155	250,996	4,036,625
Totals .....		...	10,661,497	...	11,367,580
Pyrite, pyrrhotite ¹	ton	1,032,288	3,316,378	517,258	1,830,566
Sulphur ² in smelter gases	"	289,620	2,854,623	277,056	2,708,110
Sulphur, elemental ³	"	274,359	4,298,906	394,762	7,287,881
Arsenious oxide ¹	"	862	70,400	210	16,772
Titanium dioxide, etc. ¹ .....		..	12,947,000	..	16,723,743
Mica	ton	851	94,203	808	125,377

¹ General statistics relating to pyrite, arsenious oxide and titanium dioxide are included with the smelting industry.

² Data for 1960 and 1961 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.

³ Produced from sour natural gas; includes sulphur recovered in processing nickel-copper matte.

Note: Value of containers is excluded.

TABLE 3. Consumption of Non-metallic Minerals, 1960 and 1961

	Used during	
	1960	1961
	tons of 2,000 lbs.	
Arsenic trioxide (refined)	206	241
Barite - Lump	5,411	4,410
Ground - Natural	4,325	1,021
Bleached	403	687
Blanc fixe (precipitated barium sulphate) .....	...	...
Bentonite - Swelling (also called sodium or Wyoming bentonite)	20,690	29,622
Non-swelling (also called calcium or Southern decolorizing bentonite)	6,848	5,364
China clay (Kaolin)	109,632	112,059
Diatomite (diatomaceous earth, Kieselguhr, Celite, etc.):		
Ground or powdered - Natural	10,964	10,718
Calcined	1,147	1,941
Other	643	14
Feldspar	6,520	7,455
Fluorspar - Metallurgical grade (lump)	106,884	106,104
Ceramic	628	777
Acid	4,752	4,661
Fullers earth	1,554	1,697
Graphite - For manufacture of foundry facings .....	...	...
For manufacture graphite shapes, i.e. brushes, pistons, rings, etc.	...	...
Flake	365	861
Amorphous	2,054	375
Other	2,364	2,209
Mica - Muscovite - Sheet, splittings	85	54
Wet ground	1,163	515
Other ground	463	1,283
Nepheline Syenite	34,427	39,134
Phosphate rock	859,766	894,518
Potash (muriate of potash)	132,987	136,056
Silica - Lump (quartz, quartzite, sandstone)	253,084	283,504
Sand (including foundry sand but excluding concrete sand)	659,782	591,616
Flour or pulverized	15,993	17,277
Sodium sulphate - Lump crude	109	117
Salt cake	160,376	171,763
Glauber's salts	674	534
Sulphur - Elemental	480,394	449,881
Liquid sulphur dioxide	80,147	116,417
Talc, soapstone, pyrophyllite - Ground	34,073	32,379
Other	2,722	3,340
Whiting or whiting substitute:		
Ground chalk, whiting, calcium carbonate, precipitated chalk	39,841	27,751
Whiting substitute, ground limestone and ground marble	54,393	39,614

TABLE 4. Employees and their Earnings in the Miscellaneous Non-metal Mining Industry 1957-61

	Employees					Man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and adminis- trative	Workmen	Total
	Male	Female	Male	Female					
	number					dollars			
1957	177	21	1,396	3	1,597	3,236,686	922,856	4,814,398	5,737,254
1958	193	22	1,024	1	1,240	2,604,079	1,061,029	3,776,971	4,838,000
1959	197	20	1,205	3	1,425	2,946,865	1,262,671	4,494,147	5,756,818
1960	194	22	905	1	1,122	2,283,721	1,144,583	3,404,206	4,548,789
1961	199	27	871	1	1,098	2,322,097	1,219,901	3,462,842	4,682,743

TABLE 5. Workmen, by Months, in the Miscellaneous Non-metal Mining Industry, 1960 and 1961

Month	1960					1961				
	Mine		Under-ground	Mill	Total	Mine		Under-ground	Mill	Total
	Surface					Surface				
	Male	Female				Male	Female			
number										
January	313	—	229	293	835	259	2	243	314	818
February	293	—	257	299	849	257	2	195	349	803
March	319	—	267	302	888	270	1	193	357	821
April	327	—	298	314	939	297	1	189	353	840
May	332	—	312	341	985	320	1	200	362	883
June	353	—	314	347	1,014	334	1	208	358	901
July	304	—	261	350	915	357	1	163	373	894
August	351	2	251	312	916	354	1	214	366	935
September	296	2	258	320	876	360	1	221	370	952
October	300	2	257	323	882	307	—	226	371	904
November	304	2	255	334	895	314	1	218	367	900
December	272	2	240	322	836	296	1	208	354	859
Averages	316	1	267	322	906	310	1	205	356	872
Total man-hours worked ..					1,833,067					1,835,481

TABLE 6. Fuel and Electricity Used in the Miscellaneous Non-metal Mining Industry, 1960 and 1961

Kind	1960		1961	
	Quantity	Cost at plant	Quantity	Cost at plant
		\$		\$
Bituminous coal (a) From Canadian mines	777	13,146	14,880	62,562
(b) Imported	606	10,968	403	7,294
Sub-bituminous coal (from Alberta mines only)	—	—	—	—
Anthracite coal	—	—	—	—
Lignite coal	40,311	176,383	646	3,339
Coke (for fuel only)	—	—	—	—
Gasoline (includes gasoline used in cars and trucks)	184,239	64,808	199,259	71,475
Kerosene or coal oil	11,167	3,077	38,661	7,415
Fuel oil	6,479,391	617,125	5,578,025	633,353
Wood (cords of 128 cubic feet of piled wood)	10	90	4	50
Gas (a) Liquefied petroleum gases (propane, etc.)	1,174	425	2,062	848
(b) Other manufactured gas	—	—	—	—
(c) Natural gas	851,157	250,789	1,303,659	362,778
Other fuel	—	—	—	—
Electricity purchased for power and lighting	57,915,778	722,774	53,866,746	619,593
Electricity purchased for other purposes	—	—	—	—
Totals (cost only) .....	...	1,859,585	...	1,768,707
Electricity generated (a) For own use	5,794,792	...	5,801,634	...
(b) For sale	56,599	1,250	62,325	1,376

ARSENIOS OXIDE

During 1961 the producers of arsenious oxide (arsenic trioxide) shipped 419,300 pounds valued at \$16,772. 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 treated the cobalt-silver concentrates from Cobalt and Gowganda, and imported cobalt ores. The smelter at Deloro ceased operations. The silver-cobalt ores are treated at the Cobalt Refinery, Cobalt, Ont.

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 7. Producers' Shipments, Imports and Exports of Arsenic, 1960 and 1961

	1960		1961	
	Quantity	Value	Quantity	Value
	lb.	\$	lb.	\$
Producers' shipments:				
White arsenic (crude and refined) ¹	1,724,326	70,400	419,300	16,772
Imports:				
Arsenic acid	407,465	13,347	406,892	16,378
Arsenious oxide and arsenic sulphide .....	...	...	—	—
Sodium arsenate and sodium biarsenate	128,613	39,558	133,795	38,382
Arsenate of lead	65,488	13,782	58,250	11,646
Arsenate of lime	68,000	3,384	178,861	15,089
Exports:				
Arsenic	1,054,200	37,908	244,500	10,263

¹ Includes some arsenic recovered from foreign ores.

TABLE 8. Production, Imports and Exports of White Arsenic, 1952-61

Year	Production, crude and refined, but no duplication	Imports ¹	Exports	
			Refined	Crude
			pounds	
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	—
1958	2,323,320	—	1,703,200	—
1959	1,578,307	—	1,130,400	—
1960	1,724,326	—	1,054,200	—
1961	419,300	—	244,500	—

¹ Arsenious oxide and arsenic sulphide.

TABLE 9. Consumption of Refined White Arsenic, 1957-61

Industry	1957	1958	1959	1960	1961
	pounds				
Glass	337,331	269,344	...	224,663	219,934
Insecticides ¹	²	²	²	²	²
Metal rolling, casting, extruding	73,668	68,120	35,299	22,934	46,888
Miscellaneous chemicals	49,563	60,927	73,456	245,635	347,242
Totals accounted for	460,562	398,391	...	...	614,066

¹ Does not include arsenic acid (As₂O₃) imported for use in making insecticides, as follows: 1957, 519,631 pounds; 1958, 507,657 pounds; 1959, 595,674 pounds; 1960, 407,465 pounds; 1961, 406,892 pounds.

² Included with miscellaneous chemicals total.

TABLE 10. World Production of White Arsenic, by Countries

Country ¹	1957	1958	1959	1960	1961
	short tons ²				
North America:					
Canada	1,849	1,162	789	862	153
Mexico	5,075	3,411	11,536	11,078	14,600 ³
United States	10,493	11,508	5,189	⁴	⁴
South America:					
Brazil	188	292	367	233	220 ³
Peru	22	369	524	433	450 ³
Europe:					
Belgium (exports)	2,280	543	3,161	⁵	⁵
France	7,627	8,354	8,800	9,400	13,500 ³
Germany:					
West (exports)	216	205	180	110	140 ³
Greece	11	13	11	11 ³	11 ³
Italy	927	688	1,254	654	660 ³
Portugal (exports)	1,314 ⁶	1,172 ⁶	596	810	770 ³
Spain	—	285	320	435	300 ³
Sweden	12,282	11,194	12,100	5,114 ⁶	12,000 ³
Asia:					
Japan	1,521	1,429	1,186	1,247	1,200 ³
Africa:					
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	883	683	528	204	200 ³
World totals (estimate)^{1,2}	45,000	41,000	47,000	57,000	59,000

¹ Arsenic is also produced in Argentina, Austria, China, Czechoslovakia, Finland, East Germany, Hungary, U.S.S.R. and United Kingdom, but there is too little information to estimate production.

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

³ Estimate.

⁴ Figure withheld to avoid disclosing individual company confidential data; included in world total.

⁵ Data not available; estimate included in the world total.

⁶ Exports.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

BARITE

The producers of barite in Canada shipped 191,404 tons valued at \$1,799,119 in 1961 compared with 154,292 tons worth \$1,462,212 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 Kootinay district, then shipped to a grinding plant at Lethbridge, Alberta. Shipments were made from the Giant Mascot mine, Spillamacheen and from Sheep Creek mines, to a grinding plant at Onoway, 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 manu-

facture 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 11. Production of Barite, 1952 - 61

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1952	136,002	1,521,162	1957	228,048	2,992,913
1953	247,227	2,220,292	1958	195,719	2,196,384
1954	221,472	2,003,796	1959	238,967	2,254,582
1955	253,736	2,277,166	1960	154,292	1,462,212
1956	320,835	3,031,034	1961	191,404	1,799,119

TABLE 12. Imports of Barite, 1960 and 1961

Imported from	1960		1961	
	Tons	Value	Tons	Value
		\$		\$
United Kingdom	45	1,241	25	962
Germany, West	337	9,610	282	9,632
United States	1,639	80,328	1,582	83,654
Totals	2,021	91,179	1,889	94,248

TABLE 13. Exports of Barite, 1960 and 1961

Destination	1960		1961	
	Tons	Value	Tons	Value
		\$		\$
Trinidad	10,080	186,480	9,856	182,336
Venezuela	8,905	75,694	3,920	33,323
United States	115,987	1,096,465	157,920	1,782,876
Totals	134,972	1,358,639	171,696	1,998,535

TABLE 14. Consumption of Barite, 1957 - 61

	1957	1958	1959	1960	1961
	tons				
By uses:					
Paints	962	805	901	902	984
Rubber goods	525	387	365	343	361
Glass	301	215	404	366	412
Oil-well drilling, estimate ¹	1,147	16,747	17,037	26,312	19,913
Asbestos products .....	...	30	...	...	...
Miscellaneous chemicals .....	...	12	13	...	...

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

TABLE 15. World Production of Barite, by Countries¹

Country ¹	1957	1958	1959	1960	1961
	short tons ²				
North America:					
Canada	228,048	195,719	238,967	154,292	177,954
Cuba (exports)	22,796	11,931	—	—	—
Mexico	579,646	397,550	314,933	315,627	277,046
United States	1,304,542	486,287	867,201	771,318	731,381
Totals	2,135,032	1,091,487	1,421,101	1,241,237	1,186,381
South America:					
Argentina	25,264	18,716	19,842	20,000 ³	20,000 ³
Brazil	55,349	60,630	56,009	43,826	46,729 ⁴
Chile	860	880 ⁵	880 ⁵	880 ⁵	880 ⁵
Columbia	6,963	14,330	11,023	8,047	8,000 ³
Peru	95,388	117,943	105,557	120,813	122,538
Totals	183,824	220,449	193,311	193,566	198,147
Europe:					
Austria	3,902	4,697	4,067	4,876	3,375
France	84,426	133,934	95,259	99,208	99,200 ³
Germany:					
West (marketable)	472,518	409,105	428,304	517,657	535,000 ³
Greece	143,549	169,629	143,014	165,000 ³	130,000 ³
Ireland	11,231	8,736	9,369	9,890	7,627
Italy	124,945	122,976	133,734	157,925	140,308
Poland	12,400 ³	12,400 ³	12,400 ³	12,400 ³	41,161
Portugal	853	1,351	3,760	4,310	4,300 ³
Spain	20,287	31,408	28,186	28,596	28,000 ³
U.S.S.R. ³	110,000	130,000	130,000	140,000	140,000
United Kingdom ⁵	87,280	66,139	68,408	67,431	82,021
Yugoslavia	133,137	103,801	118,267	120,691	126,766
Totals^{1,3}	1,240,000	1,230,000	1,210,000	1,360,000	1,370,000
Asia:					
Burma	—	907	1,120	1,792	2,248
China	6	55,000 ³	55,000 ³	65,000 ³	90,000 ³
India	14,462	17,536	14,939	14,976	16,794
Japan	27,514	16,510	21,331	25,184	32,232
Korea, Republic of	8	—	—	220	772
Philippines	6,088	64	186	6,198	2,109
Turkey	2,111	6,035	2,513	1,653	—
Pakistan	—	342	569	709	489
Totals^{1,3}	83,000	96,000	96,000	116,000	145,000
Africa:					
Algeria	54,261	67,911	24,038	53,192	29,728
Morocco:					
Southern Zone	16,276	47,060	40,574	92,945	90,610
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	—	34	239	—	—
Swaziland	351	480	461	200	454
Union of South Africa	3,369	2,721	2,355	1,878	1,962
United Arab Republic (Egypt Region)	294	2,282	2,017	2,866	3,000 ³
Totals	74,551	120,488	69,684	151,081	125,754
Oceania:					
Australia	10,951	7,618	6,960	12,787	19,600
World totals (estimate)^{1,2}	3,700,000	2,800,000	3,000,000	3,100,000	3,000,000

¹ In addition to countries listed, barite is produced in Czechoslovakia, East Germany and 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 barite chapters.

³ Estimate.

⁴ Exports.

⁵ Includes witherite.

⁶ Data not available; estimate included in total.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

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 Renfrew 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 economical and consequently marketable by-products would be necessary.

TABLE 16. World Production of Corundum, by Countries¹

Country ^{1,2}	1957	1958	1959	1960	1961
	short tons ²				
India.....	497	435	236	268	363
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	4,507	4,593	2,799	3,843	2,792
Union of South Africa	1,539	2,118	622	123	159
World totals (estimate) ^{1,2}	10,000	11,000	8,000	9,000	8,000

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 Corundum was produced in earlier years, by Argentina, Australia, Canada, Federation of Malaya, Mozambique, and Nyasaland.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

DIATOMITE

In 1961 the producers shipped 214 tons of diatomite which was valued at \$8,817. In the preceding year the production was 44 tons valued at \$1,430. All the diatomite recovered in the past three 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 determine, 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 17. Production of Diatomite, 1952 - 61

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1952	28	1,074	1957	120	2,400
1953	103	12,150	1958	27	540
1954	4	192	1959	5	100
1955	16	352	1960	44	1,430
1956	2	40	1961	214	8,817

TABLE 18. Imports of Diatomaceous Earth, 1960 and 1961

Imported from	1960		1961	
	Tons	Value	Tons	Value
		\$		\$
United Kingdom	—	—	—	—
Denmark	—	—	—	—
United States	28,990	1,245,518	28,875	1,345,805
Totals	28,990	1,245,518	28,875	1,345,805

TABLE 19. Consumption of Infusorial Earth in the Sugar Refining Industry, 1952 - 61

Year	Tons	Value	Year	Tons	Value
		\$			\$
1952	2,020	132,796	1957	2,260	174,677
1953	1,944	128,658	1958	1,965	164,382
1954	1,871	126,414	1959	2,113	167,117
1955	2,094	158,960	1960	2,218	191,213
1956	2,196	165,026	1961	2,089	188,703

TABLE 20. Consumption of Diatomaceous Earth in the Manufacture of Fertilizers, 1957 - 61

Year	Tons	Value
		\$
1957	6,068	314,425
1958	11,313	623,650
1959	10,628	570,837
1960	15,984	649,639
1961	11,575	664,021

TABLE 21. World Production of Diatomite, by Countries¹

Country ¹	1957	1958	1959	1960	1961
	short tons ²				
North America:					
Canada.....	120	27	5	44	25
Costa Rica.....	1,800 ³	2,205	2,425	2,425	2,400
Guatemala.....	20,613	21,190	—	—	—
Nicaragua.....	—	—	1,887	2,249	2,200
United States.....	449,780 ⁴	449,780 ⁴	449,780 ⁴	449,780 ⁴	449,780 ⁴
South America:					
Argentina.....	4,084	4,540	4,829 ³	4,800	4,800 ³
Columbia.....	275	220	330	275	275 ³
Peru.....	39	117	254	1,284	1,300 ³
Europe:					
Austria.....	3,823	4,086	4,492	4,431	5,993
Denmark:					
Diatomite.....	33,859	28,660	36,376	33,000 ³	33,000 ³
Moler ⁵	41,074	46,486	40,542	38,500 ³	38,500 ³
Finland.....	1,874	2,315	1,520	1,457	1,400
France ⁶	86,240	111,948	112,821	104,940	110,000
Germany, West ⁶	71,918	115,319	111,826	107,831	119,000
Italy.....	29,707	49,828	57,100	55,000 ³	55,000 ³
Portugal ⁶	1,613	1,159	2,075	1,172	1,100
Spain ⁶	13,856	12,858	11,561	13,840	14,330
Sweden.....	1,317	1,260	1,100 ³	2,205	2,200
United Kingdom:					
Great Britain.....	25,548	28,154	19,000 ³	16,553	16,500
Northern Ireland.....	6,842	7,206	5,227	5,500 ³	—
Yugoslavia.....	4,400 ³	4,400 ³	5,000 ³	5,000 ³	5,000 ³
Asia:					
Korea, Republic of.....	1,472	518	1,865	2,646	1,989
Africa:					
Algeria.....	19,605	28,629	31,722	24,266	38,581
Kenya.....	4,737	3,892	4,041	3,791	3,537
Mozambique.....	—	61	—	103	110 ³
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia.....	—	—	148	164	409
Union of South Africa.....	606	359	397	346	137
United Arab Republic (Egypt Region).....	708	397	441	805	770 ³
Oceania:					
Australia.....	6,968	4,749	5,700	5,218	5,500 ³
New Zealand.....	3,537	6,336	8,152	6,992	7,000 ³
World totals (estimate) ^{1,2}	940,000	1,040,000	1,030,000	1,000,000	1,030,000

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

² This table incorporates some revisions. Data do not add to totals shown due to rounding where estimated figures are included in the detail.

³ Estimate.

⁴ Average annual production 1957-59.

⁵ A clay-contaminated diatomite used principally for light weight building brick.

⁶ Includes tripoli.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

FLUORSPAR

During 1961 the value of fluorspar shipped amounted to \$1,990,200 compared with \$1,921,820 worth in the preceding year. There were two producers in Newfoundland. In Ontario the Huntingdon Fluorspar Mines Ltd. shipped metallurgical grade fluorspar and water clear crystals for mineralogical specimen collections. A small tonnage of fluorspar was obtained as a by-product in the silica operation of the Pacific Silica Ltd. at Oliver, British Columbia.

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.

TABLE 22. Production of Fluorspar, 1952-61

Year	Short tons	Selling value f.o.b. works	Year	Short tons	Selling value f.o.b. works
		\$			\$
1952	82,187	2,523,408	1957 .....	...	1,756,841
1953	88,569	2,670,585	1958 .....	...	1,542,589
1954	118,969	2,987,026	1959 .....	...	1,850,497
1955	128,114	2,708,437	1960 .....	...	1,921,820
1956	140,071	3,407,582	1961 .....	...	1,990,200

TABLE 23. Imports of Fluorspar, 1952-61

Year	Tons	Value	Year	Tons	Value
		\$			\$
1952	22,714	684,968	1957	14,547	377,706
1953	20,161	546,915	1958	30,408	763,438
1954	16,240	382,935	1959	26,588	718,774
1955	21,774	518,002	1960	59,690	1,486,107
1956	28,148	690,779	1961	32,769	914,221

TABLE 24. Consumption of Fluorspar, 1957-61

	1957	1958	1959	1960	1961
By uses:					
Steel	16,935	14,539	20,063	21,029	24,310
Glass	628	455	462	733	739
Heavy chemicals	53,198	74,939	70,046	87,186	6,150
White metal alloys	—	..	9	..	..
Smelting and refining	1	1	1	1	77,874
Totals accounted for	70,761	89,933	90,580	108,948	109,073
By provinces:					
Nova Scotia	6,734	5,430	5,974	6,592	5,084
Quebec	52,074	73,737	68,012	86,125	82,945
Ontario	11,455	10,462	16,124	15,420	19,987
Manitoba and Saskatchewan	181	172	236	291	442
Alberta	292	108	154	379	271
British Columbia	25	24	80	141	344
Totals accounted for	70,761	89,933	90,580	108,948	109,073

¹ Included in Heavy chemicals industry.

TABLE 25. World Production of Fluorspar, by Countries¹

Country ¹	1957	1958	1959	1960	1961
	short tons ²				
North America:					
Canada	66,245	62,000 ³	74,000 ³	77,000 ³	76,200 ³
Mexico	471,478	462,049	362,456	399,859	425,596
United States (shipments)	328,872	319,513	185,091	229,782	205,083
Totals	866,593	843,562³	621,547³	706,641³	706,879³
South America:					
Argentina	8,544	14,258	17,989	17,600 ³	17,600 ³
Bolivia (exports)	—	—	—	—	—
Totals	8,544	14,258	17,989	17,600³	17,600³
Europe:					
France	120,285	107,104	110,425	130,073	220,462
Germany:					
East ³	68,000	72,000	72,000	40,000	80,000
West	149,289	137,048	133,715	143,521	120,614
Italy	159,405	162,916	174,091	178,957	166,214
Norway	331	—	—	—	—
Spain	97,439	99,743	98,318	122,377	155,000 ³
Sweden (sales)	2,966	3,188	2,976	3,197	3,300
United Kingdom ⁴	104,467	86,694	93,078	109,249	111,139
Totals⁵	710,000	675,000	690,000	775,000	865,000
Asia:					
China ³	165,000	165,000	220,000	275,000	275,000
Japan	8,542	6,069	5,684	10,108	16,092
Korea North	5	5	5	5	55,000 ³
Korea, Republic of	5,644	1,786	6,748	20,834	30,790
Thailand	—	—	—	3,814	5,241
Turkey	—	88	75	359	42
U.S.S.R. ^{3,6}	165,000	180,000	190,000	210,000	230,000
Totals^{4,5}	400,000	410,000	480,000	575,000	615,000
Africa:					
Morocco:					
Southern Zone	—	—	—	—	869
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	97	6	10	19	—
South West Africa	24	4	141	—	—
Union of South Africa	35,106	48,251	70,317	113,550	95,862
Totals	35,227	48,261	70,468	113,569	96,731
Oceania:					
Australia	784	1,042	528	8	—
World totals (estimate)^{3,2}	2,020,000	1,990,000	1,880,000	2,190,000	2,300,000

¹ Fluorspar is produced in Bulgaria. Estimates are included in the total.² This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.³ Estimate.⁴ Includes fluorspar recovered from old lead and zinc mine dumps.⁵ Data not available; estimate 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.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

GARNET

A garnet deposit near River Valley, Ontario was operated by Industrial Garnet Co. Ltd. The garnets are used as abrasives for cutting granite building stone at the firm's other stone plants. Producers' shipments amounted to 80 tons valued at \$3,200 in 1961 compared with 32 tons worth \$4,480 in the preceding year. These data are subject to revision.

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

magnesium, 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 1961 there were some shipments of graphite from properties in western Quebec. There had been no shipments since 1954, when the Black Donald Mine in Renfrew county Ontario, ceased operations.

Graphite has many uses, but is employed principally in foundry facings, lubricants, crucibles, retorts 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 26. Producers' Shipments of Graphite, 1947-61

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
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	1955-60	—	—
1951	1,569	231,167	1961	1	146

TABLE 27. Imports and Exports of Graphite,¹ 1959-61

	1959	1960	1961
	dollars		
Imports:			
Plumbago, not ground	64,014	75,714	47,450
Crucibles, plumbago, and covers	224,204	236,148	215,788
Plumbago, ground, and manufactures of	976,250	905,756	945,258
Exports:			
Graphite, crude and refined	—	—	—
Carbon and graphite electrodes	340,357	734,542	819,658

¹ Includes artificial graphite.

TABLE 28. Available Data on the Consumption of Graphite, 1957-61

	1957	1958	1959	1960	1961
	pounds				
By industries:					
Polishes and dressings	11,588	100	...	...	...
Paints	117,926	96,332	63,507	82,400	53,385
Brass and copper products	69,632	67,370	65,950	49,577	58,711
Electrical apparatus	583,488	404,213	407,063	341,633	...
Heavy chemicals	637,888	1,211,095	834,174	1,239,385	657,355
Boilers and platework	12,064	13,707	17,023	20,166	19,317
Steel ingots and castings	2,516,000	1,742,000	2,310,000	2,358,000	1,424,000
Farm implements .....	...	...	...	4,370	7,400
Railway rolling stock	39,292	47,575	67,535	49,212	44,600
Machinery	166,774	185,404	204,070	200	—
Iron castings	2,200,805	660,948	762,320	726,845	790,127
Cooking and heating equipment	7,738	7,638	3,438	1,900	12
Refractories .....	...	...	...	400,000	372,000
Asbestos products .....	...	28,968	...	...	...
Batteries .....	...	...	...	...	299,115
Miscellaneous non-metallics	388,140	561	...	124,445	3,225
Miscellaneous metal fabricating	192,906	258,104	118,900	512,205	648,118
Motor vehicle parts .....	...	...	...	261,288	330,900
Communications equipment .....	...	...	...	2,665	1,054
Machine tools	4,500	4,500	5,400	205,491	385,868
Miscellaneous electrical equipment .....	...	...	...	...	150
Miscellaneous chemicals .....	...	...	...	1,350	2,725
Truck and body and trailer .....	...	...	...	...	1,300
Totals for above industries	6,948,741	4,728,515	4,859,380	6,381,132	5,099,362
By provinces:					
Newfoundland	16,649	45,196	49,293	54,516	11,809
Nova Scotia					
New Brunswick	1,189	655	340	—	—
Quebec	1,312,534	1,130,153	1,095,719	2,003,638	1,530,345
Ontario	5,324,995	2,619,717	3,237,866	3,820,453	3,070,985
Manitoba	82,820	157,314	168,049	156,856	89,253
Saskatchewan	1,300	1,000	1,250	35,110	136,159
Alberta	142,520	181,756	226,603	204,975	180,654
British Columbia	66,734	592,724	80,260	105,584	80,157
Totals accounted for	6,948,741	4,728,515	4,859,380	6,381,132	5,099,362

TABLE 29. World Production of Natural Graphite, by Countries

Country ¹	1957	1958	1959	1960	1961
	short tons ²				
North America:					
Canada	—	—	—	—	³
Mexico	25,938 ⁴	21,564 ⁴	30,684 ⁴	37,826 ⁴	21,500 ³
United States					
South America:					
Argentina	451	525	554	550 ³	550 ³
Brazil	890	1,323	1,334	1,433	
Europe:					
Austria	20,857	23,318	68,444	97,043	89,255
Germany:					
West	12,554	12,021	12,361	12,768	13,600 ³
Italy	3,093	4,393	3,412	4,098	4,484
Norway	6,266	4,927	5,396	6,589	6,600 ³
Spain	304	227	457	288	330 ³
Sweden	822	593	700	700	700 ³
U.S.S.R. ⁵	50,000	50,000	50,000	50,000	55,000
Yugoslavia	1,102	992	1,102	1,100 ³	1,100 ³
Asia:					
Ceylon (exports)	9,223	6,342	8,816	10,107	10,016
China ³		35,000	45,000	45,000	45,000
Hong Kong	3,703	3,680	3,676	4,255	1,865
India					
Japan	5,272	3,817	4,453	4,979	3,811
Korea:					
North	34,969	45,000 ³	55,000 ³	55,000 ³	55,000 ³
Republic of	162,703	103,806	91,045	101,722	97,542
Taiwan	2,756	915	621	550	550 ³
Africa:					
Kenya	1,056	739	635	1,113	—
Malagasy Republic (Madagascar)	16,989	13,427	12,614	15,923	17,000 ³
Morocco	—	—	132	—	—
Tanganyika	—	—	28	26	—
Union of South Africa	1,750	875	617	894	963
Oceania:					
Australia	—	—	—	—	—
World totals (estimate)^{1,2}	410,000	350,000	410,000	465,000	450,000

¹ Graphite has been produced in Czechoslovakia 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 Estimate.

⁴ Figure withheld to avoid disclosing individual company confidential data; included in world total.

⁵ Data not available, estimate by senior author of chapter which will appear in Minerals Yearbook, 1961, are included in total.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

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. Shipments during

1960 and 1961 amounted to 10 tons valued at \$2,000 for each year. There were 60 tons of grindstones valued at \$9,000 in 1959. Prior to 1959 there had been no shipments of grindstones since 1955.

TABLE 30. Production of Grindstones, Pulpstones and Scythestones, 1950-61

Year	Tons	Value	Year	Tons	Value
		\$			\$
1950	100	10,000	1955	10	1,500
1951	60	6,000	1956-58	—	—
1952	42	5,720	1959	60	9,000
1953	15	900	1960	10	2,000
1954	—	—	1961	10	2,000

TABLE 31. Purchases of Pulpstones by the Canadian Pulp and Paper Industry, 1951-61

Year	Number for 2 ft. wood	Value	Number for 2.5 ft. wood	Value	Number for 4 ft. wood	Value
		\$		\$		\$
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
1957	67	157,892	9	23,330	150	660,991
1958	37	83,991	9	23,168	108	477,795
1959	35	82,146	7	19,878	122	569,063
1960	51	125,793	10	24,039	140	697,876
1961 .....	..	..	..	..	178 ¹	..

¹ Includes stones for 2 ft. and 2.5 ft. wood.

IRON OXIDES

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.

Canadian producers of ochreous iron oxides shipped 808 tons valued at \$68,199 in 1961 compared

with 909 tons worth \$76,780 in 1960. In 1961 the major portion of the shipments was a higher grade milled calcined material.

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.

TABLE 32. Principal Statistics of the Natural Iron Oxides Industry, Significant Years, 1921-61

Year	Mines or plants	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				dollars		
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
1954	3	31	67,564	21,822	3,904	186,856	150,871
1956	3	29	49,669	6,055	545	191,145	152,400
1957-61	2	2	2	2	2	2	2

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

² Data included in Miscellaneous Non-metal Mining Industry.

TABLE 33. Production of Natural Iron Oxides, 1957-61

Year	Quantity	Value	Year	Quantity	Value
	short tons	\$		short tons	\$
1952	11,487	194,922	1957	7,518	187,211
1953	10,308	195,801	1958	1,632	113,390
1954	5,798	183,507	1959	1,235	108,286
1955	7,702	162,512	1960	909	76,780
1956	8,803	186,225	1961	808	68,199

TABLE 34. Imports and Exports of Ochres and Colours, 1960 and 1961

	1960		1961	
	Quantity	Value	Quantity	Value
	tons	\$	tons	\$
Imports:				
Ochres, ochrey earths, siennas and umbers	615	63,479	644	64,937
Oxides, fireproofs, rough stuff, fillers and colours, dry, n.o.p.	4,908	4,037,293	4,403	4,298,769
Exports:				
Iron oxides	2,523	404,619	2,208	376,169

TABLE 35. Consumption of Iron Oxides in Specified Canadian Industries, 1957-61

Year	Coke and gas		Paints and varnishes			
			Iron oxide pigments		Ochres, siennas and umbers	
	Quantity	Value	Quantity	Value	Quantity	Value
	tons ¹	\$	tons	\$	tons	\$
1957	5,999	64,854	1,895	427,289	263	88,103
1958	237	2,446	1,826	471,356	158	46,511
1959	100	1,211	1,889	442,477	138	40,281
1960 .....	..	..	1,858	440,614	150	48,241
1961 .....	..	..	1,755	434,206	130	45,481

¹ Oxide and purifying materials.

LITHIA

During 1961 the producers of lithia shipped 536,190 pounds valued at \$392,871 compared with 204,666 pounds worth \$84,135 in 1960. These figures on quantities are the lithia or lithium oxide content of spodumene concentrates exported for processing and of lithium compounds. The Quebec Lithium Corporation expanded the chemical plant which produced lithium carbonate and other lithium chemicals. The mine, mill and chemical plants are located at Barraute, Quebec.

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° and +320°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 trans-

parent 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, 1954-61

Year	Pounds	Value
		\$
1954	17, 052	6, 300
1955	114, 376	61, 752
1956	4, 789, 380	2, 643, 950
1957	5, 140, 257	2, 827, 143
1958	3, 853, 322	2, 047, 880
1959	2, 756, 280	1, 422, 153
1960	204, 666	84, 135
1961	536, 190	392, 871

TABLE 37. World Production of Lithium Minerals, by Countries

Country	Mineral produced	1957	1958	1959	1960	1961
short tons						
North America:						
Canada ¹	Spodumene	2,750	1,927	1,378	102	258
United States	Lithium minerals					
South America:						
Argentina	Lithium Minerals	22	175	187	³	³
Brazil	Spodumene (exports)	—	176	468	—	³
	Amblygonite (exports)	552	—	590	55	³
Europe:						
Spain	Amblygonite	7	—	—	28	—
Africa:						
Congo, Republic of the and Ruanda-Urundi	Amblygonite	2,318	11	2,965	2,569	³
	Spodumene (exports)	1	—	—	—	—
Mozambique	Lepidolite	379	96	99	1	75 ⁴
	Amblygonite	—	—	—	—	—
Rhodesia and Nyasaland, Federation of:						
Southern Rhodesia	Eucryptite	56	398		1,334	1,879
	Amblygonite	122	1,835		—	86
	Lepidolite	93,545	64,699	57,901 ⁵	15,485	24,037
	Petalite	9,934	13,166		63,336	27,698
	Spodumene	5,599	5,238		7,690	1,627
South-West Africa	Amblygonite	535	534	242	161	160 ⁴
	Lepidolite	882	1,043	2,168	972	1,240 ⁴
	Petalite	5,325	7,405	2,787	3,909	2,810 ⁴
Uganda	Amblygonite	6	—	—	—	—
Union of South Africa	Amblygonite	30	—	10	173	260
Oceania:						
Australia	Spodumene	—	—	—	—	—
	Petalite	—	76	—	—	—
Totals		121,883	96,779	68,795	95,815	³

¹ Tons of lithia in spodumene concentrates.² Figure withheld to avoid disclosing individual company confidential data. No estimates included in total.³ Data not available.⁴ Estimate.⁵ Exports.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

MAGNESITE AND BRUCITE

Magnesitic dolomite is mined 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. A minor portion of the magnesia was formerly used by the company to make magnesium metal at Arvida, Quebec. The magnesium plant is now closed. Most of the magnesia output is sold for the manufacture of basic refractories, but some is used as a 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 38. Production of Magnesitic Dolomite, 1952-61

Year	Value	Year	Value
	\$		\$
1952	2,161,472	1957	3,046,298
1953	2,016,640	1958	2,529,161
1954	1,909,163	1959	3,050,779
1955	2,151,820	1960	3,279,021
1956	2,783,181	1961	3,064,403

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

TABLE 39. Magnesite and Dolomite Used in the Canadian Primary Iron and Steel, 1956-61

Year	Calcined dolomite		Dolomite, crude		Magnesite	
	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$
1956	95,703	2,407,384	422,888	803,730	10,784	676,943
1957	99,402	2,560,630	399,156	796,434	9,062	607,987
1958	75,192	1,980,254	301,960	785,226	6,186	414,789
1959	90,403	2,351,634	331,398	961,531	9,626	662,193
1960	83,121	2,162,556	500,687	1,326,958	10,551	725,458
1961	82,565	2,112,961	599,550	1,253,588	8,138	560,650

TABLE 40. World Production of Magnesite, by Countries¹

Country ¹	1957	1958	1959	1960	1961
	short tons ²				
North America:					
United States	678,489	492,982	594,307	498,528	603,656
Totals ^{1,3}	970,000	740,000	890,000	810,000	890,000
South America:					
Brazil	11,000 ³	53,116	53,378	69,793	66,000 ³
Totals	11,000	53,116	53,378	69,793	66,000 ³
Europe:					
Austria	1,292,567	1,346,023	1,324,106	1,791,701	1,982,704
Bulgaria	155,000 ³	165,000 ³	165,000 ³	165,000 ³	165,000 ³
Czechoslovakia			440,000 ³	470,000 ³	550,000 ³
Greece	52,392	97,742	123,566	193,000 ³	220,000 ³
Italy	8,512	6,500	7,562	6,584	7,478
Norway	—	—	—	—	—
Poland	18,850	15,432	18,188	23,920	30,000 ³
Spain	40,454	38,442	44,569	53,239	55,000 ³
Yugoslavia	233,983	246,032	269,851	277,613	301,002
U.S.S.R.					2,750,000 ³
Totals ^{1,3}	3,750,000	3,900,000	4,050,000	4,650,000	6,050,000
Asia:					
China	4	4	4	4	1,100,000 ³
India	99,552	114,900	174,129	172,332	231,485
Pakistan	24	—	443	486	180
Turkey	1,439	717	—	17	2,414
Totals ^{1,3}	780,000	1,270,000	1,550,000	1,550,000	1,390,000
Africa:					
Kenya	117	551	3,145	33	1,930
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	2,910	—	—	8,031	13,880
Tanganyika (exports)	284	337	118	126	46
Union of South Africa	35,414	80,200	58,883	66,793	67,732
Totals	38,725	81,088	62,146	74,983	83,588
Oceania:					
Australia	93,490	77,718	67,856	69,626	106,234
New Zealand	675	1,344	—	891	880 ³
Totals	94,165	79,062	67,856	70,517	107,114
World totals (estimate) ^{1,2}	5,650,000	6,100,000	6,700,000	7,200,000	8,600,000

¹ Quantities in this table represent crude magnesite mined. Magnesite is also produced in Canada, China, Mexico, North Korea and U.S.S.R., but data on tonnage output are not available; estimates included in total.

² This table incorporates some revisions.

³ Estimate.

⁴ Data not available; estimates included in total.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

MAGNESIUM SULPHATE

Natural hydrous magnesium sulphate (Epsom salts of 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 Sulphate,¹ 1941-61

Year	Tons	Value
1941	265	\$ 7,343
1942	1,140	38,760
1943-61	—	—

¹ Produced entirely in British Columbia.

TABLE 42. Imports of Magnesium Sulphate, 1952-61

Year	Tons	Value	Year	Tons	Value
		\$			\$
1952	2,186	76,419	1957	2,558	71,295
1953	2,761	80,885	1958	2,453	71,209
1954	2,365	70,374	1959	2,721	70,697
1955	2,376	69,009	1960	2,434	63,998
1956	2,614	69,517	1961	2,591	69,524

TABLE 43. Available Data on Consumption of Magnesium Sulphate, 1957-61

Industry	1957	1958	1959	1960	1961
	tons				
Leather tanneries	474	464	388	355	431
Medicinals	630	658	539	501	572
Fertilizers	49	100	104	130	162
Textiles	2	—	—	—	—
Totals accounted for	1,155	1,222	1,031	986	1,165

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 A. Principal Statistics of the Mica Mining Industry, Significant Years, 1921-59

Basis: Standard Industrial Classification in use prior to 1960

	Mines or plants	Em- ployees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of production	Net value added ¹
	number		dollars				
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
1954	32	44	59,194	7,778	6,154	85,139	71,207
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
1958	25	28	44,848	5,039	4,483	90,643	81,121
1959	14	16	37,106	3,810	4,090	64,029	56,129

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

TABLE 44 B. Principal Statistics of the Mica Mining Industry, 1957-61

Basis: Revised Standard Industrial Classification and New Establishment Concept

	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 added ¹
	number		dollars				
1957	25	47	66,283	5,585	7,411	113,458	100,462
1958	25	28	44,848	5,039	4,483	90,643	81,121
1959	14	16	37,106	3,810	4,090	64,029	56,129
1960	29	21	38,022	3,303	4,457	95,997	88,237
1961	30	34	58,258	9,623	7,694	128,296	110,979

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

TABLE 45. Mica Production (Primary Sales), by Classes, 1960 and 1961

Grade	1960		1961	
	Pounds	Total value f.o.b. shipping point	Pounds	Total value f.o.b. shipping point
		\$		\$
Rough, mine-run or rifted	118,407	5,103	73,541	3,975
Mica sold for mechanical splitting	27,900	8,370	24,577	6,925
Splittings	—	—	22,556	4,836
Ground or powdered	791,994	35,257	1,434,097	63,435
Scrap, mine or shop waste and mica mined and sold for grinding	696,886	9,665	204,804	2,082
Trimmed mica	28,862	35,011	56,585	44,124
Unspecified	38,556	797	—	—
Totals, mica shipments	1,702,605	94,203	1,816,160	125,377
Varieties:				
Phlogopite mica (amber) and biotite	1,580,605	91,017	1,565,740	116,722
Muscovite mica (white) and schist	122,000	3,186	250,420	8,655

TABLE 46. Production of Mica, by Provinces and by Varieties, 1961

Province	Phlogopite and biotite		Muscovite and schist		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Quebec	1,373,200	102,390	—	—	1,373,200	102,390
Ontario	192,540	14,332	420	630	192,960	14,962
British Columbia	—	—	250,000	8,025	250,000	8,025
Totals, Canada	1,565,740	116,722	250,420	8,655	1,816,160	125,377

TABLE 47. Production of Mica, 1952-61

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1952	1,007	194,106	1957	641	111,583
1953	1,133	161,128	1958	752	89,651
1954	853	85,139	1959	407	63,004
1955	820	77,541	1960	856	94,203
1956	922	95,666	1961	908	125,377

TABLE 48. Imports and Exports of Mica, 1959-61

	1959		1960		1961	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Imports:						
Mica, unmanufactured	1,340,400	161,309	1,838,800	147,847	1,475,800	175,455
Mica, manufactures of, n.o.p. ....	...	428,088	...	322,259	—	358,499
Exports:						
Mica, scrap and waste	246,500	13,062	367,000	14,137	...	...
Mica splittings .....	—	—	—	—	...	...
Mica manufactures .....	...	8,570	...	50	...	...
Mica, rough untrimmed	107,100	5,993	30,200	9,000	...	...
Mica, trimmed	24,200	23,154	67,000	67,397	...	...
Mica, ground	46,000	2,760	24,000	1,380	...	...
Mica, rough, scrap and schist .....	...	...	...	...	181,100	52,357
Mica, fabricated .....	...	...	...	...	41,300	55,645
Totals, mica exports reported .....	...	53,539	...	91,964	...	108,002

TABLE 49. Consumption of Mica, in Specified Industries, 1957-61

	1957	1958	1959	1960	1961
	pounds				
By industries:					
Paints	2,196,612	1,912,073	1,929,365	2,364,002	2,428,880
Electrical apparatus	642,608	355,928	361,710	...	...
Rubber goods	574,706	634,021	609,155	824,556	483,729
Roofing	518,000	512,000	200,000	204,000	658,000
Paper goods	18,000	...	...	...	...
Asbestos .....	...	11,868	...	...	...
Non-metallic mineral products	79,000	121,506	127,142	60,000	45,000
Small electrical appliances .....	...	...	...	30,200	1,200
Major appliances .....	...	...	...	64,034	120,018
Communications equipment .....	...	...	...	1,034	12,384
Electrical industrial equipment .....	...	...	...	195,831	56,912
Electric wire and cables .....	...	...	...	14,480	11,830
Miscellaneous electrical products .....	...	...	...	...	1,500
Totals accounted for	4,028,926	3,547,396	3,227,372	3,758,137	3,819,453
By provinces:					
Quebec and Nova Scotia	1,946,033	1,685,410	1,619,077	1,453,869	1,482,932
Ontario	1,545,913	1,324,552	1,288,436	1,515,780	1,064,183
Manitoba	27,085	191,782	44,318	54,467	54,622
Alberta	420,000	294,000	198,000	390,436	855,524
British Columbia	89,895	51,652	77,541	343,585	362,192
Canada	4,028,926	3,547,396	3,227,372	3,758,137	3,819,453

TABLE 50. World Production of Mica by Countries¹

Country ¹	1957	1958	1959	1960	1961
thousands of pounds ²					
North America:					
Canada (shipments):					
Block	108	90	49	176	} 2,061
Splittings	15	—	—	—	
Ground	910	1,380	591	791	
Scrap	247	35	174	734	
United States (sold or used by producers):					
Sheet	690	661	706	571	480
Scrap	184,876	186,694	203,082	195,824	198,088
South America:					
Argentina:					
Sheet	212	} 192 ³	403 ³	397 ³	265 ^{3,4}
Scrap	2				
Brazil	3,265	2,829	2,553	4,440	4,400 ⁴
Europe:					
Austria ⁵	—	134	216	317	194
Norway, including scrap	4,630	4,519	12,059	5,732	6,114
Spain	24	20	11	—	—
Sweden:					
Block	—	—	—	—	—
Ground	474	421	220	441	440 ⁴
Yugoslavia	37	4	4	4	9
Asia:					
India (exports):					
Block	4,411	5,243	6,305	5,216	4,592
Splittings	16,645	14,264	15,988	17,469	18,208
Scrap	27,915	24,001	29,242	42,829	35,355
Taiwan, including scrap	11	6	6	—	—
Africa:					
Angola:					
Sheet	46	46	20	26	4
Scrap and splitting	844	716	384	721	46
Kenya	—	15	22	2	6
Malagasy Republic (Madagascar) (phlogopite):					
Block	139	234	269	256	223
Splittings	1,984	2,154	1,922	1,973	2,002
Mozambique, including scrap	66	4	7	2	2
Rhodesia and Nyasaland, Federation of:					
Northern Rhodesia:					
Sheet	1	2	1	6	—
Southern Rhodesia:					
Block	71	108	106	90	64
Scrap	—	—	—	—	—
South West Africa	—	—	234	—	—
Sudan:					
Block	13	225	} 882	{ —	—
Scrap	—	154			
Tanganyika (exports):					
Sheet	148	108	117	179	196
Ground	—	—	—	—	—
Scrap	—	24	190	—	—
Union of South Africa:					
Sheet	2	2	6	2	2
Scrap	4,226	4,255	3,752	7,284	5,441
Oceania:					
Australia:					
Block	37	31	33	9	—
Scrap	40	84	187	653	185
Damourite	1,455	1,080	1,100	1,252	1,138
World totals (estimate) ^{1,2}	320,000	315,000	350,000	365,000	355,000

¹ Mica is also produced in China, Rumania and U.S.S.R., but data on production are not available; estimates are included in total.

² This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.

³ Exports.

⁴ Estimate.

⁵ Including reclaimed from dumps.

⁶ Less than 500 pounds.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

TABLE 51. Employees and their Earnings in the Mica Mining Industry, 1957-61

Year	Employees					Man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and adminis- trative	Workmen	Total
	Male	Female	Male	Female					
	number						dollars		
1957	2	—	32	13	47	78, 251	4, 500	61, 783	66, 283
1958	1	—	27	—	28	42, 821	4, 800	40, 048	44, 848
1959	1	—	15	—	16	37, 106	4, 800	32, 806	37, 106
1960	1	1	19	—	21	34, 904	4, 836	33, 186	38, 022
1961	2	—	29	3	34	50, 996	3, 899	54, 359	58, 258

TABLE 52. Workmen in the Mica Mining Industry, by Months, 1960 and 1961

Month	1960				1961				
	Male				Male				
	Mine		Mill or shop	Total	Mine		Mill or shop		Total
	Surface	Under-ground			Surface	Under-ground	Male	Female	
	number								
January	3	6	3	12	4	8	2		14
February	3	6	3	12	4	8	3		15
March	3	6	3	12	5	7	—		12
April	3	6	3	12	7	7	2	2	18
May	5	6	4	15	18	9	2	2	31
June	12	—	4	16	21	7	3	6	37
July	13	—	5	18	21	7	3	6	37
August	12	—	5	17	26	9	3	6	44
September	6	8	5	19	32	8	7	4	51
October	5	8	5	18	28	6	7	4	45
November	2	8	5	15	21	9	10	4	44
December	6	5	3	14	6	10	4	4	24
Averages	10	5	4	19	17	8	4	3	32
Total man-hours worked				34,904					49,196

TABLE 53. Fuel and Electricity Used in the Mica Mining Industry, 1961

Kind	Quantity	Cost at plant
		\$
Bituminous coal (a) From Canadian mines	94 short ton	1,599
(b) Imported	—	—
Sub-bituminous coal (from Alberta mines only)	—	—
Anthracite coal	—	—
Lignite coal	—	—
Coke (for fuel only)	—	—
Gasoline, (includes gasoline used in cars and trucks)	13,429 Imp. gal.	5,785
Kerosene or coal oil	5	2
Fuel oil	—	—
Wood (cords of 128 cubic feet of piled wood)	— cord	—
Gas (a) Liquefied petroleum gases (propane, etc.)	—	—
(b) Other manufactured gas	—	—
(c) Natural gas	—	—
Other fuel	—	—
Electricity purchased for power and lighting	129,515 kwh.	2,237
Electricity purchased for other purposes	—	—
Totals (cost only) .....	...	9,623
Electricity generated (a) For own use	—	...
(b) For sale	—	—

NATURAL MINERAL WATERS

Most of the bottled natural mineral waters are obtained from springs in Quebec. Among the larger producers are Crush International Limited at Varennes, Sources Abenakis Ltée at St-Francois du Lac, Eau Minérale Naturelle St-Léon at St-Léon 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.

These data on the commodity are recorded here for reference purposes. They may not appear in future issues.

TABLE 54. Shipments of Natural Mineral Waters from Canadian Springs, 1952 - 61

Year	Quebec		Ontario		Canada	
	Imp. gal.	Value	Imp. gal.	Value	Imp. gal.	Value
		\$		\$		\$
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
1958	314,294	170,622	2,433	1,946	316,737	172,568
1959	366,088	201,033	3,025	1,936	369,113	202,969
1960	372,799	199,874	2,626	1,890	375,425	201,764
1961	375,948	205,923	6,985	2,786	364,933	208,709

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, Quebec, 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 55. Production of Phosphate Rock, 1947-61

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1947	—	—	1952	—	—
1948	—	—	1953	—	—
1949	20	291	1954	—	—
1950	129	1,070	1955	—	—
1951	6	94	1956-61	—	—

TABLE 56. Imports of Phosphate Rock, 1952-61

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1952	470,913	3,130,306	1957	723,220	5,897,784
1953	576,500	3,951,318	1958	744,164	6,854,243
1954	644,860	4,577,633	1959	747,068	7,468,368
1955	588,209	4,512,833	1960	941,998	8,320,129
1956	627,648	5,185,597	1961	1,056,885	9,678,644

TABLE 57. Consumption of Phosphate Rock, 1957-61

	1957	1958	1959	1960	1961
	tons				
By uses:					
Fertilizers	584,216	583,584	621,126	157,421	239,408
Chemicals	114,265	115,556	143,865	731,164	747,920
Stock and poultry feeds	24,234	29,766	30,697	29,649	33,236
Miscellaneous .....	...	...	75	...	...
Totals	722,715	728,906	795,763	918,234	1,020,564
By provinces:					
Prince Edward Island	} 293	358	427	221	416
Nova Scotia					
New Brunswick	800	808	963	1,030	1,241
Quebec	175,260	170,272	203,042	219,891	223,120
Ontario	88,129	84,607	95,355	118,951	186,358
Manitoba	815	1,218	1,702	1,220	2,007
Saskatchewan	333	664	442	706	968
Alberta	99,692	107,508	98,120	157,814	174,904
British Columbia	357,393	363,471	395,712	418,401	431,550
Canada	722,715	728,906	795,763	918,234	1,020,564

TABLE 58. World Production of Phosphate Rock, by Countries¹

Country ¹	1957	1958	1959	1960	1961
thousand long tons ²					
North America:					
United States	13,976	14,879	15,869	17,516	18,559
West Indies:					
Netherlands Antilles (exports)	105	85	97	113	144
Totals	14,081	14,964	15,966	17,629	18,703
South America:					
Brazil: Apatite	124	111	131	200	200 ³
Phosphate rock	200	524	860	666	690 ³
Chile: Apatite	32	18	20	17	17
Guano	34	31	21	21 ³	17
Peru: Guano	281	164	107	144	156
Venezuela	146	—	—	—	—
Totals	817	848	1,139	1,048	1,080³
Europe:					
Belgium	16	18	13	8	14
France	92	102	76	75 ³	75 ³
Spain	4	—	4	3	3 ³
U.S.S.R.: Apatite ³	3,940	3,940	3,940	4,230	4,530
Sedimentary rock ³	1,720	1,970	1,970	2,260	3,050
Totals^{1,3}	6,000	6,280	6,250	6,820	7,920
Asia:					
China ³	200	300	500	600	600
Christmas Island (Indian Ocean) (exports)	336	374	494	503	694
India: Apatite	9	15	14	14	20
Indonesia	4	2	10	7	9
Israel	150	206	201	221	222
Jordan	258	289	332	356	365
Korea, North	5	5	5	5	50 ³
Philippines (Guano)	4	8	4	10	4
Sarawak (Guano)	4	4	1	1 ³	4
Vietnam, North: Phosphate rock	22	32	50	50	50 ³
Apatite	55	133	256	482	568
Totals^{1,3}	1,070	1,390	1,890	2,285	2,580
Africa:					
Algeria	603	552	563	554	419
Malagasy Republic (Madagascar)	3	5	7	5	5 ³
Morocco Southern Zone	5,480	6,236	7,050	7,354	7,824
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	—	—	2	3	4
Senegal: Aluminum phosphate	88	103	94	104	100 ³
Calcium phosphate	—	—	—	106	100 ³
Seychelles Islands (exports)	6	17	6	7	7 ³
South West Africa: Guano	3	—	1	—	1
Togo	—	—	—	—	278
Tunisia	2,035	2,243	2,150	2,063	1,950
Uganda	3	2	3	4	4
Union of South Africa	166	213	228	263	292
United Arab Republic (Egypt Region)	576	549	668	558	560 ³
Totals	8,963	9,920	10,772	11,021	11,536
Oceania:					
Australia	11	7	5	2	2 ³
Makatea Island (French Oceania)	304	320	362	398	363
Nauru Island (exports)	1,105	1,234	1,192	1,351	1,282
Ocean Island (exports)	292	324	314	320	301
Totals	1,712	1,885	1,873	2,071	1,948
World totals (estimate)^{1,2}	32,640	35,290	37,890	40,870	43,770

¹ Poland produces phosphate rock; but data of output are not available; estimates have been included in the total. A negligible amount is produced in Jamaica, Japan, Somalia Republic and Tanganyika.

² This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.

³ Estimate.

⁴ Less than 500 tons.

⁵ Data not available: estimate included in total.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

POTASH

During 1961 there were no shipments of potash. The Potash Company of America Ltd. stopped mining operations while the shaft was undergoing repairs. Shipments made in 1960 were valued at \$178,700, while those made in the preceding year were valued at \$1,408,462. Although the products may be potassium chloride, the market quotations and other calculations are usually based on the K₂O equivalent. 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 59. World Production of Potash (Marketable, Unless Otherwise Stated)
in Equivalent K₂O, by Countries¹**

Country ¹	1957	1958	1959	1960	1961
	short tons ²				
North America:					
Canada	—	—	46,500	—	—
United States	2,266,481	2,147,671	2,383,259	2,638,574	2,732,602
Crude (including Brines) ³	2,615,808	2,478,725	2,781,960	3,039,309	3,143,569
South America:					
Chile	8,339	9,811	15,482	16,500 ⁴	14,000 ⁴
Europe:					
France	1,545,323	1,628,146	1,611,466	1,692,046	1,850,000 ⁴
Crude ³	1,736,894	1,835,033	1,828,804	1,909,791	2,098,798
Germany:					
East ⁴	1,653,000	1,700,000	1,764,000	1,764,000	1,764,000
Crude ^{3,4}	1,900,000	1,960,000	2,028,000	2,028,000	2,028,000
West	1,862,904	1,886,052	2,026,046	2,179,836	2,252,901
Crude ³	2,190,290	2,225,564	2,363,353	2,553,161	2,645,544
Italy	—	9,022	11,575	51,162	154,300 ⁴
Spain	251,460	262,672	269,790	291,356	298,000 ⁴
U.S.S.R. ⁴	1,040,000	1,100,000	1,160,000	1,212,500	1,300,000
Asia:					
Israel	50,000	67,100	72,000	108,000	132,300 ⁴
Japan:					
Alunite ⁴	500	500	210	190	130
Carbonate ⁴	1,175	1,380	2,120	2,570	2,540
Africa:					
Eritrea	—	450	—	—	—
World totals (marketable estimate)¹	8,700,000	8,800,000	9,400,000	10,000,000	10,500,000

¹ Potash may be produced in Poland; data on production are not available and no estimate is included in total.

² This table incorporates some revisions. 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.

⁵ Data not available, estimate included in total.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

POZZOLANA

This mineral name has alternate spellings, pozzuolana, pozzuolane and pozzolan. It is a siliceous rock or leucitic tuff which was first quarried near Pozzuoli, Italy and used in the manufacture of hydraulic cement. Artificial pozzolana is made from slag, fly ash, etc. In British Columbia Canadian Pozzolan Industries Ltd. processed shale

for pozzolan at Britannia Beach. At Ramberton the British Columbia Cement had facilities to produce this commodity. At Saltspring Island construction of a rotary-kiln plant had been started by Holdfast Natural Resources Ltd. Producers shipments in 1961 were valued at \$2,000.

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, and Weedon Pyrite Mines in Quebec and Britannia Mine in British Columbia. 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.

At Cutler, Ontario the pyrite and pyrrhotite concentrates from Noranda Mines are treated to produce sulphuric acid which is sold to the uranium mines in the Elliot Lake area. 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 60. Producers' Shipments Pyrite and Pyrrhotite, 1952-61

Year	Gross weight	Sulphur content ¹	Value	Year	Gross weight	Sulphur content ¹	Value
	tons		\$		tons		\$
1952	553,987	263,241	2,245,713	1957	1,166,416	515,096	4,808,228
1953	408,257	186,650	1,450,698	1958	1,191,731	512,427	4,248,668
1954	687,928	311,159	2,663,499	1959	1,099,564	465,611	3,433,095
1955	878,452	403,986	3,740,383	1960	1,032,288	437,790	3,316,378
1956	1,046,740	473,605	4,538,785	1961	517,258	255,376	1,830,566

¹ Data for 1952-55 include sulphur content of acid made from roasting zinc sulphide concentrates at Arvida.

TABLE 61. World Production of Pyrites (Including Cupreous Pyrites), by Countries¹

Country ¹	1958		1959		1960		1961	
	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content
	thousand long tons ²							
North America:								
Canada	1,064	458	982	416	922	396	452	223
Cuba	33	17	25 ³	12 ³	4	4	—	—
United States	974	403	1,057	437	1,016	416	987	399
South America:								
Venezuela	14	4	4	1	—	—	—	—
Europe:								
Bulgaria: Pyrite	69	28	31	13	36	15	36 ³	15 ³
Pyrite concentrates	83	34	113	47	113 ³	48 ³	113 ³	48 ³
Czechoslovakia	379	143 ³	365	144 ³	384	148	394	155 ³
Finland	249	105 ³	259	109	255	107	265	112
France	420	149	401	130	406	130	280	123
Germany:								
East	146 ³	51	141 ³	49	132 ³	46	132 ³	46 ³
West	557	224	462	189	529	219	523	221
Greece	160	71	127	56	128 ³	56 ³	167 ³	75 ³
Italy	1,490	677	1,498	674	1,521	692	1,555	708
Norway	780	339	732	320	820	356	709	311
Poland	208	75	217	79	223	83	198	76
Portugal	589	271	622	286	645	297	643	296
Rumania	202	81	231	93	263	105	271 ³	108 ³
Spain	2,014	931	2,086	961	2,217	1,053	2,018 ³	965 ³
Sweden	329	163	341	169	406	203	443 ³	217 ³
United Kingdom	3	1 ³	1	1	5	5	5	5
Yugoslavia	326	130	285	114	410	164	358	143

See footnotes at end of table.

TABLE 61. World Production of Pyrites (Including Cupreous Pyrites), by Countries¹—Concluded

Country ¹	1958		1959		1960		1961	
	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content
thousand long tons ²								
Asia:								
China ³	492	221	689	310	984	443	1,181	531
Cyprus.....	1,658	796 ³	1,226	589 ³	1,064 ⁶	515 ⁶	961	465
Japan.....	3,306	1,378	3,336	1,396	3,634	1,517	3,869	1,637 ³
Korea, North.....	4	4	4	4	4	4	400 ³	160 ³
Philippines.....	19	8	25	11 ³	25	11 ³	51	22 ³
Taiwan.....	32	12	33	13	42	16	47	16
Turkey.....	80	39	87	42	42	20	97	46
Africa:								
Algeria.....	24	11	29	13	38	17	48	22
Morocco: Southern Zone.....	18	6	14	5	13	5	13 ³	5 ³
Rhodesia and Nyasaland Federation of:								
Southern Rhodesia.....	58	24	40	17	49	19	58	25 ³
Union of South Africa.....	493	205	495	195	492	197 ³	440	176
Oceania:								
Australia.....	227	109	223	107	239	115	235	113
World totals (estimate) ^{1,2}	18,700	7,800	18,400	7,700	19,300	8,100	19,400	8,200

¹ Pyrites is produced in Brazil and U.S.S.R., but production data are not available; negligible quantities are produced in Austria, India, Republic of Korea, and Tunisia.

² This table incorporates some revisions. 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.

⁵ Less than 500 tons.

⁶ Exports.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

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 markets, production is restricted to the

requirements of consumers with 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), 1945-61

Year	Tons	Value	Year	Tons	Value
		\$			\$
1945.....	286	3,146	1950.....	—	—
1946.....	—	—	1951.....	—	—
1947.....	163	1,793	1952.....	—	—
1948.....	—	—	1953.....	—	—
1949.....	47	513	1954-61.....	—	—

SODIUM SULPHATE (NATURAL)

All the natural sodium sulphate produced in Canada was obtained from the brine lakes in Saskatchewan. Producers shipped 250,996 tons valued at \$4,036,625 in 1961 compared with 214,208 tons valued at \$3,449,155 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. Production of Natural Sodium Sulphate, 1952-61

Year	Short tons	Selling value f.o.b. shipping point	Year	Short tons	Selling value f.o.b. shipping point
		\$			\$
1952	122,590	1,708,807	1957	157,800	2,568,728
1953	115,565	1,631,258	1958	173,217	2,862,915
1954	158,417	2,385,573	1959	179,535	2,881,861
1955	178,888	2,799,715	1960	214,208	3,449,155
1956	181,053	2,838,186	1961	250,996	4,036,625

TABLE 64. Production of Manufactured Sodium Sulphate,¹ 1946-61

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	1954-61 .....	..	..
1950	3,674	74,555			

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

TABLE 65. Imports of Sodium Sulphate, 1952 - 61

Year	Salt cake		Glauber's salt	
	Tons	Value	Tons	Value
		\$		\$
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
1958	25,812	478,215	1,217	38,798
1959	27,157	511,162	966	39,907
1960	24,706	472,084	1,156	38,350
1961	32,310	575,015	898	29,023

TABLE 66. Exports of Sodium Sulphate, 1952 - 61

Year	Long tons	Value	Year	Short tons	Value
		\$			\$
1952	24,236	382,274	1957 ¹	37,023	593,390
1953	17,975	298,374	1958 ¹	39,763	645,670
1954	58,972	1,039,284	1959 ¹	47,922	752,116
1955 ¹	67,762	1,263,911	1960 ¹	63,831	1,025,632
1956 ¹	60,579	985,801	1961	87,131	1,331,428

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 67. Available Data on Consumption of Sodium Sulphate (Salt Cake) in Canada, by Industries, 1957 - 61

Industry	1957	1958	1959	1960	1961
	short tons				
Pulp and paper	160,042	164,556	168,215	178,449	192,912
Glass, including glass wool	2,111	2,357	2,078	2,813	2,756
Medicinals	67	52	54	54	16
Soaps	1,252	814	952	1,394	517
Stone products	271	288	335	352 ¹	204
Totals accounted for	163,743	168,067	171,634	183,062	196,405

¹ Mineral wool industries only.

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. Concentrates are similarly processed at the Sherbrooke Metallurgical Co. Limited, Port Maitland, Ontario.

Sour natural gas in the western provinces is processed to remove the hydrogen sulphide. The treatment of large volumes of natural gas means that there are large tonnages of elemental sulphur produced as a by-product. The output of sulphur has exceeded the market demand. Statistics on the operations of the sulphur plants are shown in Natural Gas Processing Plants, Standard Industrial classification, -065.

Elemental sulphur is also produced in the processing of nickel sulphides at the nickel refinery.

TABLE 68. Sulphur in Smelter Gases, 1952 - 61

Year	Quantity ¹	Value	Year	Quantity ¹	Value
	tons	\$		tons	\$
1952	160,547	1,605,470	1957 ²	235,123	2,322,067
1953	172,200	1,722,000	1958 ²	241,055	2,361,252
1954	221,247	2,212,470	1959 ²	277,030	2,716,416
1955	224,457	2,244,570	1960 ²	289,620	2,854,623
1956 ²	236,088	2,323,590	1961 ²	277,056	2,708,110

¹ Does not include in 1952-55 sulphur in acid made from roasting zinc sulphide concentrates at Arvida.

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

TABLE 69. Sulphur (Elemental)¹ Made from Natural Gas and Nickel Sulphide, 1952 - 61

Year	Output	Sales
	short tons	
1952	8,931	4,225
1953	18,298	16,072
1954	22,320	18,665
1955	29,093	25,976
1956	33,464	34,784
1957 ²	107,478	93,338
1958 ²	186,055	94,377
1959 ²	294,775	145,656
1960 ²	454,045	274,359
1961 ²	550,101	394,762

¹ Does not include sulphur made from imported crude petroleum.

² Includes sulphur produced at nickel refinery.

TABLE 70. Imports of Sulphur, 1951 - 61

Year	Tons	Value	Year	Tons	Value
		\$			\$
1951	395,928	8,959,677	1957	416,930	9,752,368
1952	415,185	8,376,824	1958	380,331	8,324,191
1953	359,205	8,526,804	1959	332,430	6,924,938
1954	310,127	7,816,301	1960	328,765	6,629,239
1955	373,373	8,386,983	1961	329,555	7,094,216
1956	474,117	11,857,556			

TABLE 71. Available Data on the Consumption of Sulphur (Brimstone), 1957 - 61

	1957	1958	1959	1960	1961
	tons of 2,000 pounds				
By industries:					
Pulp and paper	284,561	273,861	275,362	286,293	299,736
Heavy chemicals	189,911	229,170	193,737	197,212	175,537
Rubber goods	2,687	2,424	2,868	3,200	3,221
Medicinal	43	21	21	15	14
Adhesives	77	61	62	...	...
Starch	43	450	234	282	301
Fruit and vegetable preparations	6	3	...	...	5
Sugar refining	144	135	150	113	126
Petroleum refining	225	225	219	198	120
Steel and iron	83	58	171	1,224	1,548
Miscellaneous chemicals	3,161	8,634	10,667	19,273	25,047
Asbestos products .....	...	5	...	...	...
Malt products .....	...	...	...	...	109
Totals accounted for	480,941	515,047	483,482	507,810	505,764
By provinces:					
Newfoundland	19,886	19,387	21,094	22,624	24,122
Nova Scotia	6,753	6,543	5,029	5,236	5,802
New Brunswick	36,933	38,290	35,117	36,586	38,227
Quebec	134,528	138,483	138,063	156,397	156,612
Ontario	174,633	197,682	162,145	141,044	153,862
Manitoba and Saskatchewan	18,699	24,998	23,037	22,679	3,857
Alberta	39,105	41,688	42,127	63,030	66,487
British Columbia and Northwest Territories	48,404	47,976	56,870	60,214	56,795
Canada	480,941	515,047	483,482	507,810	505,764

TABLE 72. Exports of Sulphur and Pyrite, 1955 - 61

Year	Pyrite	Sulphur	
	Value	Tons	Value
	\$		\$
1955	2,001,575	3,051	94,141
1956	2,649,349	4,331	128,116
1957	2,852,753	12,364	293,042
1958	1,879,251	7,608	170,966
1959	1,018,608	26,526	504,961
1960	1,259,151	143,040	2,762,372
1961	899,755	217,866	3,967,884

TABLE 73. World Production of Elemental Sulphur by Countries¹

Country ¹	1957	1958	1959	1960	1961
	long tons ²				
Native sulphur:					
Frasch:					
Mexico	990,118	1,201,483	1,293,181	1,261,574	1,148,494
United States	5,491,212	4,643,243	4,553,634	4,942,935	5,385,468
Totals	6,481,330	5,844,726	5,846,815	6,204,509	6,533,962
From sulphur ores:					
Argentina	28,788	31,545	25,207	39,265	25,000 ³
Bolivia (exports)	783	392	—	1,175	4,896
Canary Islands	2,900	2,900	2,900	3,900	3,900
Chile	18,492	24,015	21,676	30,900	39,368
China ⁴	50,000	70,000	100,000	120,000	120,000
Columbia	5,905	6,693	8,824	8,899	9,941
Greece	2,826	—	—	—	—
Italy:					
Crude	175,982	154,137	119,272	79,703	68,668
Ground	19,904	18,619	69,437	34,687	17,567
Japan	253,548	178,052	215,669	243,684	238,562
Mexico	17,797	35,446	17,700 ⁵	17,700 ⁵	25,116
Philippines	1,300 ⁶	1,200	—	43	158
Poland	—	9,200	10,500	25,000	130,220
Spain	3,356	3,055	2,851	2,100	1,500 ³
Taiwan	9,433	6,178	5,533	4,797	5,472
Turkey	12,893	12,622	13,174	16,830	15,506
United Arab Republic (Egypt)	—	7,127	6,013	6,000 ³	6,000 ³
U.S.S.R. ⁷	300,000	400,000	600,000	800,000	900,000
United States	87,313	2,334	86,182	94,357	92,025
Totals ^{3,4}	990,000	960,000	1,305,000	1,530,000	1,700,000
Totals, native sulphur	7,470,000	6,810,000	7,150,000	7,730,000	8,240,000
Other elemental:					
Recovered:					
Algeria ⁸	18,275	21,062	21,416	23,221	24,000 ³
Bulgaria	2,591	2,800	4,000	5,000	5,000 ³
Canada (shipments) ⁹	95,962	166,121	263,192	244,964	353,828
China ^{3,5}	80,000	100,000	100,000	120,000	120,000
France ⁷	27,528	126,542	419,273	778,018	1,088,000
Germany:					
East	100,190	104,679	106,153	100,130	100,000 ³
West	76,569	75,566	78,474	82,807	82,000 ³
Iran ⁶	16,665	12,800	19,000 ³	19,000 ³	19,000 ³
Italy ⁷	2,000	4,000	4,000	3,200	3,200
Japan ⁷	5,486	7,889	7,829	8,356	8,163
Mexico ⁷	41,642	27,641	46,231	46,839	52,849
Netherlands ⁸	14,400	20,800	30,700	30,500	30,000 ³
Netherlands Antilles: Aruba ³	30,000	30,000	30,000	30,000	30,000
Norway ⁸	95,149	89,126	77,111	71,254	61,156
Portugal ⁸	16,675	17,373	15,888	10,915	8,813
Spain ⁸	50,200	25,251	25,719	40,194	40,000 ³
Sweden ⁹	33,310	33,465	37,576	38,000	38,000 ³
Taiwan ⁸	—	—	810	875	1,968
Trinidad ^{3,8}	5,000	5,000	5,000	5,000	5,000
Union of South Africa ⁸	—	—	—	—	2,163
U.S.S.R. ³	10	10	10	50,000	100,000
United Arab Republic (Egypt)	3,445	3,300 ³	2,403	17,716	44,692
United Kingdom	39,142	49,561	53,173	62,402	62,000 ³
United States	510,511	640,096	686,407	766,566	855,969
Totals, other elemental	1,270,000	1,560,000	2,040,000	2,560,000	3,140,000
World totals (estimate)	8,740,000	8,370,000	9,190,000	10,290,000	11,380,000

¹ This table incorporates some revisions.² Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.³ Estimate.⁴ In some years Iran produces mined sulphur equivalent to 250–1,500 tons sulphur. No estimate in total.⁵ From sulphide ores.⁶ Produced from natural gas, includes a small quantity derived from treatment of nickel sulfide matte at Port Colborne, Ontario.⁷ From natural gas.⁸ From refinery gases.⁹ From shale oil.¹⁰ Negligible.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

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 intergrowth 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.

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 oilless bearings.

TABLE 74. World Production of Vermiculite, by Countries¹

Country ¹	1957	1958	1959	1960	1961
	short tons ²				
Argentina	287	161	880 ³	880 ³	880 ³
Australia.....	—	—	—	—	—
India	—	—	2	17	1
Kenya	33	96	112	283	—
Morocco.....	147	—	—	—	—
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia.....	460	280	50	—	—
Sudan	—	130 ³	130 ³	—	55
Tanganyika.....	—	91	125	20	157
Union of South Africa	62,619	54,314	52,398	69,022	71,118
United Arab Republic (Egypt)	33	302	331	132	—
United States (sold or used by producers).....	183,987	190,564	206,579	199,072	206,637
Totals^{1,2}	247,566	245,938	260,607	269,426	278,848

¹ 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 some revisions.

³ Estimate.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

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 75. World Production of Pumice, by Countries¹

Country ¹	1957	1958	1959	1960	1961
	short tons ²				
Argentina ³	20,278	22,307	19,842	20,000 ⁴	20,000 ⁴
Austria:					
Trass	38,875	29,784	34,885	38,581	40,846
Cape Verde Islands: Pozzolan	—	—	10,033	4,043	4,400 ⁴
France:					
Pumice	8,781	7,051	2,064	5,071	5,000 ⁴
Pozzolan	468,228	396,975	482,683	518,086	520,000 ⁴
Germany, West (marketable)	3,261,735	3,255,121	4,039,966	4,742,138	5,337,252
Greece:					
Pumice	61,242	49,614	71,650	82,000	53,000 ⁴
Santorini earth	87,634	94,428	93,696	110,000	198,000 ⁴
Iceland	15,102	11,000 ⁴	10,000 ⁴	9,000 ⁴	9,000 ⁴
Italy:					
Pumice	221,990	145,413	258,254	345,390	3,970,000 ⁵
Pumicite	37,302	137,899	146,717	124,671	
Pozzolan	2,897,620	2,992,880	3,055,978	3,494,273	
Japan	5	120,000	5	5	5
Kenya	2,319	821	2,515	2,711	779
New Zealand	16,991	25,851	31,803	49,204	50,000 ⁴
Spain (Canary Islands)	—	—	1,836	1,614	1,650 ⁴
United Arab Republic (Egypt Region)	1,836	1,185	2,756	3,307	4,335
United States (sold or used by producers):					
Pumice and pumicite	1,054,594	925,026	783,873	601,315	936,039
Volcanic cinder	772,384	1,047,930	1,492,247	1,609,050	1,526,546
World totals (estimate)^{1,2}	9,100,000	9,300,000	10,700,000	11,900,000	13,400,000

¹ Pumice is also produced in Mexico, 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 some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.

³ Includes volcanic ash and cinders, and pozzolan.

⁴ Estimate.

⁵ Data not available, estimate included in total.

Source: "Minerals Yearbook" published by the United States Bureau of Mines.

Operators of Miscellaneous Non-metallic Mineral Deposits, 1961

Name of operator	Head office address	Plant or mine location
BARITE		
Nova Scotia:		
Magnet Cove Barium Corp.	Walton	Pembroke
Quebec:		
Beach, Mahlon W. ¹	Box 9, Barrie, Ontario	Woodbridge Twp.
Roy, Phillippe ¹	62 L'Évêché, Rimouski	St-Fabien
British Columbia:		
Mountain Minerals Ltd.	Box 700, Lethbridge, Alberta	Brisco
Baroid of Canada Ltd.	Box 250, Onoway, Alberta	Spillmacheen
Sheep Creek Mines Ltd.	490 Baker St., Nelson, B.C.	Invermere
BRUCITE		
Quebec:		
Aluminum Company of Canada Ltd.	Sun Life Bldg., Montreal	Wakefield
DIATOMITE		
British Columbia:		
Falrey and Co.	661 Taylor St., Vancouver	Quesnel
FLUORSPAR		
Newfoundland:		
Newfoundland Fluorspar Ltd.	327 Duckworth St., 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.
Ball Prospecting Syndicate ¹	48 Lincoln Ave., Toronto, 9	Wilberforce
Quebec:		
Lake Otter Uranium Mines Ltd. ¹	62 Richmond St. W., Toronto, Ont.	Sandy Creek
White River Exploration Ltd. ¹	507 Place d'Armes, Montreal	St. Ubald
British Columbia:		
Pacific Silica Ltd.	Oliver	Oliver
GARNET		
Ontario:		
Industrial Garnet Co. Ltd.	River Valley	River Valley
GRAPHITE		
Quebec:		
Clement, Guy ²	Venise	Canton Amherst
Clot, Oscar ²	St. Jovite	Canton Joly
Dula Metals Corp. ¹	3943 Est rue Ontario, Montreal	Labelle
Laurentide Graphite Corp.	161-4e Ave., Ville St. Pierre	Labelle
Rosario Explorations Ltd. ²	620 Cathcart St., Montreal	McGill Twp.
Italia Copper Ltd. ¹	96 Mozart Est, Montreal	Boutillier
Ontario:		
Krefeld Graphite Gold Mines Ltd. ¹	R.R. No. 2, Cooksville	Vogt Twp.
GRINDSTONES		
New Brunswick:		
Read, H.C.	Sackville	Stonehaven
Bay of Chaleur Grindstone Co. ¹	1434 Ste-Catherine St. W., Montreal, Quebec ...	Gloucester Co.

¹ Holds dormant property.² Active but not producing.

Operators of Miscellaneous Non-metallic Mineral Deposits, 1961 — Continued

Name of operator	Head office address	Plant or mine location
IRON OXIDE		
Quebec:		
Gélinas, Bruno ¹	1521 Notre Dame, Trois-Rivières	Portneuf Co.
The Sherwin-Williams Co. of Canada	2875 Centre St., Montreal	Red Mill, Champlain Co.
LITHIUM MINERALS		
Quebec:		
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
Massval Mines Ltd. ¹	132 St. James St. W., Montreal	Lacorne
Quebec Lithium Corp.	1403 Edifice Aldred, Montreal	Barraute
Sirmac Mines Ltd. ¹	347 Bay St., Toronto, Ontario	Abitibi
Vallee Lithium Mining Corp. ¹	80 Richmond St. W., Toronto, Ontario	Fredmont Twp.
Ontario:		
Alba Exploration Ltd. ¹	119 Adelaide St. W., Toronto	Barbara Lake
Lun Echo Gold Mines Ltd. ²	67 Yonge St., Toronto	Nipigon
Dunvegan Mines Ltd. ¹	357 Bay St., Toronto	Cosgrave Lake
Jean Lake Lithium Mines Ltd. ¹	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. ¹	100 Royal Trust Bldg., Edmonton	Herb Lake
Chemalloy Minerals Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Lac du Bonnet
Northwest Territories:		
Boreal Rare Metals ¹	414 St. James St. W., Montreal, Quebec ..	Hearn Channel
MAGNESITIC DOLOMITE		
Quebec:		
Canadian Refractories Ltd.	540 Canada Cement Bldg., Montreal	Kilmar
MINERAL WATERS		
Quebec:		
Lazure, Fernand	1395 Choquette, St-Hyacinthe	St-Hyacinthe
Eau Minérale Etoile	Ste-Geneviève de Batiscan	Batiscan
Eau Minérale Naturelle, St. Léon	1, rue St-Laurent, Louisville	Maskinongé
Nesbitts Orange (Montreal) 61 Ltd.	5130 Western Ave., Montreal	Chambly
Crush International Ltd.	1590 O'Connor Drive, Toronto, Ontario ..	Varenes
Sources Abenakis Ltée.	St-François-du-Lac	St-François-du-Lac
Breuages Radnor, Ltée	St-Maurice	St-Maurice
Eau Justin Enrg.	400 rue Mailot, Trois-Rivières	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
Boissonnault, F.	East Templeton	Villeneuve
Cameron, P.U. & Sons	Buckingham	Portland West
Cross, W.C.	209 Bridge St., Hull	Hull
Caron & Fileon Mica Mine Enrg.	St. Michel de Wentworth	Wentworth
Côté W.R.	627, Filiatraults St., Montreal	Rockway Valley
Duquette, Waldick	55 Maple St., Gatineau	Cantley

¹ Holds dormant property.² Active but not producing.

Operators of Miscellaneous Non-metallic Mineral Deposits, 1961 - Continued

Name of operator	Head office address	Plant or mine location
MICA - Concluded		
Quebec - Concluded:		
Gagne, C.	St. Michel de Wentworth	Wentworth
Desormeaux, Gaudias	St-Pierre de Wakefield	Portland West
Gagne, Edgar	Cascades	Pike Lake
Joanisse, L.M.	31 Graham St., Hull	Gatineau
Larmont, Edouard	Buckingham	Portland East
Lavolette Mining & Metallurgical Corp.	5083 St. Denis, Montréal 34	Suzar
Lavigne, E.	St-Pierre de Wakefield	Wakefield
Law & Co.	209 Eddy St., Hull	Hull Twp.
McAra, Cecil	Beechgrove	North Onslow
Mica Co. of Canada Ltd.	2 Lois St., Hull	Hull
Mont-Laurier Mica Enr'g.	Mont-Laurier	Robertson
Nadon, Ronald A.	Buckingham	Papineau
Poirier, C.	St-Pierre de Wakefield	Portland West
Poitras, Alexandre	St. Mathieu	St. Michel de Wentworth
Reed, Bazel	Otter Lake	Pontiac
Renaud, J.	Perkins	Wakefield
Sargent, Fred	R.R. 3 Wakefield	Hull
Trudeau, Victor H.	Wilsons Corners	Hull Twp.
Trudeau, Wm. & Boland, C.	Old Chelsea	Wright
Wallingford, A.	Gatineau Pointe	Hull Twp.
Wallingford, E. Ltd.	Perkins	Papineau
Wallingford, G.E.	63 Pinehurst Ave., Ottawa, Ontario	Templeton
Zimerling & McNeely	Otter Lake	Cawood
Ontario:		
Buchanan, Geo.	31 South St., Perth	Lanark
Duggan Wm.	Dunchurch	Hagerman
Green, W.E. W.C. and A.W.	Perth Road	Perth Road
Greer, R.	Perry Sound	Perry Island
Hilborst, L.H.	21 Foster St., Perth	Lanark
Jones, Ed.	R.R. 1 Tichborne	Oso
Mid Bay Mica Syndicate	North Bay	Nipissing
Shea, Jack	Sharbot Lake	Bob's Lake
Smith, E.W.	23 Grove St. W., Perth	Lanark
Watts, R.W.	21 Isabella St., Perth	Lanark
British Columbia:		
Fairey & Co.	661 Taylor St., Vancouver	Vancouver
Georgian Mineral Industries Ltd.	108 Bamlett Bldg., Calgary, Alberta	Cedarside
PERLITE		
British Columbia:		
Western Gypsum Products Ltd. ¹	Childs Building, Winnipeg, Manitoba	François Lake
Perlite Mining Corp. Ltd. ¹	44 King St. W., Toronto, Ontario	Uncha Lake
PHOSPHATE		
Quebec:		
Bigelow, Robert ¹	Buckingham	Bowman Twp.
Blackburn Bros. Ltd. ¹	85 Sparks St., Ottawa, Ontario	Perkins
Quebec Smelting & Refining Ltd. ¹	215 St. James St. W., Montreal	Notre-Dame-de-la-Salette
Industrial Phosphate Mines Ltd. ¹	18 Toronto St., Toronto, Ontario	Portland East Twp.
Luckridge Phosphate Mines Ltd. ¹	44 Wellington St. E., Toronto, Ontario	Portland East Twp.
Ontario:		
Ontario Phosphate Industries Ltd. ¹	Room 1101-62 Richmond St. W., Toronto	Bedford Twp.
McGlade, W.A. ¹	8 Church St., Perth	Burgess Twp.
POTASH		
Saskatchewan:		
Alwinal Potash of Canada Ltd.	4th Floor, Derrick Bldg., Regina	Lanigan
Continental Potash Corp. Ltd. ²	508 Credit Foncier Bldg., Vancouver	Unity
Duval Sulphur and Potash Co. ¹	Mellie Esperson Bldg., Houston Texas	Saskatoon
Freeport Sulphur Co.	161 East 42nd St., New York, 17	Saskatoon
International Minerals & Chemical Corp. ²	77 Metcalfe St. Ottawa, Ontario	Esterhazy
Southwest Potash Corp. ²	25 Adelaide St. W., Toronto, Ontario	Saskatoon
Tombill Mines Ltd.	60 Yonge St., Toronto, Ontario	Riddle-Tidewater
Potash Co. of America Ltd.	Box 509 Saskatoon	Patience Lake

¹ Holds dormant property.² Active but not producing.

Operators of Miscellaneous Non-metallic Mineral Deposits, 1961 - Concluded

Name of operator	Head office address	Plant or mine location
POZZOLANA		
British Columbia:		
Canadian Pozzolan Industries Ltd.	640-7th Ave W., Calgary, Alta.	Cariboo
Hold fast Natural Resources Ltd.	1253 Burrard St., Vancouver	Saltspring Island
PYRITE, PYRRHOTITE		
Quebec:		
Queumont Mining Corp. Ltd.	44 King St. W., Toronto, Ontario	Rouyn Twp.
Noranda Mines Ltd.	44 King St. W., 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.	455 Craig St. West, Montreal	Weedon
West MacDonald Mines Ltd. ¹	1434 Ste-Catherine St. W., Montreal	Dufresnoy
Ontario:		
International Nickel Company of Canada Ltd. ..	Copper Cliff	Copper Cliff
Saskatchewan:		
Lorado Uranium Mines Ltd. ¹	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
SODIUM CARBONATE (Natural)		
British Columbia:		
Bishop, V.C. (Mrs.) ¹	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	Palo
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. ²	Sun Life Bldg., Montreal	Arvida
Ontario:		
Canadian Industries Ltd.	Box 10, Montreal, Quebec	Copper Cliff
Sherbrooke Metallurgical Ltd. ²	Dunnville	Dunnville
British Columbia:		
Consolidated Mining & Smelting Company of Canada Ltd.	Trail	Trail

¹ Holds dormant property.² Produces acid by calcining zinc sulphide concentrates.

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