MISCELLANEOUS NON-METAL MINES

1962

Formerly The Miscellaneous Non-Metal Mining Industry

DOMINION BUREAU OF STATISTICS
Industry Division

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Published by Authority of
The Minister of Trade and Commerce

March 1964
6521-910

Price: 75 cents

ROGER DUHAMEL, F.R.S.C., Queen's Printer and Controller of Stationery, Ottawa

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EXPLANATORY NOTES

Establishment

The reporting unit in the Census of Mines, Quarries and Oil Wells 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 mining establishment is typically a mine, mine/mill, quarry, pit or bog principally engaged in mining operations. Prior to 1961, the Census of Mines, Quarries and Oil Wells attempted to cover the mining activities of all establishments, whether or not they were principally engaged in mining operations. Beginning with the 1961 Census, establishments (accounting entities) which are not primarily engaged in mining are no longer included as mining 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 mining establishments, many non-mining establishments are now surveyed for commodity information only and the latter are included in the appropriate tables of industry reports.

SYMBOLS

The following standard symbols are used in Dominion Bureau of Statistics publications:

.. figures not available.

... figures not appropriate or not applicable.

— nil or zero.

-- amount too small to be expressed.

p preliminary figures.

r revised figures.

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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 1962 included barite, brucite, diatomite, fluorspar, garnet, graphite, grindstones, iron oxides, magnesitic dolomite, lithia, potash, pozzolan, and sodium sulphate. The general statistics also include some data on development work done on pyrite deposits.

During 1962 there were 19 firms which made shipments of materials which are grouped as miscellaneous non-metallics. Gross value of the producer's shipments amounted to $15,148,243 in 1962 compared with $11,457,737 in the preceding year. The value of containers was included in these figures. The industry employed an average of 1,156 persons to whom $5,356,350 were paid as salaries and wages. Fuel cost $1,257,985 and 49,252,279 kwh. of electricity were purchased for $616,035. Process supplies cost $1,350,706 and the containers used were valued at $125,797. Freight paid amounted to $287,194.

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. Principal Statistics of the Miscellaneous Non-metal Mines Significant Years,[1] 1921-59

Basis: Standard Industrial Classification in use prior to 1960

Year	Mines or plants	Employees	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	10,865,027
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

[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 1A. Principal Statistics of the Miscellaneous Non-metal Mines, 1957-62[1]

Basis: Revised Standard Industrial Classification and New Establishment Concept

Year	Establishments	Employees	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
1962	27	1,156	5,356,350	1,874,020	1,476,503	15,148,243	11,510,536

[1] During the years under review there have been changes in the methods of compilation. Some commodities have been added to this goup 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, 1961 and 1962

Item		1961		1962	
		Quantity	Value	Quantity	Value
			$		$
Barite	ton	191,404	1,799,119	226,600	2,123,964
Diatomite	"	214	8,817	211	10,228
Fluorspar		..	1,990,200	..	1,870,184
Garnet	ton	80	3,200	—	—
Graphite	"	1	146	—	—
Grindstones	"	10	2,000	10	2,000
Iron oxides	"	808	68,199	771	58,363
Lithia	lb.	536,190	392,871	499,736	558,654
Magnesitic dolomite, brucite		..	3,064,403	..	3,431,873
Potash, K_2O		—	—	..	3,000,000
Pozzolana		..	2,000	..	4,927
Sodium sulphate	ton	250,996	4,036,625	246,672	3,954,273
Totals		...	**11,367,580**	...	**15,014,466**
Pyrite, pyrrhotite[1]	ton	517,258	1,830,566	517,308	1,879,584
Sulphur[2] in smelter gases	"	277,056	2,708,110	292,728	3,089,537
Sulphur, elemental[3]	"	394,762	7,287,881	695,098	9,286,999
Arsenious oxide[1]	"	210	16,772	80	6,832
Titanium dioxide, etc.[1]		..	16,723,743	..	11,573,862
Mica	ton	808	125,377	602	84,598

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

[2] Data for 1961 and 1962 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, 1961 and 1962

	Used during	
	1961	1962
	tons of 2,000 lbs.	
Arsenic trioxide (refined)	241	260
Barite — Lump	4,410	2,580
Ground — Natural	1,021	1,440
Bleached	687	976
Blanc fixe (percipitated barium sulphate)	...	...
Bentonite — Swelling (also called sodium or Wyoming bentonite)	29,622	32,440
Non-swelling (also called calcium or Southern decolorizing bentonite)	5,364	5,893
China clay (Kaolin)	108,278[r]	121,290
Diatonite (diatomaceous earth, Kieselguhr, Celite, etc.):		
Ground or powdered — Natural	10,718	8,764
Calcined	1,941	1,480
Other	14	16
Feldspar	7,455	8,802
Fluorspar — Metallurgical grade (lump)	106,104	116,121
Ceramic	777	1,093
Acid	4,661	6,480
Fullers earth	1,697	1,547
Graphite — For manufacture of foundry facings	...	...
For manufacture graphite shapes, i.e. brushes, piston, rings, etc.	...	...
Flake	861	518
Amorphous	375	1,051
Other	2,209	1,955
Mica — Muscovite — Sheet, splittings	54	117
Wet ground	515	576
Other ground	1,283	729
Nepheline Syenite	39,134	42,730
Phosphate rock	894,518	1,112,489
Potash (muriate of potash)	136,056	169,741
Silica — Lump (quartz, quartzite, sandstone)	788,834[r]	685,290
Sand (including foundry sand but excluding concrete sand)	1,429,074[r]	1,239,168
Flour or pulverized	17,277	17,375
Sodium sulphate — Lump crude	117	134
Salt cake	171,763	179,844
Glauber's salts	534	1,095
Sulphur — Elemental	447,781[r]	486,904
Liquid sulphur dioxide	116,417	96,659
Talc, soapstone, pyrophyllite — Ground	31,911[r]	34,674
Other	3,340	3,725
Whiting or whiting substitute:		
Ground chalk, whiting, calcium carbonate, percipitated chalk	27,751	31,001
Whiting substitute, ground limestone and ground marble	39,614	54,326

TABLE 4. Employees and their Earnings in the Miscellaneous Non-metal Mines, 1958-62

	Employees					Man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and administrative	Workmen	Total
	Male	Female	Male	Female					
	number						dollars		
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
1962	214	24	917	1	1,156	2,514,435	1,343,528	4,012,822	5,356,350

TABLE 5. Workmen, by Months, in the Miscellaneous Non-metal Mines 1961 and 1962

Month	1961					1962				
	Mine			Mill	Total	Mine			Mill	Total
	Surface		Underground			Surface		Underground		
	Male	Female		Male		Male	Female		Male	
	number									
January	259	2	243	314	818	225	1	205	352	783
February	257	2	195	349	803	215	1	208	356	780
March	270	1	193	357	821	226	1	213	334	774
April	297	1	189	353	840	233	1	215	333	782
May	320	1	200	362	883	269	1	221	345	836
June	334	1	208	358	901	301	1	222	371	895
July	357	1	163	373	894	302	2	226	380	910
August	354	1	214	366	935	324	3	235	386	948
September	360	1	221	370	952	407	2	244	448	1,101
October	307	—	226	371	904	406	2	247	462	1,117
November	314	1	218	367	900	399	1	194	456	1,050
December	296	1	208	354	859	392	1	190	436	1,019
Averages	**310**	**1**	**205**	**356**	**872**	**310**	**1**	**219**	**388**	**918**
Total man-hours worked					*1,835,481*					*1,998,212*

TABLE 6. Fuel and Electricity Used in the Miscellaneous Non-metal Mining Industry, 1961 and 1962

Kind		1961		1962	
		Quantity	Cost at plant	Quantity	Cost at plant
			$		$
Bituminous coal (a) From Canadian mines	short ton	14,880	62,562	716	11,295
(b) Imported	"	403	7,294	342	6,395
Sub-bituminous coal (from Alberta mines only)		—	—	—	—
Anthracite coal		—	—	—	—
Lignite coal	short ton	646	3,339	11,900	44,625
Coke (for fuel only)		—	—	—	—
Gasoline (includes gasoline used in cars and trucks)	Imp. gal.	199,259	71,475	404,122	132,980
Kerosene or coal oil	"	38,661	7,415	2,349	788
Fuel oil and diesel fuel	"	6,578,025	633,353	7,016,907	724,875
Wood (cords of 128 cubic feet of piled wood)	cord	4	50	4	32
Gas (a) Liquefied petroleum gases (propane, etc.)	Imp. gal.	2,062	848	410,199	114,936
(b) Other manufactured gas		—	—	—	—
(c) Natural gas	M cu. ft.	1,303,659	362,778	792,733	222,059
Other fuel		—	—	—	—
Electricity purchased for power and lighting	kwh.	53,866,746	619,593	49,252,279	616,035
Electricity purchased for other purposes		—	—	—	—
Totals (cost only)		...	**1,768,707**	...	**1,874,020**
Electricity generated (a) For own use	kwh.	5,801,634	...	6,431,933	...
(b) For sale	"	62,325	1,376	72,322	1,610

ARSENIOUS OXIDE

During 1962 the producers of arsenious oxide (arsenic trioxide) shipped 160,750 pounds valued at $6,832. 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 the Cobalt Refinery, Cobalt, Ont. which treated the cobalt-silver concentrates from Cobalt and Gowganda, and other custom ores.

Compounds of arsenic such as lead arsenate and calcium arsenate are used in insecticides, rodenticides and other pesticides. Other uses are: as a decolourizer in glass, as preservatives and depilatories in the tanning of hides, in the chemical debarking of trees; in pyrotechnics: and in paint pigments.

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

TABLE 7. Producers' Shipments, Imports and Exports of Arsenic, 1961 and 1962

	1961		1962	
	Quantity	Value	Quantity	Value
	lb.	$	lb.	$
Producers' shipments:				
White arsenic (crude and refined)[1]	419,300	16,772	160,750	6,832
Imports:				
Arsenic acid	406,892	16,378	627,558	26,148
Arsenious oxide and arsenic sulphide	–	–	–	–
Sodium arsenate and sodium biarsenate	133,795	38,382	144,522	59,057
Arsenate of lead	58,250	11,646	43,450	8,230
Arsenate of lime	178,861	15,089	187,900	10,258
Exports:				
Arsenic	244,500	10,263	100	178

[1] Includes some arsenic recovered from foreign ores.

TABLE 8. Production, Imports and Exports of White Arsenic, 1953-62

Year	Production, crude and refined, but no duplication	Imports[1]	Exports	
			Refined	Crude
	pounds			
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	–
1962	160,750	–	100	–

[1] Arsenious oxide and arsenic sulphide.

TABLE 9. Consumption of Refined White Arsenic, 1958-62

Industry	1958	1959	1960	1961	1962
	pounds				
Glass	269,344	...	224,663	219,934	179,163
Insecticides[1]	[2]	[2]	[2]	[2]	[2]
Metal rolling, casting, extruding	68,120	35,299	22,934	46,888	82,529
Miscellaneous chemicals	60,927	73,456	245,635	347,242	426,416
Totals accounted for	**398,391**	...	...	**614,066**	**688,108**

[1] Does not include arsenic acid (As_2O_5) imported for use in making insecticides, as follows: 1958, 507,657 pounds; 1959, 595,674 pounds; 1960, 407,465 pounds; 1961, 406,892 pounds; 1962, 627,558 pounds.
[2] Included with miscellaneous chemicals total.

TABLE 10. World Production of White Arsenic, by Countries

Country[1]	1958	1959	1960	1961	1962
	short tons[2]				
North America:					
Canada	1,162	789	862	209	80
Mexico	3,411	11,536	13,372	13,537	12,000[3]
United States	11,508	5,189	[4]	[4]	[4]
South America:					
Brazil	292	367	233	64	164
Peru	369	524	433	388	572
Europe:					
Belgium (exports)	543	3,161	[5]	[5]	[5]
France	8,354	8,842	9,200	10,500	11,300[3]
Germany:					
West (exports)	205	180	110	150	75
Greece	13	11	11[3]	3[3]	..
Italy	688	1,254	654	979	140
Portugal (exports)	1,172	596	810	330	634
Spain	285	320	435	343	234
Sweden	10,213	12,300	12,950	12,153	12,100[3]
Asia:					
Japan	1,429	1,185	1,247	1,047	1,100[3]
Africa:					
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	683	528	204	..	1,207
World totals (estimate)[1,2]	**40,000**	**46,800**	**57,300**	**55,200**	**53,900**

[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.

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

BARITE

The producers of barite in Canada shipped 226,600 tons valued at $2,123,964 in 1962 compared with 191,404 tons worth $1,799,119 in the preceding year. Nova Scotia produced most of the nation's barite. The open pit operation is located near Walton at the head of the Bay of Fundy. Shipments are made by boat from Walton. In British Columbia barite was quarried at Brisco in the East Kootenay district, then shipped to a grinding plant at Lethbridge, Alberta. Shipments were made 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 manufacture of barium chemicals; as an additive to glass batches; as an aggregate in concrete where additional weight is required (such as coatings for under water pipes), or where shielding is required against radiation such as in X-ray rooms or atomic energy plants.

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

TABLE 11. Production of Barite, 1953-62

Year	Short tons	Value	Year	Short tons	Value
		$			$
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
1957	228,048	2,992,913	1962	226,600	2,123,964

TABLE 12. Imports of Barite, 1961-62

Imported from	1961		1962	
	Tons	Value	Tons	Value
		$		$
United Kingdom	25	962	—	—
Germany, West	282	9,632	218	8,436
United States	1,582	83,654	2,209	106,455
Totals	**1,889**	**94,248**	**2,427**	**114,891**

TABLE 13. Exports of Barite, 1961-62

Destination	1961		1962	
	Tons	Value	Tons	Value
		$		$
Trinidad	9,856	182,336	18,368	332,260
Arabia	—	—	—	—
Colombia	—	—	—	—
Iran	—	—	—	—
Venezuela	3,920	33,323	—	—
United States	157,920	1,782,876	212,535	1,805,915
Totals	**171,696**	**1,998,535**	**230,903**	**2,138,175**

TABLE 14. Consumption of Barite, 1958-62

	1958	1959	1960	1961	1962
	tons				
By uses:					
Paints	805	901	902	984	1,244
Rubber goods	387	365	343	361	—
Glass	215	404	366	412	628
Oil-well drilling, estimate[1]	16,747	17,037	26,312	19,913	39,798
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 Countries

Country[1]	1958	1959	1960	1961	1962
	short tons[2]				
North America:					
Canada	195,719	238,967	154,292	191,404	226,600
Cuba (exports)	11,931	—	—	—	—
Mexico	397,550	314,933	298,458	274,153	350,684
United States	486,287	867,201	771,318	730,381	886,964
Totals	**1,091,487**	**1,421,101**	**1,224,068**	**1,195,938**	**1,464,248**
South America:					
Argentina	18,716	19,842	26,987	31,476	13,819
Brazil	68,630	56,009	44,464	68,834	60,241
Chile	880	880	1,440	1,551	1,086
Columbia	14,330	11,000	8,000	11,272	8,800
Peru	117,943	105,557	120,800	122,538	126,271
Totals	**220,500**	**193,288**	**201,691**	**235,671**	**210,217**
Europe:					
Austria (marketable)	4,697	4,068	4,829	2,716	1,192
France	133,934	95,259	116,860	95,007	83,776
Germany West (marketable)	409,105	486,810	549,134	518,951	512,230
Greece	169,629	143,014	112,203	85,000	90,000[3]
Ireland	8,736	9,157	11,704	4,659	378
Italy	122,976	133,734	157,925	155,999	134,915
Poland	12,400[3]	12,400[3]	12,400[3]	41,161	49,841
Portugal	1,351	3,760	4,310	2,285	1,489
Spain	31,408	28,186	28,596	37,449	42,923
U.S.S.R.[3]	130,000	130,000	140,000	165,000	200,000
United Kingdom[4]	66,139	68,408	67,431	91,677	84,754
Yugoslavia	103,801	118,267	120,691	114,872	143,300
Totals[1,3]	**1,230,000**	**1,270,000**	**1,360,000**	**1,350,000**	**1,380,000**
Asia:					
Burma	907	1,120	1,792	2,248	4,462
China	55,000	55,000[3]	65,000[3]	90,000[3]	90,000[3]
India	17,536	14,939	14,976	17,325	26,980
Iran[5]	1,124	1,904	14,330	20,900	16,500
Japan	16,510	21,331	25,184	32,243	42,016
Korea, Republic of	..	..	220	772	1,014
Pakistan	342	569	709	489	3,164
Philipines	64	186	6,198	2,109	459
Turkey	6,035	2,513	1,653	..	2,094
Korea, North	[5]	16,500[3]	45,000[3]	60,000[3]	65,000[3]
Totals	**98,000**	**114,000**	**175,000**	**226,000**	**252,000**
Africa:					
Algeria	67,911	24,038	61,564	33,883	13,407
Morocco:					
Southern Zone	47,060	40,574	92,945	90,591	98,980
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	34	239	..	..	..
Swaziland	480	461	200	454	68
South Africa, Republic of	2,721	2,355	1,878	1,962	1,873
United Arab Republic (Egypt Region)	2,282	2,017	2,900	2,900[3]	1,356
Totals	**120,488**	**69,684**	**159,487**	**129,790**	**115,684**
Oceania:					
Australia	7,618	6,960	12,787	21,523	14,038
World totals (estimate)[1,2]	**2,770,000**	**3,080,000**	**3,130,000**	**3,160,000**	**3,440,000**

[1] In addition to countries listed, barite is produced in Czechoslovakia and East Germany, 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] Includes witherite.
[5] Year ended March 20, of year following that stated.

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 1961 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 Countries[1,2]

Country[1]	1958	1959	1960	1961	1962
	short tons[2]				
India	435	236	276	363	332
Southern Rhodesia	4,593	2,799	3,843	2,792	3,348
South Africa, Republic of	2,118	622	123	159	349
World totals (estimate)[1,3]	**11,000**	**8,000**	**9,000**	**8,000**	**9,000**

[1] Corundum is produced in U.S.S.R., data on production are not available, and estimate is included in the total.
[2] This table incorporated some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.
[3] Estimate.

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

DIATOMITE

In 1962 the producers shipped 211 tons of diatomite which was valued at $10,228. In the preceding year the production was 214 tons valued at $8,817. 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, skelatal 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, 1953-62

Year	Short tons	Value	Year	Short tons	Value
		$			$
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
1957	120	2,400	1962	211	10,228

TABLE 18. Imports of Diatomaceous Earth, 1961-62

Imported from	1961		1962	
	Tons	Value	Tons	Value
		$		$
United Kingdom	—	—	—	—
Denmark	—	—	35	1,285
United States	28,875	1,345,805	26,063	1,379,453
Totals	**28,875**	**1,345,805**	**26,098**	**1,380,738**

TABLE 19. Consumption of Infusorial Earth in the Sugar Refining Industry, 1953-62

Year	Tons	Value	Year	Tons	Value
		$			$
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
1957	2,260	174,677	1962	2,093	188,850

TABLE 20. Consumption of Diatomaceous Earth in the Manufacture of Fertilizers, 1958-62

Year	Tons	Value
		$
1958	11,313	623,650
1959	10,628	570,837
1960	15,984	649,639
1961	11,575	664,021
1962	12,086	717,663

TABLE 21. World Production of Diatomite, by Countries[1]

Country[1]	1958	1959	1960	1961	1962
	short tons[2]				
North America:					
Canada	27	5	44	214	211
Costa Rica	2,205	2,425	2,425	717	827
Guatemala	21,190	—	—	—	—
Nicaragua	—	1,887	2,249	2,976	1,414
United States	449,780	449,789[3]	482,202[4]	482,202[4]	482,202[4]
South America:					
Argentina	4,540	4,829	117	1,286	180
Chile	—	—	—	—	—
Columbia	220	330	440	330	150
Peru	117	254	1,284	2,048	1,624
Europe:					
Austria	4,086	4,492	4,431	5,993	4,613
Denmark:					
Diatomite	28,660	18,200	17,600	21,500	22,000
Moler[5,6]	46,486	205,000	204,300	212,900	230,800
Finland	2,315	1,520	1,457	805	1,323
France[7]	111,948	112,821	140,468	118,429	110,000[6]
Germany, West[7] (marketable)	68,403	55,737	51,138	72,201	67,792
Italy	49,828	57,099	51,888	55,000[6]	55,000[6]
Portugal[7]	1,159	2,075	1,172	847	1,598
Spain[7]	12,858	11,561	13,840	19,351	13,352
Sweden	1,260	764	453	783	770[6]
U.S.S.R.[6]	275,000	275,000	300,000	330,000	330,000
United Kingdom	28,154	19,000[6]	16,553	24,920	24,900[6]
Yugoslavia	4,400	5,000[6]	5,000[6]	5,000[6]	4,500
Asia:					
Korea, Republic of	518	1,865	2,646	1,989	758
Africa:					
Algeria	28,629	38,087	24,266	34,315	30,534
Kenya	3,892	4,041	3,791	3,537	3,207
Mozambique	61	—	103	397	—
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia[7]	—	148	164	409	423
South Africa, Republic of	359	397	346	137	647
United Arab Republic (Egypt)	397	440	805	332	55
Oceania:					
Australia	4,749	5,700	5,218	6,067	8,189
New Zealand	6,336	8,152	6,992	3,961	2,099
World totals (estimate)[1,2]	**1,350,000**	**1,480,000**	**1,550,000**	**1,635,000**	**1,630,000**

[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] Average annual production 1957-59.

[4] Average annual production 1960-62.

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

[6] Estimate.

[7] Includes tripoli.

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

FLUORSPAR

During 1962 the value of fluorspar shipped amounted to $1,870,184 compared with $1,990,200 worth in the preceding year. Fluorspar is mined in Newfoundland and is produced as a by-product from a silica deposit in British Columbia. The Ontario mines did not operate in 1962.

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, 1953-62

Year	Short tons	Selling value f.o.b. works	Year	Short tons	Selling value f.o.b. works
		$			$
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
1957	...	1,756,841	1962	...	1,870,184

TABLE 23. Imports of Fluorspar, 1953-62

Year	Tons	Value	Year	Tons	Value
		$			$
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	1,286,107
1956	28,148	690,779	1961	32,769	914,221
1957	14,547	377,706	1962	67,847	2,052,056

TABLE 24. Consumption of Fluorspar, 1958-62

	1958	1959	1960	1961	1962
	tons				
By uses:					
Steel	14,539	20,063	21,029	24,310	33,824
Glass	455	462	733	739	1,157
Heavy chemicals	74,939	70,046	87,186	6,150	7,848
White metal alloys	..	9	..	..	..
Smelting and refining	[1]	[1]	[1]	77,874	78,034
Totals accounted for	**89,933**	**90,580**	**108,948**	**109,073**	**120,863**
By provinces:					
Nova Scotia	5,430	5,974	6,592	5,084	6,060
Quebec	73,737	68,012	86,125	82,945	83,718
Ontario	10,462	16,124	15,420	19,987	30,028
Manitoba and Saskatchewan	172	236	291	442	317
Alberta	108	154	379	271	400
British Columbia	24	80	141	344	340
Totals accounted for	**89,933**	**90,580**	**108,948**	**109,073**	**120,863**

[1] Included in heavy chemicals industry.

TABLE 25. World Production of Fluorspar, by Countries[1]

Country[1]	1958	1959	1960	1961	1962
	short tons[2]				
North America:					
Canada	62,000	74,000[3]	77,000[3]	80,000[3]	75,000[3]
Mexico	462,049	362,456	404,487	439,286	553,642
United States (shipments)	319,513	185,091	229,782	197,354	206,026
Totals	**843,562**	**621,547**	**711,269**	**716,640**	**834,668**
South America:					
Argentina	14,258	17,989	13,748	11,105	9,976
Bolivia (exports)	..	..	..	..	..
Totals	**14,258**	**17,989**	**13,748**	**11,105**	**9,976**
Europe:					
France	107,104	110,425	149,345	214,936	237,200
Germany:					
East[3]	72,000	70,000	80,000	80,000	80,000
West	137,048	135,956	143,474	133,515	116,592
Italy	162,916	174,091	178,957	172,582	171,474
Norway	..	..	..	..	..
Spain	99,743	98,318	122,377	161,954	165,356
Sweden (sales)	3,188	2,995	3,212	3,560	3,900
United Kingdom[4]	86,694	93,078	109,249	99,868	79,525
Totals[1,3]	**675,000**	**690,000**	**790,000**	**870,000**	**860,000**
Asia:					
China[3]	165,000	220,000	275,000	220,000	220,000
Japan	6,069	5,684	10,108	16,326	17,120
Korea North[3]	[5]	33,000	33,000	33,000	33,000
Korea, Republic of	1,786	6,748	20,834	30,790	36,343
Mongolia Outer	37,000	37,000[3]	44,400	42,000	44,000[3]
Thailand	..	..	3,814	5,241	11,806
Turkey	88	75	359	42	640
U.S.S.R.[3,6]	180,000	190,000	210,000	230,000	230,000
Totals[1,3]	**445,000**	**495,000**	**600,000**	**580,000**	**595,000**
Africa:					
Morocco	..	..	..	869	546
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	6	10	19	..	20
South Africa, Republic of	48,251	70,317	113,550	95,862	111,683
South-West Africa	4	141	..	..	240
Tunisia	..	..	..	..	..
Totals	**48,261**	**70,468**	**113,569**	**96,731**	**112,489**
Oceania:					
Australia	1,042	528	8	—	—
World totals (estimate)[1,2]	**2,025,000**	**1,900,000**	**2,230,000**	**2,275,000**	**2,410,000**

[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

The garnet deposit near River Valley, Ontario was not operated by Industrial Garnet Co. Ltd. The garnets which were mined in the earlier years were used as abrasives for cutting granite building stone at the firms other stone plants.

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

There were no shipments of graphite during the year. With the exception of 1961 there has been no shipments since 1954 when the Black Donald mine closed in Renfrew county, Ontario.

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, 1948-62

Year	Short tons	Value	Year	Short tons	Value
		$			$
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
1952	2,040	255,732	1962	–	–

TABLE 27. Imports and Exports of Graphite,[1] 1960-62

	1960	1961	1962
	dollars		
Imports:			
Plumbago, not ground	75,714	47,450	58,351
Crucibles, plumbago, and covers	236,148	215,788	254,447
Plumbago, ground, and manufactures of	905,756	945,258	1,362,492
Exports:			
Graphite, crude and refined	–	–	–
Carbon and carbon electrodes	734,542	819,658	328,425

[1] Includes artificial graphite.

TABLE 28. Available Data on the Consumption of Graphite, 1958-62

	1958	1959	1960	1961	1962
	pounds				
By industries:					
Polishes and dressings	100	...	...	...	...
Paints	96,332	63,507	82,400	53,385	48,577
Brass and copper products	67,370	65,950	49,577	58,711	94,421
Electrical apparatus	404,213	407,063	341,633	...	...
Heavy chemicals	1,211,095	834,174	1,239,385	657,355	651,047
Boilers and platework	13,707	17,023	20,166	19,317	1,330
Steel ingots and castings	1,742,000	2,310,000	2,358,000	1,424,000	1,944,000
Farm implements	...	...	4,370	7,400	800
Railway rolling stock	47,575	67,535	49,212	44,600	23,849
Machinery	185,404	204,070	200	–	–
Iron castings	660,948	762,320	726,845	790,127	738,664
Cooking and heating equipment	7,638	3,438	1,900	12	200
Refractories	...	...	400,000	372,000	328,000
Asbestos products	28,968	...	...	...	...
Batteries	...	...	...	299,115	503,157
Miscellaneous non-metallics	561	...	124,445	3,225	–
Miscellaneous metal fabricating	258,104	118,900	512,205	648,118	733,807
Motor vehicle parts	...	...	261,288	330,900	413,900
Communications equipment	...	...	2,665	1,054	540
Machine tools	4,500	5,400	205,491	385,868	309,923
Miscellaneous electrical equipment	...	...	...	150	50
Miscellaneous chemicals	...	...	1,350	2,725	–
Truck and body and trailer	...	...	...	1,300	–
Smelting and refining	..	..	..	..	172,644
Totals for above industries	**4,728,515**	**4,859,380**	**6,381,132**	**5,099,362**	**5,964,909**
By provinces:					
Newfoundland, Nova Scotia	45,196	49,293	54,516	11,809	9,120
New Brunswick	655	340	–	–	–
Quebec	1,130,153	1,095,719	2,003,638	1,530,345	1,769,120
Ontario	2,619,717	3,237,866	3,820,453	3,070,985	3,767,981
Manitoba	157,314	168,049	156,856	89,253	108,067
Saskatchewan	1,000	1,250	35,110	136,159	1,954
Alberta	181,756	226,603	204,975	180,654	188,236
British Columbia	592,724	80,260	105,584	80,157	120,431
Totals accounted for	**4,728,515**	**4,859,380**	**6,381,132**	**5,099,362**	**5,964,909**

TABLE 29. World Production of Natural Graphite, by Countries

Country[1]	1958	1959	1960	1961	1962
	short tons[2]				
North America:					
Canada	..	..	..	1	..
Mexico	21,564	30,684	37,827	19,846	31,992
South America:					
Argentina	525	554	538	858	468
Brazil	1,323	1,334	1,433	1,599	1,664
Europe:[1]					
Austria	23,318	68,444	97,043	89,255	98,416
Germany:					
West	12,021	12,377	12,760	13,349	13,134
Italy	4,393	3,457	4,098	4,484	3,703
Norway	4,927	5,396	6,437	6,283	7,055
Spain	227	457	288	303	—
Sweden	593	..	..	..	..
U.S.S.R.[3]	50,000	50,000	50,000	55,000	60,000
Asia:					
Ceylon (exports)	6,342	8,816	10,107	10,016	9,665
China[3]	35,000	45,000	45,000	45,000	45,000
Hong Kong	3,680	3,676	4,255	1,865	902
India	[4]	[4]	[4]	[4]	[4]
Japan	3,817	4,453	4,979	3,836	3,812
Korea:					
North	45,000[3]	57,000[3]	68,000[3]	72,000[3]	72,000[3]
Republic of	103,806	91,045	101,777	98,892	204,032
Taiwan	915	621	551	882	880[3]
Africa:					
Kenya	738	635	1,113	..	..
Malagasy Republic	13,427	12,614	15,923	16,473	19,274
Morocco	..	132	..	..	..
South Africa, Republic of	875	617	894	963	1,308
South West Africa	..	..	..	..	..
Tanganyika	..	28	26	..	..
Oceania:					
Australia	..	..	..	..	..
World totals (estimate)[1,2]	**350,000**	**410,000**	**475,000**	**450,000**	**590,000**

[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] 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 to 1962 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, 1951-62

Year	Tons	Value	Year	Tons	Value
		$			$
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
1955	10	1,500	1962	10	2,000

TABLE 31. Purchases of Pulpstones by the Canadian Pulp and Paper Industry, 1952-62

Year	Number for 2 ft. wood	Value	Number for 2.5 ft. wood	Value	Number for 4 ft. wood	Value
		$		$		$
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]	..
1962	..	..	..	..	174	..

[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 771 tons valued at $58,363 in 196 compared with 808 tons worth $68,199 in 1961. In 1962 the major portion of the shipments was a higher grade milled calcined material.

The ocherous 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, 1921-62

Year	Mines or plants	Employees	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
1957-62	[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, 1953-62

Year	Quantity	Value	Year	Quantity	Value
	short tons	$		short tons	$
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
1957	7,518	187,211	1962	771	58,363

TABLE 34. Imports and Exports of Ochres and Colours, 1961 and 1962

	1961		1962	
	Quantity	Value	Quantity	Value
	tons	$	tons	$
Imports:				
Ochres, ochrey earths, siennas and umbers	649	64,937	..	..
Oxides, fireproofs, rough stuff, fillers and colours, dry, n.o.p.	4,903	4,298,769	..	..
Orange and yellow pigments	..	..	414	360,523
Pigments color lakes, toners, n.o.p.	..	..	1,348	1,143,267
Exports:				
Iron oxides	2,208	376,169	1,865	365,582

TABLE 35. Consumption of Iron Oxides in Specified Canadian Industries, 1958-62

Year	Coke and gas		Paints and varnishes			
			Iron oxide pigments		Ochres, siennas and umbers	
	Quantity	Value	Quantity	Value	Quantity	Value
	tons[1]	$	tons	$	tons	$
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
1962	..	..	1,955	469,534	150	56,025

[1] Oxide and purifying materials.

LITHIA

During 1962 the producers of lithia shipped 499,736 pounds valued at $558,654 compared with 536,190 pounds worth $392,871 in 1961. 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 operated 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 transparent to ultraviolet light for use in germicidal lamps. Lithium compounds reduce the maturing temperature and increase the fluidity and gloss of glass, glazes and enamels, facilitate production of certain glasses of high electrical resistance and have many other desirable effects that render then 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 hydrozide 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, 1954-62

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
1962	499,736	558,654

TABLE 37. World Production of Lithium Minerals, by Countries

Country	Mineral produced	1958	1959	1960	1961	1962
North America:						
Canada[1]	Spodumene	[2] 1,927	[2] 1,378	[2] 102	[2] 268	[2] 250
United States	Lithium minerals					
South America:						
Argentina	Lithium Minerals	175	187	153	443	496
Brazil	Spodumene (exports)	176	468	[3]	[3]	165
	Amblygonite (exports)	..	590	55	—	—
Surinam	Amblygonite	—	—	—	475	827
Europe:						
Spain	Amblygonite	—	—	28	19	—
Africa:						
Mozambique	Lepidolite	96	99	—	170	302
Rhodesia and Nyasaland, Federation of:						
Southern Rhodesia	Eucryptite	398		1,334	1,879	866
	Amblygonite	1,835		..	86	35
	Lepidolite	64,699	57,901[4]	15,485	24,037	21,243
	Petalite	13,166		63,336	27,698	21,705
	Spodumene	5,238		7,690	1,627	1,496
Ruanda-Urundi	Amblygonite	11	2,965	2,569	1,854	359
South Africa, Republic of	Lithium minerals	..	10	173	260	1,263
South-West Africa	Amblygonite	534	242	161	136	141
	Lepidolite	1,043	2,168	973	1,418	1,781
	Petalite	7,405	2,787	3,909	2,540	1,007
Uganda	Amblygonite	..	..	..	26	22
Oceania:						
Australia	Petalite	76	..	1	108	94
	Amblygonite	—	—	17	27	31
	Spodumene	—	—	—	6	27
World totals		**96,779**	**68,795**	**95,985**	**63,077**	**52,110**

[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] 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, 1953-62

Year	Value	Year	Value
	$		$
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
1957	3,046,298	1962	3,431,873

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, 1957-62

Year	Calcined dolomite		Dolomite, crude		Magnesite	
	Short tons	Value	Short tons	Value	Short tons	Value
		$		$		$
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	604,074[r]	1,273,530[r]	8,138	560,650
1962	90,269	2,315,866	667,613	1,257,587	15,320	1,029,598

TABLE 40. World Production of Magnesite, by Countries[1]

Country[1]	1958	1959	1960	1961	1962
	short tons[2]				
North America:					
United States	492,982	594,307	498,528	603,656	492,471
Totals[1,3]	**740,000**	**890,000**	**810,000**	**900,000**	**820,000**
South America:					
Brazil	53,116	53,378	69,793	84,549	103,348
Colombia	—	—	—	110	110
Totals	**53,116**	**53,378**	**69,793**	**84,659**	**103,458**
Europe:					
Austria	1,346,133	1,324,106	1,791,701	1,982,704	1,771,863
Czechoslovakia[3]	[4]	440,000	470,000	550,000	580,000
Greece	97,742	123,566	206,451	163,573	162,921
Italy	6,500	7,562	6,584	7,478	9,275
Norway	..	..	..	..	..
Poland	15,432	18,200	23,920	29,900	37,600
Spain	38,442	44,569	53,239	91,702	78,691
U.S.S.R.[3]	[4]	[4]	[4]	2,750,000	2,750,000
Yugoslavia	246,032	269,851	277,613	301,002	411,561
Totals[1,3]	**3,750,000**	**3,900,000**	**4,500,000**	**5,900,000**	**5,800,000**
Asia:					
China	..	880,000	1,100,000	700,000	880,000
India	114,900	174,129	172,325	231,203	239,201
Pakistan	..	443	486	180	1,036
Turkey	717	..	17	2,414	10,736
Korea North	—	55,000	55,000	220,000	550,000
Totals[1,3]	**1,270,000**	**1,110,000**	**1,330,000**	**1,220,000**	**1,680,000**
Africa:					
Kenya	551	3,145	33	1,930	—
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	..	..	8,031	13,880	11,619
South Africa, Republic of	80,200	58,883	66,793	67,732	102,352
Tanganyika (exports)	337	118	126	46	..
Totals	**81,088**	**62,146**	**74,983**	**83,588**	**113,971**
Oceania:					
Australia	77,718	67,856	69,626	110,651	69,654
New Zealand	1,344	..	891	650	711
Totals	**79,062**	**67,856**	**70,517**	**111,301**	**70,365**
World totals (estimate)[1,2]	**6,000,000**	**6,100,000**	**6,850,000**	**8,300,000**	**8,600,000**

[1] Quantities in this table represent crude magnesite mined. Magnesite is also produced in Canada and Bulgaria, but calcined 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] 1941-62

Year	Tons	Value
		$
1941	265	7,343
1942	1,140	38,760
1943-62	—	—

[1] Produced entirely in British Columbia.

TABLE 42. Imports of Magnesium Sulphate, 1953-62

Year	Tons	Value	Year	Tons	Value
		$			$
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
1957	2,558	71,295	1962	2,806	81,389

TABLE 43. Available Data on Consumption of Magnesium Sulphate, 1958-62

Industry	1958	1959	1960	1961	1962
	tons				
Leather tanneries	464	388	355	431	412
Medicinals	658	539	501	572	571
Fertilizers	100	104	130	162	40
Textiles	—	—	—	—	—
Totals accounted for	**1,222**	**1,031**	**986**	**1,165**	**1,023**

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 puporses in the muscovite class.

TABLE 44. Principal Statistics of the Mica Mines, Significant Years, 1921-59

Basis: Standard Industrial Classification in use prior to 1960

	Mines or plants	Employees	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 A. Principal Statistics of the Mica Mines, 1957-62

Basis: Revised Standard Industrial Classification and New Establishment Concept

	Establishments	Employees	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
1962	15	21	55,664	5,532	6,315	86,828	74,981

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

TABLE 45. Mica Production (Primary Sales), by Classes, 1961 and 1962

Grade	1961		1962	
	Pounds	Total value f.o.b. shipping point	Pounds	Total value f.o.b. shipping point
		$		$
Rough, mine-run or rifted	73,541	3,975	72,187	4,596
Mica sold for mechanical splitting	24,577	6,925	26,400	7,695
Splittings	22,556	4,836	–	–
Ground or powdered	1,434,097	63,435	609,968	29,366
Scrap, mine or shop waste and mica mined and sold for grinding	204,804	2,082	455,805	4,559
Trimmed mica	56,585	44,124	33,437	33,906
Unspecified	–	–	6,237	4,476
Totals, mica shipments	**1,816,160**	**125,377**	**1,204,034**	**84,598**
Varieties:				
Phlogopite mica (amber) and biotite	1,565,740	116,722	1,204,034	84,598
Muscovite mica (white) and schist	250,420	8,655	–	–

TABLE 46. Production of Mica, by Provinces and by Varieties, 1962

Province	Phlogopite and biotite		Muscovite and schist		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
Quebec	702,762	75,350	–	–	702,762	75,350
Ontario	501,272	9,248	–	–	501,272	9,248
British Columbia	–	–	–	–	–	–
Totals, Canada	**1,204,034**	**84,598**	**–**	**–**	**1,204,034**	**84,598**

TABLE 47. Production of Mica, 1953-62

Year	Short tons	Value	Year	Short tons	Value
		$			$
1953	1,133	161,128	1958	752	89,651
1954	853	85,139	1959	407	63,004
1955	820	77,541	1960	856	94,208
1956	922	95,666	1961	908	125,377
1957	641	111,583	1962	602	84,598

TABLE 48. Imports and Exports of Mica, 1960-62

	1960		1961		1962	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
Imports:						
Mica, unmanufactured	1,838,800	147,847	1,475,800	175,455	2,306,300	286,047
Mica, manufactures of, n.o.p.	...	322,259	...	358,499	...	439,069
Exports:						
Mica, scrap and waste	367,000	14,137	...	...	...	...
Mica splittings	—	—	...	...	...	...
Mica manufactures	...	50	...	...	...	...
Mica, rough untrimmed	30,200	9,000	...	...	...	...
Mica, trimmed	67,000	67,397	...	...	...	...
Mica, ground	24,000	1,380	...	...	...	...
Mica, rough, scrap and schist	...	...	181,100	52,357	97,900	30,355
Mica, fabricated	...	...	41,300	55,645	102,300	64,463
Totals, mica exports reported	...	**91,964**	...	**108,002**	...	**94,818**

TABLE 49. Consumption of Mica, in Specified Industries, 1958-62

	1958	1959	1960	1961	1962
	pounds				
By industries:					
Paints	1,912,073	1,929,365	2,364,002	2,428,880	1,780,195
Electrical apparatus	355,928	361,710	...	...	...
Rubber goods	634,021	609,155	824,556	483,729	6,524
Roofing	512,000	200,000	204,000	658,000	42,000
Paper goods	...	...	...	...	...
Asbestos	11,868	...	...	...	...
Non-metallic mineral products	121,506	127,142	60,000	45,000	150,000
Small electrical appliances	...	...	30,200	1,200	120,000
Major appliances	...	...	64,034	120,018	250,000
Communications equipment	...	...	1,034	12,384	18,141
Electrical industrial equipment	...	...	195,831	56,912	87,239
Electrical wire and cables	...	...	14,480	11,830	7,400
Miscellaneous electrical products	...	...	...	1,500	4,000
Totals accounted for	**3,547,396**	**3,227,372**	**3,758,137**	**3,819,453**	**2,465,499**
By provinces:					
Quebec, Nova Scotia and Newfoundland	1,685,410	1,619,077	1,453,869	1,482,932	1,307,237
Ontario	1,324,552	1,288,436	1,515,780	1,064,183	985,910
Manitoba	191,782	44,318	54,467	54,622	60,830
Alberta	294,000	198,000	390,436	855,524	42,000
British Columbia	51,652	77,541	343,585	362,192	69,522
Canada	**3,547,396**	**3,227,372**	**3,758,137**	**3,819,453**	**2,465,499**

TABLE 50. World Production of Mica by Countries[1]

Country[1]	1958	1959	1960	1961	1962
	thousands of pounds[2]				
North America:					
Canada (shipments):					
Block	90	49	176	154	
Splittings	..	..	..	22	
Ground	1,380	591	791	1,433	1,204
Scrap	35	174	734	205	
United States (sold or used by producers):					
Sheet	661	706	587	526	363
Scrap	186,694	203,082	195,824	198,088	215,404
South America:					
Argentina:					
Sheet	192	110	190	119	273
Scrap	—	—	—	—	—
Brazil	2,829	2,553	4,440	9,101	3,885
Europe:					
Austria[3]	134	216	317	194	33
France	459	670	686	304	190
Norway, including scrap	4,519	12,059	6,393	7,716	2,205
Spain	20	11	[4]	..	..
Sweden:					
Block	..	..	..	..	..
Ground	421	328	348	..	..
Yugoslavia	4	4	4	9	22
Asia:					
Ceylon	..	..	..	..	..
India (exports):					
Block	5,243	6,305	5,216	4,592	4,396
Splittings	14,264	15,988	17,469	18,208	18,838
Scrap	24,001	29,242	42,829	35,355	45,522[5]
Taiwan, including scrap	..	[4]	..	..	..
Africa:					
Angola:					
Sheet	46	20	26	4	—
Scrap and splittings	716	384	721	51	108
Kenya	15	22	2	—	2
Malagasy Republic (phlogopite):					
Block	234	269	256	223	181
Splittings	2,154	1,922	1,973	2,002	2,780
Morocco:					
Sheet	..	..	..	..	..
Scrap	..	..	..	..	..
Mozambique, including scrap	4	13	2	4	2
Rhodesia and Nyasaland, Federation of:					
Northern Rhodesia:					
Sheet	2	[4]	[4]	..	..
Southern Rhodesia:					
Block	108	106	90	64	33
Crude and scrap	..	..	754	101	172
South Africa, Republic of:					
Sheet	2	—	2	2	2
Scrap	4,255	3,761	6,711	5,441	4,901
South West Africa	..	234	..	..	150
Sudan:					
Block	225	882	..	..	..
Scrap	154				
Tanganyika (exports):					
Sheet	108	117	179	196	218
Scrap	24	190	..	..	..
Oceania:					
Australia:					
Block	31	33	9	..	..
Scrap	84	187	648	185	—
Damourite	1,080	1,100	1,252	1,138	1,087
World totals (estimate)[1,2]	**315,000**	**350,000**	**365,000**	**365,000**	**390,000**

[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] Including reclaimed from dumps.

[4] Less than 500 pounds.

[5] Includes condenser film as follows: 1962, 412 thousand pounds.

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

TABLE 51. Employees and their Earnings in the Mica Mines, 1958-62

Year	Employees					Man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and administrative	Workmen	Total
	Male	Female	Male	Female					
	number						dollars		
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
1962	1	—	20	—	21	42,366	9,320	46,344	55,664

TABLE 52. Workmen in the Mica Mines, by Months, 1961 and 1962

Month	1961					1962			
	Male					Male			
	Mine		Mill or shop		Total	Mine		Mill or shop	Total
	Surface	Underground	Male	Female		Surface	Underground		
	number								
January	4	8	2		14	3	9	4	16
February	4	8	3		15	3	10	4	17
March	5	7	—		12	3	11	4	18
April	7	7	2	2	18	3	10	4	17
May	18	9	2	2	31	11	7	3	21
June	21	7	3	6	37	16	8	1	25
July	21	7	3	6	37	14	8	1	23
August	26	9	3	6	44	10	8	1	19
September	32	8	7	4	51	12	11	1	24
October	28	6	7	4	45	8	7	3	18
November	21	9	10	4	44	5	7	4	16
December	6	10	4	4	24	5	8	4	17
Averages	**17**	**8**	**4**	**3**	**32**	**8**	**9**	**3**	**20**
Total man-hours worked					*49,196*				*55,664*

TABLE 53. Fuel and Electricity Used in the Mica Mines, 1962

Kind		Quantity	Cost at plant
			$
Bituminous coal (a) From Canadian mines	short ton	108	1,698
(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)	Imp. gal.	2,152	968
Kerosene or coal oil		—	—
Fuel oil	Imp. gal.	250	100
Wood (cords of 128 cubic feet of piled wood)	cord	13	162
Gas (a) Liquefied petroleum gases (propane, etc.)		—	—
(b) Other manufactured gas		—	—
(c) Natural gas		—	—
Other fuel		—	—
Electricity purchased for power and lighting	kwh.	126,280	2,604
Electricity purchased for other purposes		—	—
Total (cost only)		...	**5,532**
Electricity generated (a) For own use		—	...
(b) For sale		—	—

PERLITE

Perlite is a volcanic glass characterized by a concentric "onion skin" fracture and usually a 2 to 6 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 54. Production of Phosphate Rock, 1947-62

Year	Short tons	Value	Year	Short tons	Value
		$			$
1947	–	–	1952	–	–
1948	–	–	1953	–	–
1949	20	291	1954	–	–
1950	129	1,070	1955	–	–
1951	6	94	1956-62	–	–

TABLE 55. Imports of Phosphate Rock, 1953-62

Year	Short tons	Value	Year	Short tons	Value
		$			$
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
1957	723,220	5,897,784	1962	1,155,966	10,842,509

TABLE 56. Consumption of Phosphate Rock, 1958-62

	1958	1959	1960	1961	1962
	tons				
By uses:					
Fertilizers	583,584	621,126	157,421	239,408	339,509
Chemicals	115,556	143,865	731,164	747,920	752,796
Stock and poultry feeds	29,766	30,697	29,649	33,236	34,659
Miscellaneous	...	75	...	...	...
Totals	**728,906**	**795,763**	**918,234**	**1,020,564**	**1,126,964**
By provinces:					
Prince Edward Island, Nova Scotia	358	427	221	416	356
New Brunswick	808	963	1,030	1,241	1,367
Quebec	170,272	203,042	219,891	223,120	235,502
Ontario	84,607	95,355	118,951	186,358	288,046
Manitoba	1,218	1,702	1,220	2,007	2,231
Saskatchewan	664	442	706	968	995
Alberta	107,508	98,120	157,814	174,904	176,574
British Columbia	363,471	395,712	418,401	431,550	421,893
Canada	**728,906**	**795,763**	**918,234**	**1,020,564**	**1,126,964**

TABLE 57. World Production of Phosphate Rock, by Countries[1]

Country[1]	1958	1959	1960	1961	1962
	thousand long tons[2]				
North America:					
Mexico	24	29	27	29	30[3]
United States	14,879	15,869	17,516	18,559	19,382
West Indies:					
Netherlands Antilles (exports)	85	97	113	141	127
Totals	**14,964**	**15,995**	**17,656**	**18,729**	**19,539**
South America:					
Argentina	1	1	[4]	[4]	[4]
Brazil: Apatite	111	131	200	240	305
Phosphate rock	524	860	666	409	251
Chile: Apatite	19	19	17	14	12
Guano	31	21	18	19	16
Peru: Guano	164	125	155	157	203
Venezuela	..	..	..	..	..
Totals	**849**	**1,157**	**1,056**	**839**	**787**
Europe:					
Belgium	18	13	8	14	12
France	102	76	57	80[3]	80[3]
Poland	70	40	40	46	55
Spain	11	[4]	3	..	..
U.S.S.R.: Apatite[5]	3,940	4,040	4,720	5,610	6,400
Sedimentary rock[3]	1,970	1,970	2,260	3,050	3,450
Totals[1,4]	**6,100**	**6,140**	**7,090**	**8,800**	**10,000**

See footnotes at end of table.

TABLE 57. World Production of Phosphate Rock, by Countries[1] — Concluded

Country[1]	1958	1959	1960	1961	1962
	thousand long tons[2]				
Asia:					
China[3]	300	500	600	500	600
Christmas Island (Indian Ocean) (exports)	374	494	503	694	521
India: Apatite	15	16	15	20	29
Indonesia	2	10	7	10	6
Israel	206	201	221	222	226
Jordon	289	332	356	416	450
Korea, North (apatite)[3]	24	50	100	150	200
Philippines: Guano	7	[4]	10	[4]	[4]
Phosphate rock	1	..	[4]	..	4
Vietnam, North: Apatite	133	256	480	555	667
Phosphate rock	32	50	50	57	33
Totals[3,4]	**1,390**	**1,910**	**2,340**	**2,620**	**2,740**
Africa:					
Algeria	552	563	554	433	384
Malagasy Republic	5	7	5	..	..
Morocco	6,236	7,050	7,354	7,824	8,033
Mozambique (guano)	1	[4]	[4]	..	..
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	..	2	3	[4]	..
Senegal[6]: Aluminum phosphate	103	94	104	137	139
Calcium phosphate	..	..	106	401	480
Seychelles Islands (guano)	17	6	7	8	5
South Africa, Republic of	213	228	263	292	302
South West Africa: Guano	..	1	..	1	1
Togo	..	..	..	116	190
Tunisia	2,243	2,150	2,063	1,950	2,064
Uganda	2	3	4	[4]	1
United Arab Republic (Egypt Region)	549	619	557	617	592
Totals	**9,920**	**10,723**	**11,020**	**11,779**	**12,200**
Oceania:					
Angaur Island (export)	..	..	..	..	..
Australia	7	5	2	5	4
Makatea Island (French Oceania)	320	362	407	375	407
Nauru Island (exports)	1,234	1,192	1,351	1,282	1,516
Ocean Island (exports)	324	314	320	338	257
Totals	**1,885**	**1,873**	**2,080**	**2,000**	**2,184**
World totals (estimate)[3,2]	**35,110**	**37,800**	**41,240**	**44,770**	**47,450**

[1] A negligible amount is produced in Jamaica, Japan, Sarawak, 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.

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

POTASH

Potash shipments were made in 1962 by the International Minerals and Chemical Corp. The shaft of the Potash Company of America was undergoing repairs. Shipments had been made in 1959 and 1960 from the plant at Patience Lake, Saskatchewan.

Although the products may be potassium chloride, the market quotations and other calculations are usually based on the K_2O 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 58. Producers' Shipments of Potash (K_2O), 1959-62

Year	Tons	Value
		$
1959	..	1,408,462
1960	..	178,700
1961	—	—
1962	..	3,000,000

TABLE 59. World Production of Potash (Marketable, Unless Otherwise Stated) in Equalent K_2O, by Countries[1]

Country[1]	1958	1959	1960	1961	1962
	short tons				
North America:					
Canada	..	46,500	..	..	150,000
United States	2,147,671	2,383,259	2,638,574	2,732,602	2,452,921
Crude (including Brines)[2]	2,478,725	2,781,960	3,039,309	3,143,569	2,863,335
South America:					
Chile (Nitrate)	9,811	15,482	16,500[2]	15,504	19,541
Europe:					
France	1,628,146	1,611,466	1,688,635	1,884,791	1,878,178
Crude[2]	1,835,033	1,828,804	1,909,791	2,098,603	2,118,919
Germany:					
East[3]	1,700,000	1,764,000	1,836,000	1,846,000	1,930,000
Crude[2,3]	1,960,000	2,028,000	2,111,000	2,122,000	2,183,000
West	1,886,052	2,022,697	2,181,206	2,253,122	2,138,637
Crude[2]	2,225,600	2,363,842	2,553,158	2,646,000	2,495,331
Italy	[4]	10,698	54,338	149,187	170,142
Spain	262,672	269,790	291,356	289,037	259,156
U.S.S.R.[3]	1,100,000	1,160,000	1,212,500	1,455,000	1,650,000
Asia:					
Israel	69,900	76,000[5]	91,000[5]	93,600[5]	100,200[5]
Japan:					
Alunite	500	210	190	130	—
Carbonate	1,380	—	—	—	—
Africa:					
Eritrea	450	..	..	..	..
World totals (marketable estimate)[1]	**8,800,000**	**9,400,000**	**10,000,000**	**10,700,000**	**10,800,000**

[1] This table incorporates some revisions. Data do not add to totals shown due to rounding where estimated figures are included in the detail.
[2] Estimate.
[3] To avoid duplication of figures, data on crude potash are not included in the total.
[4] Data not available, estimate included in total.
[5] Year ended March 31 of year following that stated.

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 Bamberton the British Columbia Cenemt had facilities to produce this commodity. At Saltspring Island a rotary-kiln plant was operated by Holdfast Natural Resources Ltd. Producers shipments in 1961 were valued at $2,000 and in 1962 the value was $4,927.

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. Since 1961 the data on this material have been included in the figures on by-products iron ore.

TABLE 60. Producers' Shipments Pyrite and Pyrrhotite, 1953-62

Year	Gross weight	Sulphur content[1]	Value	Year	Gross weight	Sulphur content[1]	Value
	tons		$		tons		$
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
1957	1,166,416	515,096	4,808,228	1962	517,308	257,084	1,879,584

[1] Data for 1953-55 include sulphur content of acid made from roasting zinc sulphide concentrates at Arvida.

TABLE 61. World Production of Pyrites (including Cupreous Pyrites), by Countries

Country[1]	1959		1960		1961		1962	
	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content
	thousand long tons[2]							
North America:								
Canada	982	416	922	391	462	223	462	236
Cuba[3]	20	9	18	8	20	9	26	12
United States	1,057	437	1,016	416	987	399	916	379
South America:								
Venezuela	4	1	..	..	..	..	..	..
Europe:								
Bulgaria	113	47	117	49	120	50	140	59
Czechoslovakia	365	144	384	148	363	141	395	155
Finland	259	109	256	108	270	114	468	215
France	290	121	273	117	281	118	299	126
Germany:								
East	141	49	132[3]	46	115[3]	40	118[3]	41
West	462	189	529	210	524	221	404	173
Greece	127	57	161	74	185	86	142	65
Italy	1,496	682	1,523	694	1,555	708	1,560	711
Norway	732	320	820	356	722	319	780	320
Poland	217	79	223	83	198	76	219	82
Portugal	622	286	645	297	643	296	631	290
Rumania	231	92	263	105	259	103	300	120
Spain	2,086	961	2,217	1,058	2,097	1,001	2,095	997
Sweden	341	169	406	203	431	220	370	189
U.S.S.R.[3]	2,559	1,358	2,756	1,457	2,756	1,457	2,953	1,563
United Kingdom	1	[4]	[4]	[4]	[4]	[4]	27	11[3]
Yugoslavia	285	114	410	164	358	143	407	163

See footnotes at end of table.

TABLE 61. World Production of Pyrites (including Cupreous Pyrites), by Countries[1] — Concluded

Country[1]	1959		1960		1961		1962	
	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content	Gross weight	Sulphur content
	thousand long tons[2]							
Asia:								
China[3]	837	374	984	443	984	443	1,083	492
Cyprus	870	418	914	439	824	396	809	388
Japan	3,336	1,396	3,634	1,517	3,869	1,624	3,952	1,664
Korea, North[3]	197	79	246	98	295	118	344	138
Philippines	25	11[3]	25	11[3]	51	22[3]	8	3[3]
Taiwan	33	13	42	16	47	20	45	20
Turkey	87	42	42	20	97	46	105	51
Africa:								
Algeria	29	13	38	17	48	22	42	19
Morocco:	14	5	13	5	14	5	20	7
Rhodesia and Nyasaland Federation of:								
Southern Rhodesia	40	17	49	19	58	23	50	19
South Africa, Republic of	495	195	492	212	440	176	434	174
Oceania:								
Australia	223	107	239	115	213	102	149	65
World totals (estimate)[1,2]	**18,600**	**7,800**	**19,800**	**8,300**	**19,300**	**8,100**	**19,800**	**8,300**

[1] Pyrites is produced in Brazil, but production data are not available.
[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] Less than 500 tons.

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), 1945-62

Year	Tons	Value	Year	Tons	Value
		$			$
1945	286	3,146	1950	—	—
1946	—	—	1951	—	—
1947	163	1,793	1952	—	—
1948	—	—	1953	—	—
1949	47	513	1954-62	—	—

SODIUM SULPHATE (NATURAL)

All the natural sodium sulphate produced in Canada was obtained from the brine lakes in Saskatchewan. Producers shipped 246,672 tons valued at $3,954,273 in 1962 compared with 250,996 tons valued at $4,036,625 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, 1953-62

Year	Short tons	Selling value f.o.b. shipping point	Year	Short tons	Selling value f.o.b. shipping point
		$			$
1953	115,565	1,631,258	1958	173,217	2,862,915
1954	158,417	2,385,573	1959	179,535	2,891,851
1955	178,888	2,799,715	1960	214,208	3,449,155
1956	181,053	2,838,186	1961	250,996	4,036,625
1957	157,800	2,568,728	1962	246,672	3,954,273

TABLE 64. Production of Manufactured Sodium Sulphate,[1] 1945-62

Year	Salt cake		Year	Salt cake	
	Tons	Value		Tons	Value
		$			$
1945	2,850	35,226	1950	3,674	74,555
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	59,733
1949	3,738	83,996	1954-62	..	..

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

TABLE 65. Imports of Sodium Sulphate, 1953-62

Year	Salt cake		Glauber's salt	
	Tons	Value	Tons	Value
		$		$
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	899	29,023
1962	31,347	608,958	426	22,579

TABLE 66. Exports of Sodium Sulphate, 1953-62

Year	Long tons	Value	Year	Short tons	Value
		$			$
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[1]	87,131	1,331,428
1957[1]	37,023	593,390	1962[1]	74,049	1,210,958

[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, 1958-62

Industry	1958	1959	1960	1961	1962
			short tons		
Pulp and paper	164,556	168,215	178,449	192,912	200,166
Glass, including glass wool	2,357	2,078	2,813	2,756	3,026
Medicinals	52	54	54	16	56
Soaps	814	952	1,394	517	1,131
Stone products	288	335	352[1]	204	259
Totals accounted for	**168,067**	**171,634**	**183,062**	**196,405**	**204,638**

[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, 1953-62

Year	Quantity[1]	Value	Year	Quantity[1]	Value
	tons	$		tons	$
1953	172,200	1,722,000	1958[2]	241,055	2,361,252
1954	221,247	2,212,470	1959[2]	277,030	2,716,1[illegible]
1955	224,457	2,244,570	1960[2]	289,620	2,854,[illegible]
1956[2]	236,088	2,323,590	1961[2]	277,056	2,708,[illegible]
1957[2]	235,123	2,322,067	1962[2]	292,728	3,089,[illegible]

[1] Does not include in 1953-55 sulphur in acid made from roasting zinc sulphide concentrates at Arvida.
[2] Includes sulphur in acid made from zinc sulphide at Arvida, Port Maitland and Valleyfield.

TABLE 69. Sulphur (Elemental)[1] Made from Natural Gas and Nickel Sulphide, 1953-62

Year	Output	Sales
	short tons	
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	394,7[illegible]
1962[2]	1,167,999	695,0[illegible]

[1] Does not include sulphur made from imported crude petroleum.
[2] Includes sulphur produced at nickel refinery.

TABLE 70. Imports of Sulphur, 1953-62

Year	Tons	Value	Year	Tons	Value
		$			$
1953	359,205	8,526,804	1958	380,331	8,324,191
1954	310,127	7,816,301	1959	332,430	6,924,938
1955	373,373	9,386,983	1960	328,765	6,629,239
1956	474,117	11,857,556	1961	329,555	7,094,216
1957	416,930	9,752,368	1962	195,089	4,637,588

TABLE 71. Available Data on the Consumption of Sulphur (Brimstone), 1957-62

	1957	1958	1959	1960	1961	1962
	tons of 2,000 pounds					
By industries:						
Pulp and paper	284,561	273,861	275,362	286,293	299,736	315,279
Heavy chemicals	189,911	229,170	193,737	197,212	175,537	206,991
Rubber goods	2,687	2,424	2,868	3,200	3,221	108
Medicinal	43	21	21	15	14	—
Adhesives	77	61	62	...	...	...
Starch	43	450	234	282	301	323
Fruit and vegetable preparations	6	3	...	...	5	1
Sugar refining	144	135	150	113	126	169
Petroleum refining	225	225	219	198	120	186
Steel and iron	83	58	171	1,224	1,548	1,319
Miscellaneous chemicals	3,161	8,634	10,667	19,273	25,047	27,880
Abestos products	...	5	...	...	...	...
Malt products	...	...	...	...	109	127
Totals accounted for	**480,941**	**515,047**	**483,482**	**507,810**	**505,764**	**552,413**
By provinces:						
Newfoundland	19,886	19,387	21,094	22,624	24,122	21,998
Nova Scotia	6,753	6,543	5,029	5,236	5,802	11,883
New Brunswick	38,933	38,290	35,117	36,586	38,227	42,722
Quebec	134,528	138,483	138,063	156,397	156,612	152,401
Ontario	174,633	197,682	162,145	141,044	153,862	188,197
Manitoba and Saskatchewan	18,699	24,998	23,037	22,679	3,857	5,359
Alberta	39,105	41,688	42,127	63,030	66,487	67,424
British Columbia and Northwest Territories	48,404	47,976	56,870	60,214	56,795	62,429
Canada	**480,941**	**515,047**	**483,482**	**507,810**	**505,764**	**552,413**

TABLE 72. Exports of Sulphur and Pyrite, 1957-62

Year	Pyrite	Sulphur	
	Value	Tons	Value
	$		$
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
1962	890,055	400,026	6,649,943

TABLE 73. World Production of Elemental Sulphur, by Countries[1,2]

Country[1]	1958	1959	1960	1961	1962
	long tons[2]				
Frasch:					
Mexico	1,201,483	1,293,181	1,261,574	1,148,494	1,350,375
United States	4,643,243	4,553,634	4,942,935	5,385,468	4,984,578
Totals	**5,844,726**	**5,846,815**	**6,204,509**	**6,533,962**	**6,334,953**
From sulphur ores:					
Argentina	31,545	25,207	39,265	22,183	22,303
Bolivia (exports)	392	..	1,175	4,896	7,247
Canary Islands	2,900	2,900	3,900	4,900	5,900
Chili	24,015	21,676	30,900	43,994	54,132
China[3]	70,000	100,000	120,000	120,000	120,000
Columbia	6,693	8,824	8,899	9,941	10,046
Italy	154,137	116,252	79,703	68,668	53,068
Japan[4]	178,052	215,669	243,684	238,456	220,438
Mexico	35,446	17,700[3]	17,700[3]	25,116	26,751
Phillipines	1,200	..	43	158	926
Poland	9,200	10,500	25,000	227,000	337,000
Spain	3,055	2,851	1,336	..	..
Taiwan	6,178	5,533	5,725	5,472	7,462
Turkey	12,622	13,174	16,830	15,506	18,247
U.S.S.R.[3]	400,000	600,000	800,000	900,000	950,000
United Arab Republic (Egypt)	1,425	1,200	3,500	9,000	6,000[3]
United States	2,334	86,182	94,357	92,025	40,840
Totals[3,5]	**940,000**	**1,230,000**	**1,490,000**	**1,790,000**	**1,880,000**
Totals, native sulphur	**6,785,000**	**7,075,000**	**7,700,000**	**8,320,000**	**8,220,000**
Recovered:					
Bulgaria[6]	2,800	4,000	5,000	5,000	6,000
Canada (Sales)[7]	84,265	130,050	244,963	352,466	620,623
China[3,6]	100,000	100,000	120,000	120,000	120,000
France[8]	126,542	419,273	778,157	1,080,013	1,326,000
Germany:					
East	104,679	106,153	100,130	115,000	118,000
West	75,566	78,474	82,807	82,861	90,666
Iran[3,9]	12,800	19,000	20,000	20,000	15,000
Italy[3]	4,000	4,000	3,200	2,000	2,000
Japan[9]	7,889	7,829	8,326	8,763	8,549
Mexico[8]	27,641	45,054	33,487	51,086	46,545
Netherlands[6]	20,800	30,700	30,000	38,000	28,000
Netherlands Antilles: Aruba, Curacao[3]	30,000	30,000	40,000	40,000	40,000
Norway[6]	89,126	77,111	71,256	61,156	45,175
Portugal[6]	17,373	15,888	10,915	8,813	6,637
Spain[6]	25,251	25,719	40,194	48,323	41,836
Sweden[10]	33,465	37,576	38,900	30,500	30,000[3]
Taiwan[9]	..	810	875	1,968	2,130
Trinidad[3,9]	5,000	5,000	5,000	5,000	5,000
South Africa Republic of[6]	..	..	..	2,163	1,913
U.S.S.R.[3]	180,000	180,000	210,000	275,000	370,000
United Arab Republic (Egypt Region)	3,000	2,403	2,345	2,545	2,039
United Kingdom[11]	49,561	53,173	62,402	58,405	51,900
United States	640,096	686,407	766,566	858,169	899,598
Totals[3,6]	**1,460,000**	**2,060,000**	**2,675,000**	**3,270,000**	**3,880,000**
World totals (estimate)	**8,245,000**	**9,135,000**	**10,375,000**	**11,590,000**	**12,100,000**

[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] Includes sulphur from mixed sulphur-sulfide ore.
[5] In some years Iran produces mined sulphur equivalent to 250—1,500 tons sulphur. No estimate in total.
[6] From sulphide ores.
[7] Produced from natural gas, includes a small quantity derived from treatment of nickel sulfide matte at Port Colborne, Ontario.
[8] From natural gas.
[9] From refinery gases.
[10] From shale oil.
[11] Including sulphur recovered from petroleum refineries.

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 fluorspar, 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 Countries[1]

Country[1]	1958	1959	1960	1961	1962
	short tons[2]				
Argentina	161	880[3]	349	541	2,962
India	..	2	17	697	410
Kenya	96	112	283	—	22
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	280	50	..	..	..
South Africa, Republic of	54,314	52,398	69,022	71,118	85,534
Sudan	130[3]	130[3]	..	55	55
Tanganyika	91	125	20	157	72
United Arab Republic (Egypt)	302	331	132	..	313
United States (sold or used by producers)	190,564	206,579	199,072	206,637	205,747
Totals[1,2]	**245,938**	**260,607**	**268,895**	**279,205**	**295,115**

[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 Countries[1]

Country[1]	1958	1959	1960	1961	1962
	short tons[2]				
Argentina[3]	22,307	19,842	16,573	32,321	12,585
Austria:					
Trass	29,784	34,885	38,581	40,846	30,696
Canary Islands	..	1,836	1,614	1,585	1,918
Cape Verde Islands: Pozzolan	..	10,033	7,094	7,361	7,503
France:					
Pumice	7,051	2,064	995	1,455	1,876
Pozzolan	396,975	482,683	475,484	485,724	521,751
Germany, West (marketable)	3,255,121	4,039,966	4,742,138	5,898,461	6,290,882
Greece:					
Pumice	49,614	71,650	88,185	77,162	88,000[4]
Santorin earth	94,428	93,696	198,416	209,439	220,000[4]
Iceland	11,000	10,000[4]	9,000[4]	9,000[4]	7,200[4]
Italy:					
Pumice	145,413	258,254	345,390	282,834	349,862
Pumicite	137,899	146,717	124,671	161,488	165,000[4]
Pozzolan	2,992,880	3,055,978	3,494,273	3,213,338	3,320,114
Japan	120,000	121,250	[5]	[5]	[5]
Kenya	821	2,515	2,711	779	1,243
New Zealand	25,851	31,803	49,204	36,637	36,425
United Arab Republic (Egypt Region)	1,185	2,756	3,307	4,335	2,276
United States (sold or used by producers):					
Pumice and pumicite	925,026	783,873	601,315	936,039	583,716[6]
Volcanic cinder	1,047,930	1,492,247	1,609,050	1,526,546	1,737,587
World totals (estimate)[1,2]	**9,300,000**	**10,700,000**	**11,900,000**	**13,100,000**	**13,500,000**

[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, but it is believed that U.S.S.R. produces a sizable quantity.
[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.
[6] Includes American Samoa.

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

Operators of Miscellaneous Non-metallic Mineral Deposits, 1962

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'Evêché, Rimouski	St-Fabien
British Columbia:		
Mountain Minerals Ltd.	Box 700, Lethbridge, Alberta	Brisco
Baroid of Canada Ltd.[2]	Box 250, Onoway, Alberta	Spillimacheen
Sheep Creek Mines Ltd.	490 Baker St., Nelson, B.C.	Invermere
BRUCITE		
Quebec:		
Aluminium Company of Canada Ltd.	Sun Life Bldg., Montreal	Wakefield
DIATOMITE		
British Columbia:		
Fairey and Co.	661 Taylor St., Vancouver	Quesnel
Cariboo Diatomite Ltd.	12470 - 113 B Ave., North Surrey	Cariboo
FLUORSPAR		
Newfoundland:		
Newfoundland Fluorspar Ltd.	327 Duckworth St., St. John's	St. Lawrence
St. Lawrence Corporation of Nfld., Ltd.[2]	120 Broadway, New York U.S.A.	St. Lawrence
Ontario:		
Huntingdon Fluorspar Mines Ltd.[1]	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.[2]	River Valley	River Valley
GRAPHITE		
Quebec:		
Clement, Guy[2]	Venise	Canton Amherst
Clot, Oscar[2]	St. Jovite	Canton Joly
Laurentide Graphite Corp.	161 - 4e Ave., Ville St. Pierre	Labelle
Italia Copper Ltd.[1]	96 Mozart Est, Montreal	Bouttillier
Westfield Minerals Ltd.[1]	25 King St. W., Toronto, Ontario	Buckingham
Ontario:		
Krefeld Graphite Gold Mines Ltd.[1]	R.R. No. 2, Cooksville	Vogt Twp.
Portland Graphite Co.[1]	Portland	Bastard Twp.

See footnotes on page 48.

Operators of Miscellaneous Non-Metallic Mineral Deposits, 1962 — Continued

Name of operator	Head office address	Plant or mine location
GRINDSTONES		
New Brunswick:		
Read, H.C.	65 Verdun St., Moncton	Stonehaven
Bay of Chaleur Grindstone Co.[1]	1434 Ste-Catherine St. W., Montreal, Quebec	Gloucester Co.
IRON OXIDE		
Quebec:		
Gelinas, 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.
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
Lithigean 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
Chemalloy Minerals Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Lac du Bonnet
MAGNESITIC DOLOMITE		
Quebec:		
Canadian Refractories Ltd.	540 Canada Cement Bldg., Montreal	Kilmar
MICA		
Quebec:		
Blackburn Bros. Ltd.	85 Sparks St., Ottawa, Ontario	Cantley
Bastien, Laurier	Buckingham	Portland
Boland, Charles	Chelsea	Wakefield
Boissonnault, F.	East Templeton	Villeneuve
Cameron, Don & Earl	Buckingham	Portland West
Cross, W.C.	209 Eddy St., Hull	Hull
Côté W.R.	627, Filiatrault St., Montreal	Rockway Valley
Duquette, Waldick	55 Maple St., Gatineau	Cantley
Gagne, C.	St. Michel de Wentworth	Wentworth
Desormeaux, Gaudias	St-Pierre de Wakefield	Portland West
Gagne, Edgar & Richard	Cascades	Pike Lake
Joanisse, L.M.	31 Graham St., Hull	Gatineau
Larmont, Edouard	Buckingham	Portland East
Laviolette Mining & Metallurgical Corp.	5083 St. Denis, Montréal 34	Suzar
Lavigne, E.	St-Pierre de Wakefield	Wakefield
Law & Co.	209 Eddy St., Hull	Hull Twp.

See footnotes on page 48.

Operators of Miscellaneous Non-metallic Mineral Deposits, 1962 – Continued

Name of operator	Head office address	Plant or mine location
MICA – Concluded		
Quebec – Concluded:		
Massie, Ovide	Cantley	Wentworth
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
Reed, Bazel	Otter Lake	Pontiac
Renaud, J.	Perkins	Wakefield
Rousseau, C.	St. Remi d'Amherst	Labelle
Surcess, A.	Buckingham	Portland
Sargent, Fred	R.R. 3 Wakefield	Hull
Trudeau, Victor H.	279 Bronson Ave., Ottawa, Ont	Hull Twp.
Wallingford, E. Ltd.	Perkins	Papineau
Wallingford, G.E.	63 Pinehurst Ave., Ottawa, Ontario	Templeton
Zimmereling, A.	Otter Lake	Cawood
Ontario:		
Arvay, Robt.	R.R. 6 Kingston	Lawghborough
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.	Parry Sound	Parry Island
Fowler, Don	532 Eastern Ave., Toronto	Frontenac
Jones, Ed.	R.R. I Tichborne	Oso
Shea, Jack	Sharbot Lake	Bob's Lake
Watts, R.W.	21 Isabella St., Perth	Lanark
Wilson, Richard	R.R. 1, Hartington	Frontenac
British Columbia:		
Fairey & Co.[1]	661 Taylor St., Vancouver	Vancouver
Georgian Mica Co Ltd.[1]	5010-47 Ave., Red Deer, Alberta	Valemont
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.
POTASH		
Saskatchewan:		
Alwinsal Potash of Canada Ltd.[1]	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.[1]	161 East 42nd St., New York 17	Saskatoon
International Minerals & Chemical Corp.	77 Metcalfe St. Ottawa, Ontario	Esterhazy
Kalium Chemical, Ltd.[2]	500 Financial Bldg., Regina	Pense
Potash Co. of America Ltd.[2]	Box 509 Saskatoon	Patience Lake
Southwest Potash Corp.[2]	25 Adelaide St. W., Toronto, Ontario	Saskatoon
Tombill Mines Ltd.[1]	60 Yonge St., Toronto, Ontario	Riddle-Tidewater

See footnotes on page 48.

Operators of Miscellaneous Non-metallic Mineral Deposits, 1962 — Concluded

Name of operators	Head office address	Plant or mine location
POZZOLANA		
British Columbia:		
Canadian Pozzolan Industries Ltd.	640-7th Ave W., Calgary, Alta.	Cariboo
Holdfast Pozzolan, Ltd.	1253 Burrard St., Vancouver	Saltspring Island
PYRITE, PYRRHOTITE		
Quebec:		
Quemont 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 Mining Corp. Ltd.	455 Craig St. West, Montreal	Weedon
Ontario:		
International Nickel Company of Canada Ltd.	Copper Cliff	Copper Cliff
British Columbia:		
Consolidated Mining & Smelting Company of Canada Ltd.	Trail	Kimberley
Howe Sound Co.	500 Fifth Ave New York, N.Y., U.S.A.	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.	120 Broadway New York	Gladmar
Saskatchewan Minerals (Sodium Sulphate Div.)	Chaplin	Chaplin, Bishopric
SULPHUR (in smelter gas)		
Quebec:		
Aluminum Co. of Canada Ltd.[3]	Sun Life Bldg., Montreal	Arvida
Ontario:		
Canadian Industries Ltd.	Box 10, Montreal, Quebec	Copper Cliff
Sherbrooke Metallurgical Ltd.[3]	Dunnville	Dunnville
British Columbia:		
Consolidated Mining & Smelting Company of Canada Ltd.	Trail	Trail

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