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CANADA

DEPARTMENT OF TRADE AND COMMERCE

DOMINION BUREAU OF STATISTICS

CENSUS OF INDUSTRY

MINING, METALLURGICAL & CHEMICAL BRANCH

Report

on

THE MISCELLANEOUS

INDUSTRIAL OR NON-METALLIC MINERALS

IN CANADA, 1944

including

Barite
Corundum
Diamonds
Diatomite
Fluorspar
Garnet
Graphite
Grindstones
Kyanite
Lithium Minerals
Magnesitic Dolomite
Magnesium Sulphate
Natural Mineral Waters
Phosphate
Silica Brick
Sodium Carbonate
Sodium Sulphate
Strontium Minerals
Sulphur (Pyrites)
Volcanic Ash

OTTAWA
1946

Price 25 cents

(may 23'46)

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MISCELLANEOUS INDUSTRIAL OR NON-METALLIC MINERALS IN CANADA, 1944

Canadian operators producing certain industrial minerals, and who are usually relatively few in number, have been segregated for statistical purposes into a single group designated as the Miscellaneous Industrial or Non-Metallic Minerals Industry. Minerals or primary mineral products produced (or deposits developed) by this industry during 1944 included barite, brucite, diatomite, fluorspar, graphite, grindstones, magnesitic-dolomite (crude and refined), mineral waters, phosphate, silica brick, sodium carbonate and sodium sulphate. For convenience, the sulphur content of pyrites shipped and sulphur recovered from smelter gas are recorded with the various miscellaneous minerals listed above; the value of sulphur production, however, is not included in the total for the miscellaneous non-metallic or industrial minerals as the value of this element is credited to the copper-gold-silver mining and non-ferrous smelting industries.

The number of firms reported as active in the industry during 1944 was 50; employees numbered 365 and salaries and wages paid amounted to $1,500,250. The cost of fuel, purchased electricity, containers and process supplies used during the year was reported at $1,188,860, and the gross value of production totalled $3,986,579 compared with $3,476,707 in 1943.

"BARITE - Production of barite in Canada in 1944 was nearly five times greater than in 1943, the previous record year, and exceeded by a considerable margin the entire output from 1885 to the end of 1943. Sales by primary producers comprised both crude ore and ground material.

"For the first time in years crude barite was in demand for export. Shortages in the United States of crude lump for barium chemicals and lithopone, and of drilling, glass, and pigment grades, served to direct attention to Canada as a source of supply. The shortages were first in evidence in 1943 and were accentuated throughout 1944 by increased military demands for barite for use in camouflage paints and by the labour scarcity. As a result, contracts were negotiated by the U.S. War Production Board in 1944 for shipments of 60,000 tons of Nova Scotia barite to American consumers, 50,000 tons of which was to be crude ore and 10,000 tons ground material, the order to be completed by February, 1945. A substantial domestic market for crude ore also developed for use as permanent ballast in maintenance ships being built in West Coast yards, and nearly 12,000 tons was supplied for this purpose. Most of the ground barite produced was exported for use in oil well drilling in Trinidad, Venezuela, and other South American countries. In April, the U.S. War Production Board placed barite in the group of minerals the supply of which was insufficient to satisfy war plus essential industrial demands, and it was moved up into Group I and continued there for the remainder of the year.

"For the past several years the production of barite in Canada has been confined to Nova Scotia and British Columbia, the source of supply in Nova Scotia being the deposit of Canadian Industrial Minerals, Limited, at Walton, in Hants county. In British Columbia, output in 1944 came from a property at Parson, 25 miles south of Golden, that was operated by R. A. Thrall.

"The fluorspar ores of the Madoc area, Ontario, and of a deposit at Lake Ainslie in Nova Scotia, contain important amounts of barite. The latter deposit was operated in 1942 and 1943 and a small tonnage of hand-picked barite has been stockpiled. Tests by the Bureau of Mines, Ottawa, on ores from the Madoc and Lake Ainslie areas indicate the possibility of recovering a marketable barite product from them by flotation. Canadian Industrial Minerals, Limited did some exploratory work on the Lake Ainslie property in 1944, and on another barite deposit near Brookfield, Colchester county, Nova Scotia, under option agreements.

"World production of barite prior to the war was close to one million tons a year, of which Germany supplied 50 per cent and the United States 30 per cent. The remainder came mainly from the United Kingdom, Italy, Greece, France, and India.

"Crude lump barite is used in the manufacture of lithopone, an important white pigment and filler material, and in a wide range of barium chemicals. For these trades, barite is required to contain 95 to 96 per cent $BaSO_4$, and not more than 3 per cent SiO_2 and 1 per cent Fe_2O_3. The ore should be furnished crushed to 1½-inch size. There is little manufacture of the above products in Canada, but they are produced on a large scale in the United States, where, in 1944, 34 per cent of the total barite used was employed for such purposes.

"For most other industrial uses barite is employed in finely ground form, 325 mesh being the general specification. The material should be of good white colour, the best grades being obtained by wet-grinding, bleaching with acid, and water-floating. Some off-colour material is used for less exacting

purposes. Content of $BaSO_4$ is usually required to be not less than 95 per cent. Chief uses for ground barite are as a heavy, inert filler or loader in rubber, asbestos products, paper, linoleum and oilcloth, textiles, leather, and plastics. It is one of the leading pigments and extenders in paints, and in recent years has become of increasing importance as a heavy weighting medium in oil-well drilling muds, to overcome gas pressures. Colour is immaterial in barite for the last-named use, the requirements for which are a minimum specific gravity of 4.25 (corresponding to a $BaSO_4$ content of 93 per cent) and absence of soluble salts. The glass trade also uses considerable barite as a batch fluxing ingredient for moulded flint glass. For this purpose, it should contain not less than 96 per cent $BaSO_4$, under 3 per cent moisture, and not more than 0.4 per cent iron oxide (Fe_2O_3), with a fineness in the range of 20 to 100 mesh.

"Consumption of ground and crushed barite in Canada in 1943, as reported by users, was 3,732 tons, distributed among the following trades: paint, 2,760 tons; rubber, 434 tons; glass, 290 tons; linoleum, 109 tons; wallpaper, 15 tons; miscellaneous, 124 tons. Shipments from Canadian mines for domestic use totalled 2,569 tons, which, plus imports of 1,686 tons, and less changes in consumers' stocks of 203 tons, showed an apparent total consumption of 4,052 tons.

"Distribution of the 510,000 tons of primary barite consumed in 1944 in the United States was as follows: oil-well drilling, 54 per cent; barium chemicals and lithopone, 34 per cent; fillers, loaders, and pigments, 7 per cent; glass, 5 per cent.

"Barium carbonate is the principal intermediate salt used in the manufacture of other barium chemicals. It is also employed to prevent the unsightly white efflorescence ("scumming") in bricks and other heavy clay products, and for case-hardening of steel. Important military uses for it, and for the nitrate, are in making green flares, tracers, incendiary bombs, shell primers, etc. Blanc fixe, or precipitated barium sulphate, is used in white paints, rubber, linoleum, and oilcloth. Barium chloride is used to purify salt brines for the manufacture of chlorine and sodium hydroxide; in making coatings for photographic paper; as a flux in the production of magnesium alloys; as an extender in titanium pigments; in colour lakes; in finishing white leather; and in the purification of beet sugar. Barium hydroxide, also, is used in the refining of sugar and of animal or vegetable oils; and the peroxide, in making hydrogen peroxide.

"Barium metal has only limited industrial applications. It is used as a wire coating to remove traces of gas in radio, vacuum, and thermionic tubes, and to coat steel balls in the rotating anodes of X-ray tubes. Alloys of barium with lead and calcium "Frary" metal) are used for bearings; and nickel-barium alloys for corrosion-resistant sparkplug electrodes. Nickel coated with barium oxide can replace tungsten to advantage for the cathodes of the smaller types of electron tubes, giving a high yield of electrons per watt of heating energy.

"Of interest is the announcement made in 1944 by the Laprairie Company, 906 University Tower Building, Montreal, of a method of employing the intermediate compound, barium sulphide or "black ash", made by roasting barite with coal, as a substitute for barium carbonate to prevent scumming in bricks. The black ash is introduced into the pugging water in solution, and is stated to be three times as effective as the same weight of carbonate.

"Canadian quotations in 1944 for crude barite remained unchanged at around $7 per short ton, f.o.b. mines. Domestic ground white barite for pigment and filler use sold at $32 to $40 per ton, f.o.b. works, according to quality, whereas prime white imported was quoted at $50, and off-colour at $46. Ground off-colour domestic averaged around $12.80 per short ton, f.o.b. Atlantic port.

"In the United States, Georgia crude was quoted at $8.50 to $9 per long ton, f.o.b. mines. Missouri crude, which in the first quarter sold at $6.75 to $7.50, according to grade, rose to $8.25 to $8.50 in the latter part of the year. In the American market, crude barite is usually sold on a penalty-premium basis, a content of 95 per cent $BaSO_4$ and 1 per cent Fe_2O_3 being considered standard. A premium or penalty of 25 cents per short ton is set for each per cent of barium sulphate above or below 95 per cent, and a similar premium or penalty for each 0.1 per cent of Fe_2O_3 below or above 1 per cent.

"The United States imposes a duty of $4 per ton on crude barite, and $7.50 per ton on ground or otherwise manufactured material. Barite enters Canada free under the British preferential tariff: imports from other countries pay 25 per cent ad valorem.

"Witherite (natural barium carbonate) is the only other barium mineral of commerce. Commercial deposits are rare and no occurrences of economic interest are known in Canada. Most of the world supply is derived from England." (Bureau of Mines, Ottawa)

Table 1 - PRODUCTION OF BARITE IN CANADA, 1913-1944

Year	Short tons	$	Year	Short tons	$
1913	641	5,410	1927	56	1,268
1914	612	6,169	1928	127	2,847
1915	550	6,875	1929	105	2,341
1916	1,368	19,393	1930	66	1,484
1917	3,490	54,027	1931	16	363
1918	640	10,165	1932	...	...
1919	468	8,154	1933	20	60
1920	751	22,983	1939	323	5,659
1921	270	9,567	1940	338	4,819
1922	289	9,537	1941	6,890	74,416
1923	409	8,548	1942	19,667	188,144
1924	151	3,308	1943	24,474	279,253
1925	95	2,259	1944	118,719	1,023,696
1926	100	2,307			

Table 2 - BARITE AND BLANC FIXE USED BY THE CANADIAN PAINTS, PIGMENTS AND VARNISHES INDUSTRY IN CANADA, 1931-1943

Year	Barite		Blanc Fixe (x)	
	Pounds	$	Pounds	$
1931	2,304,119	39,361	146,025	12,915
1932	2,064,303	35,138	23,353	817
1933	2,062,957	33,578	47,793	1,471
1934	2,393,330	44,690	93,918	2,481
1935	2,308,628	43,702	141,975	4,223
1936	2,533,275	41,687	97,016	3,148
1937	2,630,366	42,821	125,743	4,136
1938	2,729,212	46,288	116,545	3,287
1939	2,884,985	49,659	139,408	4,455
1940	3,281,747	71,492	99,422	3,873
1941	4,906,829	112,760	169,583	8,010
1942	6,833,584	150,927	104,948	5,328
1943	5,519,352	121,727	87,369	4,441

(x) Artificial barium sulphate.

Table 3 - IMPORTS AND EXPORTS OF BARITE AND SPECIFIED COMMODITIES, 1943 and 1944

	1943		1944	
	Pounds	$	Pounds	$
Imports				
Blanc fixe.....	345,536	16,694	549,220	22,686
Lithopone	17,754,879	857,507	18,999,905	932,787
Barite	3,372,500	45,239	3,648,600	47,913
Exports				
Barite	-- Data not shown separately in Trade Reports --			

"CORUNDUM - As a result of circumstances arising from the war, there was a revival of activity in the production of corundum in Canada in 1944. It was the first recorded output of the mineral in the Dominion since 1921, and the five car lots of concentrate produced were obtained from the treatment of tailings at the Craigmont property in Renfrew county, Ontario. The concentrate was shipped to American Abrasive Company's plant in Westfield, Massachusetts, for grinding and for the preparation of fine powders and flour. Wartime Metals Corporation of Montreal arranged to treat the tailings at the request of the United States Government, which has been encountering difficulties in obtaining supplies from the Transvaal in South Africa in sufficient quantities to meet the requirements. The 125,000 tons of tailings available at the Craigmont property are estimated to have a corundum content of about 3 per cent. A 200-ton gravity mill equipped with a magnetic separator was erected by Wartime Metals Corporation, close to the

site of the old Craig mill early in 1944 and shipments of concentrate to Westfield were commenced in the autumn of that year.

"Corundum (Al_2O_3), the oxide of aluminium, usually occurs as bronze-coloured barrel-shaped crystals. It is fairly heavy, and has a hardness (Mohs' scale) of 9, being the hardest known mineral next to diamond (hardness 10).

"All of the Canadian production of corundum has come from a corundum-bearing belt of nepheline syenite that passes in a northeast direction through the southeast, northern, and central parts respectively, of Haliburton, Hastings, and Renfrew counties in Ontario, and about 82 per cent of the total output to date has come from the Craigmont property, the chief source of the remainder being the Burgess deposits, about 5 miles to the west. The belt is about 100 miles long and 6 miles wide and is the most northerly of three belts of syenites in which corundum is known to occur. The middle belt is in Methuen and Burleigh townships, Peterborough county, and the southern belt, 65 miles to the east, is in Frontenac county. A deposit of corundum in the French River area northeast of Georgian Bay was prospected in 1943, the results of which work indicated that the corundum content is much below commercial grade.

"As noted above, Canada produced a few carloads of corundum in 1944, but from 1901 when production was commenced until about 1915 the Dominion was the leading producer of the mineral, and from 1901 to 1918 inclusive, a total of 370,000 tons of ore was treated. From this, 19,000 tons of concentrate valued at $2,024,000 was shipped. The ore came mainly from numerous open cuts on the present Craigmont property, some of which are over 600 feet long and 250 feet wide. The workings, known as the Craig and Klondike cuts, are on the south and west slopes of Robillard Mountain. During the early part of this continuous period of operation the ore milled had a corundum content of 10 per cent, but that milled near the end of the operations had a content of only 4 per cent. A total of about 26,000 tons of mill tailings was re-treated during 1920 and 1921, from which 600 tons of concentrate valued at $80,500 was shipped.

"Canada imported only a small quantity of corundum in 1944. The imports included a small amount of flour corundum that was prepared at Westfield, Mass. Certain physical and structural qualities of the minute grains of natural corundum make it preferable to those of the artificial abrasive for the purposes for which it is used.

"Most of the world production of the mineral during the past 25 years has come from the Transvaal, Union of South Africa, from which an output of from 4,000 to 7,000 tons a year has been obtained since 1940, though production has been declining since 1942, the peak year. All of the output is exported, mainly to the United States. Production from Russia in recent years is said to have been large, but no statistics are available. Production from India and Madagascar has been intermittent. In the United States there was no production of corundum in 1944, but the erection of a mill is planned on a deposit in Gallatin county, Montana, from which a small annual output was maintained between 1902 and 1905. During 1943 and 1944 a careful re-examination was made of the known corundum deposits in the United States, most of which were last worked 40 to 50 years ago. As a result of these investigations some corundum was produced near Clover in South Carolina in 1943, but operations were discontinued in the same year.

"In the Transvaal, most of the output has been in the form of "Crystal" that occurs as loose crystals of corundum in shallow alluvial deposits or "paddocks" that are formed by the disintegration of corundiferous rock. The crystals are mined intermittently, mainly from small open cuts, by a large number of "diggers", and are washed on screens that are revolved by hand. The deposits are small and are unevenly distributed over a wide area in the Zoutpansberg and Pietersburg districts of northern and eastern Transvaal. In the spring of 1944 a modernly equipped mill was erected at Pietersburg for the concentration of reef corundum, or plumasite, that occurs in veins or feldspathic dykes, somewhat similar to the Craigmont deposit in Canada. The mill is in steady production and the concentrate is exported.

"Until recently, corundum was used chiefly for the abrasive grit in grinding wheels required for special types of work. At present, however, most of the corundum used in the United States, which is by far the leading consumer, is in the form of very fine powder or flour for use in the grinding and polishing of high precision lenses for naval and military optical instruments. The coarse corundum grain is used mainly in the manufacture of wheels for snagging the forgings and castings for tanks and other military equipment.

"Canadian concentrates should have a corundum content of at least 65 per cent, and preferably 70 per cent, or higher, and they should be as free as possible of magnetic material. South African corundum is marketed in the United States in accordance with Government (Transvaal) grading regulations, based on the alumina content and on screen-sized limits.

"The aforementioned "crystal" corundum of the Transvaal is produced at a much lower cost than it would be possible to produce corundum from any of the deposits on the North American continent. Apparently,

however, supplies of this "crystal" corundum are becoming exhausted, or the widely scattered deposits are difficult to operate on an efficient basis. In any event, nearly 30 per cent of the total output of corundum from South Africa in 1944 was in the form of concentrate obtained from the treatment of reef corundum, or plumasite, whereas "crystal" corundum accounted for only 40 per cent of the output as compared with more than 90 per cent in 1940. If this is indicative of an eventual changeover to the production of concentrate the prospects for the successful development of Canadian deposits will be enhanced. In the post war years, however, natural corundum will again be in competition with artificial abrasives, the civilian uses of which are now restricted. Canadian output of corundum in 1944 totalled 173 tons valued at $17,830; this came entirely from Renfrew county, Ontario." (Bureau of Mines, Ottawa)

DIAMONDS - Diamonds are not produced in Canada and requirements for stones in the Dominion are supplied entirely by imports. In 1944 imports of black diamonds and bort for borers were appraised at $1,721,416 compared with $1,631,019 in 1943. Imports of unset white diamonds in 1944 were valued at $2,073,098 as against $1,407,044 in the preceding year.

The following information is from a review on Diamonds in 1944 as published (April 1945) by the Mining Journal, London:

"It is too early as yet to form any useful opinion as to the extent of world production of diamonds, but it is already sufficiently manifest that the downward trend from 1940 to 1943 was halted last year, and perhaps substantially reversed, consequent on the request of the United Nations to the Belgian Congo to double its output of crushing boart, and the reported shipments of over 10,000,000 carats last year. Although this will depend chiefly on the output of the big African producers, one feature of 1944 was the reports of larger production from other sources. For the first time the U.S.S.R. was reported to be in production, Tanganyika was found to be producing on a larger scale, whilst new deposits were reported from Goiaz and Mato Grosso in Brazil. The Japanese, too, are probably exploiting the small deposits in N. Borneo to their fullest extent. . . . . The tremendous increase in the use of the diamond for industrial purposes has received a very great impetus because of the war, but, as its unequalled advantages have been so widely appreciated in engineering of many kinds, it is unlikely that there will ever be a return to the position where the diamond is predominantly used for gem purposes only. Industrial diamonds have continued to be made available to the United Nations at a very low level by Diamond Corporation, the cheapest crushing bort actually being reduced to 2s 6d. a carat; at first sights in 1945 held in Kimberley, according to the Diamond News, prices were advanced by 5 per cent in some classes, and by 10 per cent in others.

Table 4 - WORLD PRODUCTION AND SALES OF DIAMONDS, 1937-1944

Year	Production Metric carats	Sales £ Sterling	
1937	9,164,024	9,151,205	
1938	11,619,971	3,673,934	
1939	12,500,553	5,865,000	
1940	13,012,525	6,144,314	
1941	9,104,978	7,414,420	(Industrials 2,000,000 (Cuttables.. 5,550,000
1942	9,258,734	10,694,671	(Industrials 4,240,000 (Cuttables.. 6,250,000
1943	8,140,000	20,500,000	(Industrials 5,000,000 (Cuttables.. 15,500,000
1944	? 12,000,000 +	17,000,000 (estimate)	

"DIATOMITE - Production of diatomite in Canada has been insignificant and almost all the requirements are imported. Although deposits are numerous and widespread, they are, with few exceptions, small and the material is not suitable as a filter-aid, until recently the principal use. Owing, however, to the use of diatomite as a fertilizer dusting agent, a recent development, Canadian consumption in 1944 was more than double that of 1943, and tests are under way to determine the suitability of Canadian material for this new use.

"Diatomite consists of the microscopically small remains of siliceous shells of diatoms, a form of algae that at one time lived under water. The material of Recent (geologically) fresh water origin, which is the most common in Canada, usually occurs as a grey or brown mud or peat, whereas the diatomite of Tertiary age is in dry and compact beds, and is very light in weight and white to cream in colour.

"There are more than 400 known deposits of diatomite in Canada. These deposits are in the swamps and in the lake bottoms of northern Nova Scotia; in southern New Brunswick; in the Muskoka district, Ontario; and in various localities in British Columbia. The Tertiary fresh water deposits near Quesnel in the Cariboo district, British Columbia, are by far the largest known in Canada. They extend for many miles along the Fraser River, are compact, and up to 40 feet thick. At Digby Neck, Nova Scotia, is the largest known recent fresh water (swamp) deposit in Canada. All of the Canadian production of diatomite since 1939 has come from these and from the Fraser River localities, the two producers being G. Wightman, who operates the deposit at Digby Neck, and L. T. Fairey, of Vancouver, who has been obtaining his output from Lot 1122, on the west bank of the Fraser River, north of Quesnel. There has been no activity of consequence on the deposits in the Muskoka area for some time.

"Production in 1944 was 39 tons; and sales 13 tons valued at $437, compared with sales of 98 tons valued at $3,331 in 1943. Imports into Canada were 11,664 tons valued at $335,939, of which 73 per cent came from California, 23 per cent from Washington, and 4 per cent from Oregon. In 1943, imports were 5,623 tons valued at $184,012. Consumption in Canada was approximately 11,680 tons compared with about 5,700 tons in 1943.

"Prior to the war diatomite was produced in about 30 countries, and at present the United States, with about 20 operators, is by far the largest producer, having increased its output in 1944 to nearly 160,000 tons.

"Until recently between 70 and 80 per cent of the diatomite consumed in Canada was used in the form of filter-aids, mainly in the refining of cane sugar, but in 1944 only about 38 per cent was so used, and over 54 per cent was consumed as a dusting agent in ammonium nitrate fertilizers that are made for the Government by three companies, one in Welland, Ontario, one in Calgary, Alberta, and the other in Trail, British Columbia. The diatomite thus used is highly porous and when added to the nitrate it absorbs moisture which prevents it from caking and ensures even spreading. Specifications call for uncalcined material of 325 mesh and less than 5 per cent moisture. The remainder of the diatomite consumed was used chiefly for insulation and as a filler in the paint, chemical, paper, rubber, soap, and textile industries, and in silver polish bases.

"Amongst war uses are: for blocks and pipe insulation in combination with asbestos in the naval construction program; in fireproof structural sheets for minimizing fire hazards on warships; in pressure filters for the filtration of potable water; and in paints for Army equipment.

"Indications are that not more than 25 per cent of the calcined material produced from the best-quality Canadian deposit so far discovered can be made into an efficient filter-aid that can compete with the imported product. Thus, the future for Canadian production appears to depend upon whether the tests being made by the British Columbia Department of Mines will prove that the diatomite in the vicinity of Quesnel can be used as a dusting agent in ammonium nitrate fertilizer. Consumption for this purpose in 1944 was 6,315 tons, and all of the requirements are at present being imported from a deposit near Kittitas, Washington. Production of this fertilizer for use in Europe is expected to increase. No other known deposit in Canada contains the type of diatomite that would meet the specification calling for uncalcined material.

"The price of diatomite used in Canada for insulation varies from $25 to $40 per ton, for filtration from $26 to $75 per ton; for fertilizer grades, $28 to $42 per ton; for material suitable for polishes the price for small lots ranged up to $200 a ton. Imported insulation bricks vary in price from $85 to $140 per 1,000, according to grade and density." (Bureau of Mines, Ottawa)

Table 5 - PRODUCTION OF DIATOMITE IN CANADA, 1928-1944

Year	Short tons	$	Year	Short tons	$
1928	368	8,960	1937	643	13,606
1929	429	10,330	1938	398	13,842
1930	554	13,247	1939	301	10,388
1931	1,610	32,789	1940	248	7,957
1932	1,496	29,509	1941	344	9,935
1933	1,789	36,648	1942	365	9,088
1934	1,372	54,910	1943	98	3,331
1935	823	33,140	1944	13	437
1936	615	13,650			

Table 6 - CONSUMPTION OF INFUSORIAL EARTH BY THE CANADIAN SUGAR REFINING INDUSTRY, 1932-1943

Year	Pounds	Value	Year	Pounds	Value
		$			$
1932	2,577,585	73,309	1938	4,908,597	101,473
1933	2,507,469	70,191	1939	4,819,811	105,711
1934	2,562,552	69,116	1940	4,984,362	112,369
1935	4,307,142	96,560	1941	5,343,151	138,973
1936	4,375,999	98,954	1942	3,007,180	75,295
1937	4,586,786	95,532	1943	3,451,142	89,075

"FLUORSPAR - Commercial deposits of fluorspar in Canada occur only in a few areas, and 55 per cent of the total output of 96,000 tons to the end of 1944 was obtained from the Madoc area, Hastings county, Ontario, and 44 per cent from British Columbia. In general, mining of fluorspar has been intermittent and on a small scale, with periods of greater activity during the first world war and the present war. At no time, however, has production been sufficient to meet domestic requirements, and Canada depends largely upon imports to meet the needs of industry. Indicating Canada's dependence on foreign sources of supply, in the 5-year period 1940-1944 reported consumption of fluorspar, largely for military purposes, totalled 227,484 tons. Of this, only 34,296 tons (13 per cent) was derived from domestic mines, 219,171 tons (87 per cent) being imported. In 1944, about 85 per cent of the tonnage imported was obtained from Newfoundland, 14 per cent came from the United States, and the remainder from Mexico.

"To assist in meeting war shortages, the Dominion Government in 1942 initiated a program of assistance to fluorspar producers by means of loans, (under arrangements involving the advisory supervision of operations), diamond drilling, geological examination of properties, and in other ways. Of the total output, amounting to almost 25,000 tons in the three years ended 1944, nearly 72 per cent was produced by four operators who were assisted under this program. Most of the mine shipments have comprised material considerably below standard metallurgical specifications and have consisted of screened fines sweetened with clean, picked lump. Average grade of such combined product has ranged from 60 to 65 per cent CaF_2, calcite and barite being the chief impurities. A number of milling tests were run in the laboratories of the Bureau of Mines, Ottawa, in 1944 on trial shipments from various properties in an effort to reduce the objectionably high barite content of most Canadian fluorspar ores.

"Most of the domestic supply of fluorspar during the present war has come from the Madoc area, Ontario, where the mineral has been mined intermittently for about 40 years. Since 1939, most of the output has come from the Noyes, Parry, Keene, Wallbridge, Blakeley, Rogers, and Bailey mines. The Rogers mine, last actively operated in 1914, was reopened late in 1943, when operations at the Perry mine were abandoned. On the Bailey property a new vein was opened up in August, 1944, following the cessation of operations at the Keene mine.

"The fluorspar bodies in the Madoc area consist of a series of impersistent shallow veins that fill fractures in limestone, and the vein zone extends for several miles adjacent to a major fault. At a few mines the veins extend downward into underlying granite. Much of the ore consists of an interbanded association of fluorspar, calcite, and barite, which presents serious concentrating difficulties.

"Some interest has been shown in recent years in fluorspar occurrences in the Wilberforce-Harcourt district, Haliburton county, about 50 miles north of Madoc, where diamond drilling and some surface work were done on several properties in 1943. The ore is an intimate mixture of fluorspar and calcite. It usually also contains considerable apatite, and some mica and other silicate minerals. The work did not disclose any important ore-bodies, and there was little further activity in 1944. W. E. Clark (Tops Mining Syndicate) produced a few tons of high-grade picked spar from his holdings near Harcourt.

"In the latter part of 1944 a deposit of fluorspar, essentially similar in character to that of the Haliburton area, was discovered near Cobden, in Renfrew county. The property is owned by Eric Johnston, of Cobden. Some surface work was done by Dominion Magnesium, Limited to determine whether the deposit might supply the fluorspar requirements of the company's magnesium plant at nearby Haley, but no report on the results is available.

"Scattered occurrences of fluorspar are known in Quebec, but a few of these appear to be of economic importance. In 1943 and 1944, some work was done by Twin Valley Prospecting Syndicate, of Ottawa, on fluorspar showings near Sand Creek, north of Otter Lake, Pontiac county. About 20 tons of clean, picked spar was shipped in 1944 to the plant of Dominion Magnesium, Haley, Ontario. Grade is reported to have run

92 to 98 per cent CaF_2. This represents the first recorded production of fluorspar in the province.

"In Nova Scotia, there is considerable fluorspar in some of the barite veins near Trout River, Inverness county, where work was done in 1942 and 1943 on the MacKay property. In 1944 the Provincial Department of Mines continued a program of diamond drilling and geological investigation on the property, which was also examined and sampled by Canadian Industrial Minerals, Limited. A shipment of the ore was sent to the Bureau of Mines, Ottawa, to determine whether recovery can be made of fluorspar and barite products.

"In British Columbia, Consolidated Mining and Smelting Company operated a large deposit of fluorspar between 1919 and 1929 at its Rock Candy mine, near Grand Forks, and produced about 70,000 tons of ore, from which 42,000 tons of concentrate was recovered. The mine has since been idle and there has been no further production of fluorspar in the province. In the latter part of 1942, interest developed in a fluorspar occurrence near Birch Island, North Thomson River, where drilling operations have been undertaken by Globe Investment Company, 11 King Street West, Toronto. The deposit consists of a fine-grained, intimate mixture of fluorspar, celestite, and feldspar, with considerable pyrite. Preliminary results of tests on trial shipments by the Bureau of Mines, Ottawa, indicate that the ore is amenable to flotation.

"Canada produced 6,924 tons of fluorspar valued at $217,701 in 1944, compared with 11,210 tons valued at $318,424 in 1943.

"Imports were 37,101 tons valued at $840,309, compared with 77,436 tons valued at $1,738,669 in 1943. Most of the material came from Newfoundland, and was consigned to Arvida, Quebec, for use in the production of aluminium.

"In 1944, the six following producers, all in the Madoc area reported shipments: Reliance Fluorspar Mining Syndicate (Rogers mine); Millwood Fluorspar Mines (Keene and Bailey mines); Charles Stoklosar (Blakeley mine); Bassett Fluorspar Mining Syndicate (Lee Junior mine); Detomac Mines (McIlroy mine); and Fluoroc Mines (Howard mine). Nearly 60 per cent of the total output from the above seven mines came from the Rogers property, 14 per cent from the Bailey, 10 per cent from the Keene, and 9 per cent from the Blakeley. The Reliance, Millwood, and Fluoroc were Government-assisted projects.

"Production of fluorspar from the Madoc area during the five years 1940 to 1944, inclusive, amounted to about 32,000 tons, or 94 per cent of the total domestic output.

"World production of fluorspar prior to the war averaged about 500,000 short tons annually, of which the United States and Germany supplied about 75 per cent. The remainder came mainly from Russia, the United Kingdom, Newfoundland, France, Korea, Italy, and the Union of South Africa.

"The United Kingdom is the leading Empire source of fluorspar. Newfoundland, which is next on the list, has large reserves and has greatly expanded shipments in recent years.

"Consumption of fluorspar in Canada in 1944 was 56,900 tons, of which 60 per cent was used by non-ferrous smelters, including aluminium and magnesium plants; 33 per cent by the steel trade; and 5 per cent by the heavy chemicals industry.

"Fluorspar has a variety of industrial uses, in most of which it serves as a powerful fluxing agent. The steel industry is by far the largest consumer. In basic open-hearth and electric furnace charges, fluorspar is an essential ingredient, imparting fluidity to the slag and permitting the use of larger quantities of lime, the agent most effective in removing sulphur, phosphorus, and other impurities. About 6 pounds of spar is required per ton of steel made in the open-hearth, and 20 pounds per ton for that made in the electric furnace. Fluorspar is used in small amounts in numerous other metallurgical industries, including foundries and various metal-refining operations. A small addition of fluorspar is made to the ferrosilicon-calcined dolomite briquettes used in the production of magnesium by the Pidgeon process, where it serves as a catalyst and improves recovery.

"The next largest use for the mineral is in the manufacture of hydrofluoric acid, which is used mainly in making artificial cryolite and aluminium fluoride for the aluminium industry. The anhydrous acid is used in making organic ("Freon") refrigerants, a recently expanded use for which as an aerosol insecticide carrier in the newly developed "mosquito bombs" is of timely interest in view of the highly effective use that is being made of these "bombs" against malarial mosquitoes in the Pacific war theatre. The acid is being used to an increasing extent as an improved catalyst, in place of sulphuric acid, for the alkylation of olefins in the production of 100-octane aviation gasoline. Next in importance is the use of fluorspar as a fluxing and opacifying ingredient in glass and enamels.

"Standard fluxing gravel or lump grade for metallurgical use is usually sold on a specification of a minimum 85 per cent CaF_2, and not over 5 per cent silica or 0.3 per cent sulphur. It should not contain more than 15 per cent of fines. Owing to recent shortages, however, sales in the United States are being made on the basis of 78 per cent CaF_2, with a minimum of 55 "effective units", and up to 1 per cent sulphur. Effective units are computed as being the CaF_2 percentage less $2\frac{1}{2}$ times the silica content. Canadian shipments have been running much below even this reduced standard, and in some cases consumers sweeten the material with higher grade imported spar.

"Glass and enamel grades call for not less than 95 per cent CaF_2, with a maximum of $2\frac{1}{2}$ to 3 per cent SiO_2 and 0.12 per cent Fe_2O_3. The material must be in ground form, in mesh sizes ranging from coarse to extra fine.

"Acid-grade spar has the most rigid specification, namely a minimum of 98 per cent CaF_2 and not over 1 per cent SiO_2. Like the ceramic grade, it must be in powder form, and most of the material supplied to the acid and ceramic trades is a flotation concentrate.

"By arrangement with consumers, the price of domestic metallurgical fluorspar was set in 1942 by the Metals Controller on the following basis: $24 in U.S. funds a short ton, f.o.b. Kentucky-Illinois mines, plus 11 per cent exchange, plus 10 per cent war exchange tax, plus freight from above field to Canadian consuming point, less freight from Canadian mine to same point, less 25 cents for each per cent CaF_2 below 85 per cent. As an example, this would work out at $36.36 a short ton for standard 85 per cent grade, f.o.b. Madoc, for shipment to Sault Ste. Marie, Ontario, or $32.38 for shipment to Hamilton, Ontario. Although maximum prices in the Illinois-Kentucky field were revised in July, 1943, there was no change in the above arrangement in 1944 as a result of the increases.

"In 1942, fluorspar was placed on the list of minerals requiring a permit for exportation from Canada, but this restriction was withdrawn, effective April 1, 1944, in respect to shipments to the United States and to any part of the British Empire.

"The duty on metallurgical grade fluorspar entering the United States is $5.625 a ton, and on acid and ceramic grades, $3.75 a ton. There is no duty on fluorspar imported into Canada." (Bureau of Mines, Ottawa)

Table 7 - PRODUCTION OF FLUORSPAR IN CANADA, 1924-1944

Year	Short tons	$	Year	Short tons	$
1924	76	1,343	1936	75	900
1925	3,886	19,234	1937	150	2,550
1926-1928 ...	...	...	1938	217	3,906
1929	17,870	268,120	1939	240	4,995
1930	80	1,240	1940	4,454	59,317
1931	40	620	1941	5,534	97,767
1932	32	464	1942	6,199	146,039
1933	73	1,064	1943	11,210	318,424
1934	150	2,100	1944	6,924	217,701
1935	75	900			

Table 8 - CONSUMPTION OF FLUORSPAR IN CANADA, BY USES, AS REPORTED TO THE ANNUAL CENSUS OF INDUSTRY, 1942 and 1943

Industry	1942		1943	
	Quantity	Cost at Works	Quantity	Cost at Works
	tons	$	tons	$
Steel furnaces	20,133	562,480	20,790	715,991
Chemicals (acids, alkalies and salts)	21,689	684,194	41,409	1,320,106
Glass	231	10,273	273	13,360
Ferro-alloys	855	21,203	1,407	37,802
Enamelling and glazing	103	4,120	74	2,960
TOTAL ACCOUNTED FOR	43,009	1,282,270	63,953	2,090,219

Table 9 - IMPORTS OF FLUORSPAR INTO CANADA, 1929-1944

Year	Tons	$	Year	Tons	$
1929	12,092	159,798	1937	11,444	158,082
1930	12,651	160,995	1938	15,057	212,151
1931	3,216	31,257	1939	16,322	258,796
1932	1,009	22,965	1940	30,312	628,719
1933	2,219	21,165	1941	26,539	567,656
1934	7,220	56,628	1942	47,784	1,046,526
1935	11,591	92,775	1943	77,436	1,738,669
1936	11,194	95,268	1944	37,100	840,309

Table 10 - FLUORSPAR MINING IN CANADA, 1943 and 1944 (x)

		1943	1944
Active firms	No.	10	10
Employees - On salary	No.	12	11
Wage-earners	No.	85	67
Total	No.	97	78
Salaries and wages - Salaries	$	17,084	17,237
Wages	$	113,201	85,094
Total	$	130,285	102,331
Gross value of production	$	318,424	217,701
Cost of fuel and electricity	$	20,145	14,869
Process supplies used	$	13,370	10,148
Net value of production	$	284,909	192,684

(x) Data included in Tables 33-36.

"GARNET - Niagara Garnet Company shipped about 100 tons of garnet rock to a small mill at Sturgeon Falls, Ontario, from a deposit in Dana township, concession III, lots 1 and 2, 4 miles north of River Valley Station (41 miles northwest of North Bay). About 10 tons of ore from this rock was treated, and 3 tons of concentrate valued at $90 was shipped to the company's head office in Niagara Falls, New York, for further treatment.

"Canada Garnet, Limited mined a few tons at its property south of Labelle, 100 miles north of Montreal, and shipped a car lot to the Quebec Bureau of Mines' treatment plant at Val d'Or, where 2 tons of concentrate was made. Samples were sent to foundries for sandblasting tests. Tests were made by the Bureau of Mines, Ottawa, on concentrate submitted by the company to determine the efficiency of the garnet for sandblasting on metal and stone, compared with that of silica sand and artificial abrasives in general use. Results did not indicate any advantage in its use.

"A. G. Chew, of Sudbury, prospected a garnet zone in Loughrin township, concession IV, lot 14, about 24 miles east of Sudbury, and shipped 4 tons of ore to the United States for experimental purposes.

"About 85 per cent of the world output of garnet comes from the United States, mainly from North Creek, New York, and the product is regarded as the world standard abrasive garnet. Production in 1944 dropped over 20 per cent below the 1943 output of 5,935 tons, valued at $429,120.

"Garnet, crushed and suitably graded as to size, is used for making abrasive-coated papers and cloth, which in turn are used mainly in the wood-working (hard woods) and to a lesser extent in the shoe leather industries. The specifications for garnet for this use are somewhat exacting. Few, if any, of the hundred or more garnet deposits so far examined in Canada fulfil all of the requirements. Minor uses for garnet are for sandblasting; for surfacing plate glass, and garnet superfine (flour) grades are now being used as a partial substitute for corundum flour used for optical lens polishing.

"Canadian consumption of garnet grain suitable for "sandpaper" manufacture is less than 200 tons annually and none is at present commercially used for sandblasting. Competition from the artificial abrasives (silicon carbide and oxide of alumina) is a serious factor in the marketing of garnet.

"Prices of ungraded concentrate suitable for sandpaper range from $60 to $85 a ton." (Bureau of Mines, Ottawa).

"GRAPHITE - Production of graphite in Canada in 1944 continued to be confined to the old-established Black Donald mine near Calabogie, in Renfrew county, Ontario, which produces a variety of grades of mill products for different industrial uses.

"There were no important changes in the general graphite situation in 1944. Supply for Allied Nations' requirements maintained the over-all improvement shown in the previous year, and the concern felt in the earlier stages of the war over possible shortages, particularly of crucible grades, was much less in evidence.

"Flake graphite is widely distributed in many parts of the Canadian Precambrian Shield, chiefly in gneisses and crystalline limestones. Production has been confined to adjacent sections of western Quebec and eastern Ontario, in the general Ottawa region. Occurrences of flake graphite are known also in Manitoba and British Columbia, but so far these have attracted little interest. Bodies of amorphous graphite occur near Saint John, New Brunswick, and were worked on a small scale many years ago.

"In 1942, Frobisher Exploration Company (a subsidiary of Ventures, Limited) undertook a geological investigation of the Black Donald property and conducted a diamond-drilling program, as a result of which a substantial tonnage of new ore was located. Frobisher Exploration took over the property in 1943, and has since been operating it under the name of Black Donald Graphite, Limited. A new power plant on the Madawaska River was completed at the end of 1943 to replace the old one washed out earlier in the year, and various additions and changes were made in the mill circuit.

"Canadian production of graphite in the form of finished mill products totalled 1,582 tons valued at $171,166, with sales valued at about $125,000. Output consisted mainly of foundry grades, but included also some 300 tons of high-grade lubricating flake. In 1943, production was 1,903 tons valued at $197,431.

"Exports of milled and finished concentrates were 576 tons valued at $87,774, compared with 611 tons valued at $80,961 in 1943. Most of the material went to the United States.

"Imports of unmanufactured graphite, most of which was Mexican amorphous, were valued at $48,095; of manufactured, at $261,205; and of graphite crucibles, at $128,738. These values compare with $23,775, $286,583, and $191,296, respectively, in 1943.

"Artificial graphite is made in Canada by Electro-Metallurgical Company of Canada, Welland, Ontario, and by Exolon Company, Thorold, Ontario. These companies export part of their production to the United States.

"Prior to the war, world production of natural graphite of all types, and including flake, crystalline (plumbago), and amorphous, averaged about 140,000 short tons a year. Madagascar, Germany, Austria, and Czechoslovakia were the principal sources of flake; Ceylon, of plumbago; and Mexico and Korea, of amorphous.

"The United States and Canada possess important graphite reserves, but are deficient in the types of graphite required for the most exacting uses, notably for crucible manufacture. Deposits are comparatively low grade for the most part, and production costs are high. Consequently, the United States depends, for most of its requirements of high-grade graphite, on imports of flake from Madagascar and of plumbago from Ceylon. Production of all types and grades in the United States in 1943 totalled just under 10,000 tons.

"In 1943, shipments of graphite from Ceylon amounted to 20,501 tons, a decline of 25 per cent from the 1942 figure. For the past several years all graphite from Ceylon and Madagascar has been purchased by the British Ministry of Supply, under allocation agreement with the United States Government for Allied Nations' use.

"Graphite has many uses in industry, 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.

"The flake of the Black Donald deposit is too small for crucible use, but the products made are high in carbon and are well suited for lubricants, packings, polishes, and foundry requirements, for which purposes most of the output is sold. Prepared facings for the domestic foundry trade also are made.

"Canadian graphite requirements are principally for the foundry, dry battery, packings, lubricants and paint trades. Foundry needs are met in part by domestic (Black Donald) 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 and flake. American imports of Canadian graphite are used in foundry facings, lubricants, and pencils.

"In general, a No. 1 crucible flake should be coarser than 50-mesh, with about 40 per cent standing on a 35-mesh screen and 40 per cent on a 28-mesh screen. Carbon content should be 85 per cent, or over.

"Trade quotations showed little change in 1944 from those of the previous year. All Ceylon and Madagascar graphite continued to be purchased and sold to consumers at fixed prices by Metals Reserve Company, which also had set prices on United States flake.

"The duty on graphite entering the United States under the general tariff is 5 per cent ad valorem on natural amorphous and artificial grades, and 15 per cent on crystalline lump, chip, and dust grades. The Canadian tariff is as follows: graphite, not ground or otherwise manufactured, British, free; intermediate (including the United States), 7½ per cent ad valorem; general, 10 per cent; on ground and manufactures of, including foundry facings, but not crucibles, British, 15 per cent; intermediate, 22½ per cent; general, 25 per cent.

"Exports of Canadian graphite and graphite products have been subject to special export licence since January, 1941." (Bureau of Mines, Ottawa)

Table 11 - MINE PRODUCTION (SALES) OF GRAPHITE IN CANADA, 1931-1944

Year	Short tons	$	Year	Short tons	$
1931	548	32,149	1938	(x)	41,590
1932	346	18,483	1939	(x)	61,684
1933	405	18,367	1940	(x)	94,038
1934	1,518	71,424	1941	(x)	132,924
1935	1,782	79,781	1942	1,192	117,904
1936	(x)	88,812	1943	1,903	197,431
1937	(x)	125,345	1944	1,582	179,457

(x) Not available for publication.

Table 12 - CONSUMPTION OF GRAPHITE OR PLUMBAGO IN CANADA, BY INDUSTRIES, AS REPORTED TO THE CENSUS OF INDUSTRY, 1942 and 1943

Industry	1942		1943	
	Quantity	Cost at works	Quantity	Cost at works
	Short tons	$	Short tons	$
Paints and varnishes	103	11,855	94	9,837
Polishes	39	5,020	57	6,525
Foundries	410	59,874	806	72,150
Acids and salts	114	34,582	167	45,654
Prepared foundry facings	316	19,108	202	19,789
TOTAL ACCOUNTED FOR	982	130,439	1,126	153,955

"GRINDSTONES, PULPSTONES, and SCYTHESTONES - Material suitable for these stones occurs in certain sandstone beds in Nova Scotia, New Brunswick, and on the coast of British Columbia. Many years ago the output was considerable, but most of the known beds have been depleted and the demand for natural stones has decreased.

"No pulpstones or scythestones were produced in 1944, but 225 tons of grindstones valued at $12,000 were shipped by the Read Stone Company, Sackville, from quarries near Stonehaven on the Bay of Chaleur, northern New Brunswick. In 1943 that company produced about 162 tons of grindstones and 2 tons of scythestones having a total value of $6,225.

"Pulpstones were last produced in 1937 by the J. A. and C. H. McDonald Company from Gabriola Island, near Nanaimo on Vancouver Island, British Columbia. Good pulpstones are in demand, particularly for use in the large magazine grinders, but known Canadian deposits containing thick beds of sandstone of the proper quality appear to have been worked out and production has ceased. There is also an increasing competition from Canadian-made artificial segmental pulpstones, mainly of silicon carbide grit, and about 680 of these stones are in use and in stock in the various Canadian pulp mills. The imported natural pulpstones come mainly from West Virginia." (Bureau of Mines, Ottawa)

The following were imported into Canada during 1944: grinding wheels $389,818; grinding stones $69,682; 578 grindstones, 36 inches or over $59,211 and 672 grindstones, n.o.p., $2,098.

Table 13 - PRODUCTION OF GRINDSTONES, PULPSTONES AND SCYTHESTONES IN CANADA, 1931-1944

Year	Tons	$	Year	Tons	$
1931	621	38,103	1938	306	16,198
1932	328	15,735	1939	304	15,278
1933	498	21,919	1940	341	14,543
1934	987	46,478	1941	188	11,500
1935	708	34,010	1942	216	10,000
1936	569	24,724	1943	164	6,225
1937	412	21,429	1944	225	12,000

Table 14 - PRODUCTION OF NATURAL ABRASIVE STONES, BY KINDS, 1943 and 1944

	Pulpstones		Sharpening Stones		Grindstones	
	Tons	$	Tons	$	Tons	$
1943						
Nova Scotia	...	...	...	...	...	...
New Brunswick	...	...	2	225	162	6,000
CANADA	...	...	2	225	162	6,000
1944						
Nova Scotia	...	...	...	...	...	...
New Brunswick	...	...	...	...	225	12,000
CANADA	...	...	...	...	225	12,000

Table 15 - CONSUMPTION OF PULPSTONES BY THE CANADIAN PULP AND PAPER INDUSTRY, 1931-1944

Year	Number for 2 ft. wood	Value	Number for 2.5 ft. wood	Value	Number for 4 ft. wood	Value
		$		$		$
1931	226	72,588	225	71,760	285	337,580
1932	210	65,450	139	46,436	222	249,373
1933	321	98,475	95	31,945	199	223,635
1934	378	103,811	84	29,680	268	292,359
1935	417	116,501	52	20,297	237	243,805
1936	463	120,227	61	19,478	253	281,265
1937	392	123,598	84	21,700	280	382,084
1938	306	92,822	37	13,351	186	238,488
1939	242	60,622	60	22,443	203	238,620
1940	311	96,957	110	49,899	163	257,628
1941	295	127,349	77	35,843	97	215,913
1942	237	100,466	53	23,898	94	208,986
1943	197	102,888	54	20,000	66	151,411
1944	187	89,133	57	34,365	76	193,396

KYANITE - Kyanite is usually a rock-forming mineral, and only rarely does it occur in large monomineralic masses as segregations in quartz-kyanite gneiss or schist. The mineral occurs in Nyasaland, British East Africa and Western Australia.

Consumption of the sillimanite-group minerals increased in the United States in 1941. Shipments of United States kyanite by five firms rose to 8,335 short tons valued at $175,581; imports of British India kyanite also increased in 1941, receipts during the first nine months amounting to 6,211 short tons, having a foreign market value of $81,356. The metallurgical industries account for about 50 per cent of the total kyanite refractories used in the United States.

The leading andalusite mine in the world is operated by Champion Sillimanite, Inc., in the White Mountains, California; this company is a subsidiary of the Champion Spark Plug Co., Detroit, Mich.

None of the minerals, kyanite, sillimanite or andalusite are commercially mined in Canada at the present time and any imports of these minerals into Canada are not shown separately in the Canadian customs classification. "Metal and Mineral Markets", New York, September, 1945 quoted kyanite, per ton f.o.b. point of shipment, crude, $19; 35 mesh, $37.50; glass grade $40 nominal.

"LITHIUM MINERALS - Amblygonite, spodumene, and lepidolite are the chief lithium minerals of commerce: their ores contain, respectively, about 8, 6 and 4 per cent of lithium oxide. Spodumene is in greatest supply, and is the base raw material for the manufacture of many lithium salts, lithium metal, and alloys. Amblygonite has similar uses, but is scarcer and more expensive. Lepidolite, or lithia mica, is employed mainly in the natural state as a batch ingredient in glass. The occurrence of all three minerals is confined to pegmatite dykes of a definite type, which usually have a localized, regional distribution and often carry, also, important amounts of beryl and tantalite-columbite. In some cases, such dykes have been worked for the recovery of all of these minerals.

"There has been no recorded production of lithium minerals in Canada since 1937, when 32 tons of amblygonite and spodumene valued at about $1,700 was shipped, and little if any lithium ore is known to be used or required for any purpose in the Dominion. Thus, an outside market would have to be found for any production. Considerable development work has been done in recent years, however, on deposits in the Pointe du Bois area in southeastern Manitoba; and in the three years ended 1944 increased interest was shown in the commercial possibilities of lithium deposits in other sections of that province, though activities have been confined to exploratory drilling. Some attention has been given, also, to lithium-bearing deposits in the Yellowknife-Beaulieu area in the Northwest Territories.

"Lithium ores and compounds early became of strategic importance in the present war, and to conserve supply for defence needs the United States Government placed both under allocation control in 1942. Government assistance also was given to the establishment of two spodumene mills, one in North Carolina, and the other in South Dakota. These measures resulted in a considerable easing of the general supply situation in 1944.

"Total production in Canada during the active period 1925 to 1937, inclusive, is estimated at about 250 tons, and comprised lepidolite, spodumene, and amblygonite. Most of the material was exported to the United States.

"The United States and Southwest Africa have been the two leading producers of lithium ores in recent years, with the former probably supplying well over 50 per cent of the annual total, and possessing the largest reserves. Production consists mainly of spodumene and amblygonite, and in the United States has come chiefly from the Black Hills region in South Dakota. An additional important source of lithia in the United States is lithium-sodium phosphate, recovered from the brine of Searle's Lake, at Trona, California, which at present furnishes nearly 50 per cent of the total American lithia production. Shipments of lithium ores and compounds in the United States in 1944 reached an all-time high of 13,319 tons, a 65 per cent increase over the previous year.

"There are no plants in Canada for the chemical treatment of lithium ores. Most of the world production marketed prior to the war was treated by a few large chemical firms specializing in the business, the principal plants being in the United States, Great Britain, Germany, and France. Such firms usually purchased their requirements under individual contract, and there has thus been little in the way of an open market, price quotations given in trade journals being merely nominal. Some of the larger consumers own and operate their own mines.

"Prices of lithium minerals in 1944 showed little change from those of the previous year. Amblygonite, 8 to 9 per cent Li_2O, was quoted at $40 to $50 per ton; spodumene, 6 per cent grade, at $5 to $6 per unit for mill concentrates; and lepidolite, 3 per cent Li_2O at $25 per ton, all f.o.b. mines. Lithium metal was unchanged at $15 per pound.

"MAGNESITIC DOLOMITE AND BRUCITE - Magnesite is found in Quebec and British Columbia. In Quebec the magnesite occurs intimately associated with dolomite and the rock is properly termed "magnesitic dolomite". It is quarried at Kilmar and at Harrington East, Argenteuil county, and is processed for use as refractory materials.

"Large deposits of magnesite containing considerable silica and alumina occur in British Columbia near Marysville, between Cranbrook and Kimberley. They are owned by Consolidated Mining and Smelting Company of Canada, Limited, and experimental work to remove the silica and alumina by flotation has been done, but there has been no commercial production. A number of other deposits of magnesite are known in British Columbia and Yukon, but either because of their limited extent or distance from transportation they are not of commercial importance at present.

"Deposits of earthy hydromagnesite occur in British Columbia near Atlin and Clinton, and at various times some of them have been worked on a small scale, but there has been no production in recent years.

"Brucite (magnesium hydroxide) in the form of granules thickly disseminated through a matrix of crystalline limestone occurs in large deposits at Rutherglen, Ontario, and at Bryson and Wakefield in Quebec. By a process developed in the Bureau of Mines laboratories, Ottawa, these brucite granules are recovered in the form of magnesia of a high degree of purity, and hydrated lime is obtained as a co-product in a plant near Wakefield. The deposits are the largest known in the world.

"In 1944 the value of products made from magnesitic dolomite and brucite was $1,139,281, compared with $1,260,056 in 1943.

"Exports of basic refractory materials made from magnesite and brucite in 1944 amounted to 1,013 tons valued at $31,583, compared with 9,006 tons valued at $110,976 in 1943.

"Imports of magnesia products in 1944 had a value of $1,513,302 and consisted of the following items: dead-burned and caustic-calcined magnesite, $466,314; magnesite brick, $718,481; magnesia, $219,116; magnesia pipe covering, $71,138; and magnesium carbonate, $38,853. In 1943 the total value of these products was $1,746,060.

"Products from magnesitic dolomite include dead-burned or grain material, bricks and shapes (burned and unburned), caustic-calcined magnesitic dolomite, and finely ground refractory cements.

"The magnesia obtained from brucitic limestone is in granular condition. The greater part of the production is dead-burned and made into the same types of refractory products as is the magnesitic dolomite, but important quantities are also marketed in the lightly calcined state for use as an ingredient in chemical fertilizers, and also for making paper.

"Products made in Canada from imported magnesite and magnesia include fused magnesia (artificial periclase), optical periclase, and "85 per cent magnesia" pipe covering.

"Prices of calcined magnesite in 1944, f.o.b. Montreal or Toronto, as quoted by Canadian Chemistry and Process Industries, were $70 to $90 a ton.

"Magnesite is usually calcined before shipment and the resultant magnesia is used for the making of refractory products to withstand extremely high temperatures, for making oxychloride cement, and for the production of magnesium. It is the basis for a number of magnesium salts and has many minor uses.

"Brucite is much less common than magnesite and the only deposits being worked commercially are in Canada and the United States. The magnesia obtained by calcining brucite can be used for the same purposes as that obtained from magnesite and it also has some special uses.

"Dolomite and sea-water compete with magnesite and brucite as sources of magnesia products. Dolomite, in addition to its use as a refractory material, has long been the principal source of basic magnesium carbonate and pure magnesium oxide, and in recent years it has become a source of magnesium metal.

"Sea-water has become an important source of magnesia in England and the United States for use in making magnesium and for various industrial and pharmaceutical purposes." (Bureau of Mines, Ottawa)

Table 16 - PRODUCTION OF MAGNESITIC DOLOMITE (CALCINED) IN CANADA, 1931-1944

Year	Tons	Value	Year	Tons	Value
		$			$
1931	11,411	295,579	1938	(a)	420,261(c)
1932	(a)	262,860	1939	(a)	474,418
1933	(a)	360,128	1940	(a)	897,016
1934	(a)	382,927	1941	(a)	831,041
1935	(a)	486,084	1942	(a)	1,059,574(b)
1936	(a)	768,742	1943	(a)	1,260,056
1937	(a)	677,207	1944	(a)	1,139,281

(a) Not available for publication. (b) 1942 and following years include the value of brucite shipped. (c) Represents value of magnesite (dead-burned, etc.) only, whereas the values for years immediately preceding include the value of some end products containing imported material; for this reason the 1938 to 1944 values are not entirely comparable with those for preceding years.

Table 17 - MAGNESITE AND DOLOMITE USED IN THE CANADIAN PRIMARY IRON AND STEEL INDUSTRY, 1931-1943

Year	Calcined Dolomite (b)		Dolomite, crude		Magnesite	
	Short tons	Value	Short tons	Value	Short tons	Value
		$		$		$
1931	...	...	15,773	76,317	(a)	(a)
1932	...	...	6,725	32,523	420	14,500
1933	...	...	6,874	30,557	399	14,798
1934	...	...	14,748	69,104	2,733	105,072
1935	...	...	18,394	79,914	3,891	149,987
1936	...	...	43,562	145,502	6,432	230,656
1937	...	...	53,066	181,146	8,994	326,091
1938	...	...	40,540	137,127	9,219	336,811
1939	14,858	99,838	40,592	78,904	11,401	351,680
1940	21,949	136,360	59,284	123,429	13,673	506,032
1941	21,608	160,602	71,087	159,037	18,127	682,742
1942	22,550	179,427	79,091	225,393	20,665	786,321
1943	10,310	99,740	78,746	245,793	19,427	744,716

(a) Information not available.
(b) Included with crude dolomite prior to 1939.

Relatively large quantities of magnesite or magnesium refractories are also used in the smelting of non-ferrous ores but complete data relating to this consumption are not yet available.

Table 18 - CALCINED MAGNESITE USED BY THE ARTIFICIAL ABRASIVES AND ABRASIVE PRODUCTS INDUSTRY IN CANADA, 1933-1943

Year	Tons	Value	Year	Tons	Value
		$			$
1933	(x)	16,430	1939	121	7,735
1934	104	6,370	1940	302	19,331
1935	40	2,448	1941	809	77,508
1936	418	25,256	1942	398	58,648
1937	484	29,242	1943	150	12,164
1938	...	...			

(x) Information not available.

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

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

"In Saskatchewan two lakes south of Wiseton contain brines high in magnesium sulphate, and Muskiki Lake, just north of Dana, contains brine high in magnesium and sodium sulphates, which at certain times of the year crystallizes into a bedded deposit with layers of both salts.

"There was no production of magnesium sulphate in Canada in 1943 and 1944. In 1942 the production was 1,140 tons valued at $38,760.

"Imports of magnesium sulphate in 1944 were 2,684 tons valued at $108,795, compared with 3,379 tons valued at $137,372 in 1943. The imports were mainly from the United States.

"In the chemical industries, Epsom salt 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.

"Prices for Epsom salts remained steady due to the discontinuance of supplies from European countries, hitherto the main sources of supply. Quotations for the technical grade, as given by Canadian Chemistry and Process Industries for Toronto or Montreal delivery, ranged from $63 to $65 per short ton in bags, whereas the B.P. material was quoted at $3.60 per barrel throughout the years 1943 and 1944.

"When magnesium sulphate is not being made in Canada, imports are dutiable at the rate of 17½ per cent, otherwise the duty is 20 per cent. The tariff on the material entering the United States is ¾ cent per pound, or $15 per ton." (Bureau of Mines, Ottawa)

Table 19 - PRODUCTION OF NATURAL MAGNESIUM SULPHATE IN CANADA (x), 1935-1944

Year	Tons	Value	Year	Tons	Value
		$			$
1935	340	7,965	1940	...	...
1936	654	13,712	1941	265	7,343
1937	727	14,456	1942	1,140	38,760
1938	470	9,400	1943	...	...
1939	550	9,900	1944	...	...

(x) Produced entirely in British Columbia.

Table 20 - MAGNESIUM SULPHATE USED IN CANADIAN PHARMACEUTICAL PREPARATIONS AND IN TANNING, 1935-1943

Year	Pharmaceutical Preparations		Tanning	
	Pounds	Value	Pounds	Value
		$		$
1935	826,082	22,647	759,744	12,254
1936	878,120	23,162	1,115,965	15,120
1937	919,825	23,881	992,203	16,165
1938	855,547	23,687	1,272,549	14,153
1939	830,927	24,091	1,139,670	17,808
1940	925,948	31,554	1,646,217	34,242
1941	1,043,110	35,389	1,508,824	43,400
1942	1,077,601	38,352	1,782,479	45,956
1943	1,154,065	41,031	1,870,046	52,447

MINERAL WATERS - Shipments of natural mineral waters from Canadian springs in 1944 totalled 156,150 gallons valued at $88,918 compared with 139,611 gallons worth $67,541 in 1943.

Production during both years originated in Ontario and Quebec. Some of the more prominent Canadian mineral waters possessing special therapeutic or hygienic properties include the following: in Quebec, the Abenakis springs on the St. François river in Yamaska county; Potton Springs in Brome county and the Colombia spring at L'Epiphanie. In Ontario, saline, sulphur and gas springs occur at Caledonia Springs and at Carlsbad Springs, near Ottawa; the waters range from alkaline to strongly saline. St. Catharines, near Niagara, is one of the oldest Canadian mineral water resorts and sulphur waters are found at the Preston mineral springs in Waterloo county. The most famous of all Canadian springs is undoubtedly the group of hot sulphur springs at Banff, Alberta. In British Columbia the Harrison Hot Springs in the Fraser Valley and the Halcyon Hot Springs on Arrow Lake are noted for their curative properties.

The total number of firms reporting production of natural mineral waters in the Dominion was 15 in 1944, of which 12 were located in the province of Quebec and 3 in Ontario.

Table 21 - SHIPMENTS OF NATURAL MINERAL WATERS FROM CANADIAN SPRINGS, 1931-1944

Year	Quebec		Ontario		CANADA	
	Imp.gal.	$	Imp.gal.	$	Imp.gal.	$
1931	19,868	4,746	197,540	8,578	217,408	13,324
1932	15,506	4,697	61,208	2,473	76,714	7,170
1933	9,024	3,094	29,794	2,347	38,818	5,441
1934	75,665	16,116	21,775	1,622	97,440	17,738
1935	126,616	15,113	19,900	1,477	146,516	16,590
1936	131,186	17,399	23,100	1,117	154,286	18,516
1937	198,319	19,697	26,700	889	225,019	20,586
1938	159,893	19,033	28,416	2,586	188,309	21,619
1939	104,629	17,503	19,140	1,602	123,769	19,105
1940	109,025	18,466	31,638	2,426	140,663	20,892
1941	144,441	58,062	36,623	14,469	181,064	72,531
1942	129,062	60,316	28,023	14,189	157,085	74,505
1943	125,605	61,793	14,006	5,748	139,611	67,541
1944	148,965	88,113	7,185	805	156,150	88,918

"PHOSPHATE - All of the small output of phosphate in Canada consists of apatite, a common associate of the phlogopite mica mined in the Precambrian crystalline pyroxenites of southwestern Quebec and eastern Ontario. Apatite was mined on a considerable scale prior to 1900, but since then a large part of the comparatively small output has represented by-product material derived from operations for mica. During the present war there has been a slight renewal of interest in mining for straight apatite, and small tonnages have been produced from several of the larger old mines in Quebec that have been reopened. The largest output from these recent operations was obtained in 1941, when a total of 2,500 tons was produced. Though small, this tonnage exceeded the production in any other year since 1900. Total production since the inception of mining in 1870 is estimated at about 350,000 tons. Although there are probably substantial reserves of apatite in the above region, the deposits tend to be erratic and pockety, and are incapable of supplying more than a small fraction of the domestic requirements.

"In Quebec, most of the apatite has come from mines in territory contiguous to the Lievre River in Papineau county, and mainly from Buckingham, Portland, Bowman, and Templeton townships.

"In Ontario, the apatite-bearing belt extends in a southwesterly direction through the Rideau Lakes section, chiefly in Lanark, Leeds, and Frontenac counties. Ontario Phosphate Company conducted a diamond-drilling program in 1944 on the old MacLaren property, in Bedford township, near Westport, sank a 3-compartment shaft to a depth of 175 feet, and opened a level at 150 feet, to tap ore indicated by drilling. In August, the company was reorganized as Ontario Phosphate Industries, Limited (Temple Building, Toronto).

"The sedimentary phosphate rock which occurs along the Rocky Mountains divide, notably in the Crowsnest area, is rather low grade and is not considered to be of present economic interest.

"Shipments of apatite in 1944 totalled 482 tons valued at $6,716, compared with 1,451 tons valued at $18,385 in 1943. Practically all of the production came from a property in Bowman township, operated by Robert Bigelow; the old High Rock mine in West Portland township, operated by O. C. Cote; and the old Phosphate King mine in Templeton township, operated by Blackburn Bros.; all of these properties being in Quebec. For many years Electric Reduction Company, Buckingham, Quebec, has purchased most of the apatite produced, for use in the production of elemental phosphorus and various phosphorus compounds. Canadian Refractories, Ltd., Kilmar, Quebec, also purchases small tonnages.

"Production of superphosphate by eastern Canadian plants in 1944 is estimated to have reached nearly 200,000 tons, or over double the pre-war output. This quantity supplied about 60 per cent of the domestic demand and the remainder was imported, mainly from the United States.

"Imports of sedimentary phosphate rock totalled 388,247 tons valued at $1,710,378, compared with 260,846 tons valued at $1,085,080 in 1943. Most of the material came from Florida and Montana. Imports included, also, a small tonnage of rock brought in ballast from Morocco, and a shipment of low-fluorine phosphate from Curacao, imported by the Feeds Administration for use in stock feeds.

"By far the greater part of the world production consists of sedimentary rock, of which the United States is the leading producer, its output in 1944 being estimated at about 5½ million tons.

"Most of the phosphate mined throughout the world is used for the manufacture of fertilizers. Ordinary superphosphate is the chief product made, but triple superphosphate, ammonium phosphate, and other compounds are produced on an important scale.

"Phosphate rock is the sole commercial source of phosphorus. As the element, and as a component in a wide variety of salts and compounds, phosphorus is used extensively in many industries.

"Actual consumption of phosphate rock in Canada in 1943, as reported by users, was 277,979 tons, of which 81 per cent went to the fertilizer trade, and 18 per cent into the production of phosphorus and phosphorus compounds. All of the fertilizer rock is used in three superphosphate plants of Canadian Industries Limited, located at Beloeil, Quebec; Hamilton, Ontario; and New Westminster, British Columbia; and in the plant of Consolidated Mining and Smelting Company, Trail, British Columbia.

"Cost of American-produced phosphate rock of 75 per cent grade, laid down at eastern Canadian points, in 1944 ranged from $14 to $19 per long ton. The price paid for Canadian apatite was $16 per short ton, for material of 80 per cent grade, with a penalty or premium of 20 cents per unit below or above that figure.

"Phosphate rock enters Canada duty free. Superphosphate, for use as fertilizer in the condition imported, is free under the British preferential tariff, but under the intermediate tariff, pays 7½ per cent ad valorem, and under the general tariff, 10 per cent. Under the United States Canada Trade Agreement of 1938, superphosphate imports from the United States are dutiable at 5 per cent, provided that no restrictions are placed by the United States Government on exports of either crude phosphate rock or superphosphate. Superphosphate intended for blending with other fertilizer ingredients, however, enters Canada free under all tariffs." (Bureau of Mines, Ottawa)

Table 22 - PRODUCTION OF PHOSPHATE IN CANADA, 1929-1944

Year	Short tons	$	Year	Short tons	$
1929	1,185	5,380	1937	100	900
1930	40	760	1938	208	1,886
1931	...	...	1939	157	1,712
1932	1,516	12,333	1940	358	4,039
1933	2,214	5,475	1941	2,487	33,376
1934	81	685	1942	1,264	17,451
1935	186	1,103	1943	1,451	18,585
1936	525	4,927	1944	482	6,716

Table 23 - PHOSPHATE ROCK AND SUPERPHOSPHATE USED IN THE MANUFACTURE OF CANADIAN FERTILIZERS, 1931-1944

Year	Superphosphate		Phosphate Rock	
	Short tons	$	Short tons	$
1931	51,639	595,789	48,373	395,547
1932	36,005	366,462	41,114	316,519
1933	59,443	657,123	21,961	164,614
1934	73,182	859,980	48,007	396,133
1935	86,701	986,674	74,507	610,118
1936	97,515	1,103,222	60,924	438,948
1937	157,801	1,661,243	101,704	726,572
1938	180,243	2,193,699	102,125	765,816
1939	174,989	2,026,293	96,319	711,508
1940	175,045	2,175,615	143,667	1,262,847
1941	143,420	1,719,674	156,058	1,573,165
1942	177,421	2,748,290	207,842	2,255,517
1943	214,340	3,846,027	226,350	2,528,062
1944	251,184	3,805,659	357,632	3,817,626

SILICA SAND - The production of silica brick in Canada during 1944 totalled 3,997 M valued at $312,092 compared with 4,165 M worth $295,505 in 1943. The manufacture of these refractories was confined in both years to the plants of the Dominion Steel and Coal Company Ltd. at Sydney, Nova Scotia, and the Algoma Steel Corporation Ltd., Sault Ste. Marie, Ontario. The brick manufactured by both these firms are processed from crushed silica rock and are utilized in furnace construction and repairs.

Table 24 - PRODUCTION OF SILICA BRICK IN CANADA, 1928-1944

Year	M	$	Year	M	$
1928	3,224	155,502	1937	3,744	181,126
1929	3,951	173,581	1938	1,788	100,403
1930	2,418	97,379	1939	2,493	124,807
1931	900	35,746	1940	3,438	182,786
1932	93	4,304	1941	4,111	238,433
1933	636	23,185	1942 (x)	4,273	263,006
1934	2,528	85,945	1943	4,165	295,505
1935	2,461	96,194	1944	3,997	312,092
1936	2,393	97,285			

(x) Largest annual output.

The value of silica brick imported into Canada in 1944 totalled $713,538 compared with $847,456 in 1943. Imports in 1944 came entirely from the United States.

"SODIUM CARBONATE (Natural) - Deposits of natural sodium carbonate, in the form of "Natron" (sodium carbonate with 10 molecules of water) and also of brine, occur in a number of "lakes" throughout the central part of British Columbia, chiefly in the Clinton mining division, about 20 miles northwest of Clinton, and in the neighbourhood of Kamloops.

"These deposits are far from the main eastern Canadian markets for sodium carbonate, and production is restricted to the requirements of consumers within economic rail-haul. Over the period since 1921, output from several of the deposits has been small and intermittent, amounting to 44 tons valued at $484 in 1944, compared with 468 tons valued at $5,148 in 1943, and shipped to Vancouver for soap manufacture.

"Eastern Canadian consumers of soda ash obtain their supplies from chemically prepared material made from salt by the Solvay or ammonia process in Ontario and the United States.

"Imports of soda ash or barilla in 1944 were 20,141 tons valued at $583,653, compared with 70,557 tons valued at $1,213,818 in 1943.

"Sodium carbonate, or soda ash, has many industrial uses, notably in the manufacture of glass and soap; in the purification of oils, and of bauxite for the production of aluminium; and in the flotation of minerals. Technological advances are continuing to increase the consumption of soda ash in the glass industry. Another major use of sodium carbonate is in the production of sodium hydroxide or caustic soda. A recent development is its use in the manufacture of "synthetic salt cake" (anhydrous sodium sulphate). Substantial quantities of soda ash are also used in the smelting of iron ores.

"The special wartime demands of new munitions plants, of expansion in aluminium production, of increased utilization of low-graded ores, and of the higher operating schedules of the major consuming industries have contributed to a greatly increased consumption of soda ash during the war. The total Canadian consumption amounted to 89,400 tons in 1942, the latest year for which figures are available. The 1944 consumption appears to have been somewhat lower.

Table 25 - PRODUCTION OF SODIUM CARBONATE (NATURAL) IN CANADA, 1931-1944

Year	Tons	$	Year	Tons	$
1931	712	7,351	1938	252	2,268
1932	495	5,450	1939	300	2,400
1933	559	5,773	1940	220	1,760
1934	244	1,920	1941	186	1,488
1935	242	2,430	1942	256	2,048
1936	192	1,677	1943	468	5,148
1937	286	2,574	1944	44	484

Table 26 - CONSUMPTION OF SODA ASH IN SPECIFIED CANADIAN INDUSTRIES, 1942 and 1943

	1942		1943	
	Tons	Value	Tons	Value
		$		$
Chemical and allied products (acids, salts, explosives, soaps, etc.)	30,391	900,378	27,770	769,619
Manufacture of non-metallic minerals (including coke, gas, petroleum and glass)	54,539	1,471,513	46,801	1,266,581
Pulp and paper industry	3,476	120,465	3,465	117,941
Dyeing, cleaning, etc.	556	28,724	519	28,988
Textiles	287	11,027	346	13,294
Sugar refinery	189	8,762	174	8,257

The price of "soda ash" in 1944, as quoted in Canadian Chemistry and Process Industries, was $2.00 per bag of 100 pounds throughout the year.

"SODIUM SULPHATE (Natural) - Sodium sulphate occurs as crystals or in the form of highly concentrated brines in many lakes throughout Western Canada. Hydrated sodium sulphate, known as Glauber's salt, and anhydrous sodium sulphate, known to the trade as "salt cake", are produced in Canada.

"Production has been mainly from Saskatchewan. A small tonnage of crude has been harvested intermittently in Alberta for local consumption as cattle lick, although sodium sulphate is the chief salt in a number of salt deposits in that province. Undeveloped deep-seated beds of sodium sulphate occur in southern New Brunswick.

"The production of natural sodium sulphate in 1944 amounted to 102,421 tons valued at $987,842, compared with 107,121 tons valued at $1,025,151 in 1943. The decrease is attributed to the shortage of labour. The operating plants in Western Canada are capable of producing over 900 tons of dried salts a day, and if necessary the tonnage could be greatly increased.

"Production in 1944 was entirely from Saskatchewan. The principal producers were: Natural Sodium Products, Limited, with plants at Bishopric and Hardene; Horseshoe Lake Mining Company, Ormiston, Midwest Chemical Company, Palo; and Sybouts Sodium Sulphate Company, Gladmar; all of which are in Saskatchewan. Small tonnages were also produced from several other properties.

"Natural Sodium Products' plant at Bishopric operated throughout the year and has a capacity of about 500 tons a day. The company also operated up to April, 1944, the deposit at Alsask Lake or Hardene where a 250-ton plant has been in operation since 1942. Midwest Chemicals, Limited, of Palo, with property at the central portion of Whiteshore Lake, operated throughout the year. Horseshoe Lake Mining Company operated, throughout 1944, its plant at Ormiston. Sybouts Sodium Sulphate Company operated its dehydrating plant at Sybouts Lake, 9 miles south of Gladmar. Chaplin Sodium Sulphate, Ltd., formed to develop Lake Chaplin sodium sulphate deposits. Dr. D. C. Hart of Regina, who has been operating a test plant, produced in a small way at Cabri and Snake Hole Lakes.

"Investigations of the sodium sulphate deposits in Western Canada was started by the Bureau of Mines, Ottawa, in 1921, and over 120,000,000 tons of hydrous salts was proved in the few deposits examined in detail. These deposits were described in Report No. 646, issued in 1926 and entitled "Sodium Sulphate Deposits in Western Canada".

"Complete figures for the world production of sodium sulphate were not available and it is difficult to compare the returns from different countries as the production comes from chemical plants and natural deposits. Germany, prior to the war, was probably the largest producer of sodium sulphate, and Canada was among the first ten producers. Canada is, however, one of the largest producers of sodium sulphate from natural deposits.

"Export figures of sodium sulphate are not available. Shipments from the deposits in Western Canada to the United States have shown a marked increase since the commencement of the war. Imports of sodium sulphate, including Glauber's salt (hydrated sodium sulphate), salt cake (anhydrous sodium sulphate) and nitre cake (sodium bisulphate), in 1944 were 22,044 tons valued at $242,095, compared with 13,231 tons valued at $191,283 in 1943.

"A discovery made in New Brunswick during 1937 may yet prove of importance as a source of sodium sulphate. New Brunswick Gas and Oilfields, Limited, in drilling for gas at Waldon, has proved large thicknesses of rock salt (sodium chloride). Two holes drilled 3,500 feet apart, from which cores were obtained,

show the presence of a bed of glauberite ($Na_2SO_4CaSO_4$) from 60 to 100 feet thick, mostly overlying the rock salt. The sodium sulphate content of this bed ranges from 25 to 30 per cent. Glauberite and sodium chloride are present in other holes drilled in 1939, thus further extending the salts basin. Many millions of tons of sodium sulphate seem to be indicated in this deposit, the boundaries of which have not been fully determined. The Bureau of Mines, Ottawa, did much research work on the material recovered in these cores, and indicated a method of recovery of the sodium sulphate. Further detailed work is required to determine the commercial possibilities of the deposit.

"The material from Western Canada is shipped to the Pacific coast of Canada and the United States; east to Ontario, Quebec and the Maritimes; and south to the middle western States and to Louisiana.

"Glauber's salt is used widely in the chemical industries, and the demand is increasing. Sodium sulphate is used extensively in the pulp and paper (70,100 tons in 1942), glass, dye, and textile industries and to a smaller extent for medicinal purposes and for tanning. It is also used extensively (21,500 tons in 1942) in the form of nitre cake in the smelting of nickel-copper ores for the separation of these two metals.

"The price for natural anhydrous sodium sulphate from the deposits in Western Canada ranges from $9 to $10 per short ton f.o.b. plant. The delivered price is considerably higher owing to the high freight rates to the consuming plants, which are mostly in Eastern Canada." (Bureau of Mines, Ottawa)

Table 27 - PRODUCTION OF NATURAL SODIUM SULPHATE (x) IN CANADA, 1930-1944

Year	Short tons	$	Year	Short tons	$
1930	31,571	293,847	1938	63,009	553,307
1931	44,957	421,097	1939	71,485	628,151
1932	28,466	271,736	1940	94,360	829,589
1933	50,080	485,416	1941	115,608	931,554
1934	66,821	587,986	1942	131,258	1,079,692
1935	44,817	343,764	1943	107,121	1,025,151
1936	75,598	552,681	1944	102,421	987,842
1937	79,804	617,548			

(x) All produced in the province of Saskatchewan with the following exceptions:
Includes production in: Alberta ... 1937 ... 80 tons, value $480
1938 ... 89 tons, value $1,127
1939 ... 10 tons, value $186
1940 ... 10 tons, value $50
1941 ... 8 tons, value $32

Table 28 - SALT CAKE USED IN SPECIFIED CANADIAN INDUSTRIES, 1932-1943

Year	Textile Industry		Medicinal and pharmaceutical industry		Acids, alkalies and salts industry (x)		Wood-pulp	
	Tons	Value $	Tons	Value $	Tons	Value $	Tons	Value $
1932	...	...	...	...	94	1,811	24,301	489,343
1933	...	...	39	4,879	9,968	146,201	29,563	580,251
1934	...	...	51	7,278	26,075	368,576	34,559	655,905
1935	...	...	59	4,617	22,485	316,734	35,350	642,801
1936	...	...	27	2,546	7,220	102,176	41,524	711,635
1937	...	...	29	2,234	8,006	113,054	50,584	884,437
1938	323	8,419	21	1,593	3,412	48,486	33,213	588,217
1939	401	11,636	24	1,940	11	314	40,685	722,178
1940	522	13,607	21	1,820	14	416	53,540	994,875
1941	884	25,390	34	3,073	10	326	61,679	1,133,625
1942	860	24,831	40	4,626	107	2,040	70,078	1,303,461
1943	734	21,039	38	4,142	120	1,868	67,292	1,306,215

(x) Sodium sulphate used direct in smelting of nickel-copper ores included only for years 1933-1935 inclusive; in 1944 this consumption totalled 37,097 tons compared with 33,885 tons in 1943.

Table 29 - (x) PRINCIPAL STATISTICS OF SODIUM SULPHATE MINING INDUSTRY, 1943 and 1944

		1943	1944
Active firms	No.	5	5
Producing plants	No.	6	6
Salaried employees	No.	15	17
Wage-earners	No.	177	141
Total Employees	No.	192	158
Salaries	$	30,653	31,007
Wages	$	243,643	232,997
Total Salaries and Wages	$	274,296	264,004
Gross value of production	$	1,025,151	987,842
Cost of fuel and electricity	$	342,566	253,043
Cost of process supplies	$	61,231	39,722
Net Value of Production	$	621,354	695,077

(x) Data included with those shown in Tables 33-36.

STRONTIUM MINERALS - There was no commercial production of strontium minerals in Canada during recent years. In 1941, 27 tons of celestite valued at $280 was shipped from old dumps located on lots 6 and 7, concession 10 of Bagot township, Renfrew county, Ontario.

The following, relating to strontium, is from a review prepared by the Bureau of Mines, Ottawa:

"Several occurrences of celestite (strontium sulphate) of possible economic interest are known in Canada, and in 1920-21, some ground material produced from a deposit in Bagot township, Ontario, was sold to the paint trade. The material from this deposit is coarsely-fibrous in character and is not very pure, containing about 18 per cent of barium sulphate. It is accordingly not favoured for chemical use, but is regarded as suitable for paints and general filler or loader use. The old pit was pumped out in 1941 and a few tons of ore were scaled down from a small drift. This, along with some stockpile material was shipped to Montreal for grinding. The product was used in the paint trade as a substitute for barite, but is reported to have found little favour, and no further work was done. Celestite of similar character and analysis occurs at some of the old fluorspar mines of the Madoc area in Ontario, and part of it might be recoverable from the waste dumps.

"Celestite, analyzing 98 to 99 per cent strontium sulphate occurs as a small vein of coarse platey crystals in Lansdowne township, Ontario and some of it was mined many years ago.

"World production of strontium minerals is estimated at 5,000 to 7,000 tons a year. England is the principal source of supply, with Germany next. The United States produced about 350 tons in 1940, exclusive of celestite used for oil-drilling. Important deposits are reported to occur in India and Newfoundland, but there has been no production from these sources as yet.

"Celestite is the principal source of strontium used in the manufacture of the various strontium salts, and strontianite a less common mineral, is used for the same purpose. The nitrate, carbonate, and hydrate are the most important of the strontium compounds used in industry and medicine. Strontium nitrate is employed mainly in pyrotechnics, for fireworks, railroad signal flares, and military flares and rockets to which it imparts the characteristic strong red flame colour of the element. Other strontium compounds are employed in tracer bullets and shells. The hydrate is used chiefly in the refining of beet sugar by the Scheibler process. In North America, however, sugar is refined mainly by the Steffens, or lime, process. The carbonate is reported to be used to some extent as a batch ingredient in the manufacture of certain kinds of glass, glazes, and enamels, and as a fluxing and desulphurizing and dephosphorizing agent in iron and steel. Strontium chloride powder finds limited use in refrigerators working on the solid absorption principle. Ground celestite is used in fairly large quantities for purifying caustic soda in the rayon industry, and some impure material has been ground and employed as a barite substitute for weighting oil-drilling muds. Interest has also been shown in the possibilities of the carbonate and the sulphate in glass and white wares.

"Strontium metal, made from either the natural sulphate or carbonate, is used in limited quantities in certain alloys, mainly of copper, tin, lead, zinc, and cadmium."

"E and M J Metal and Mineral Markets", New York, quoted celestite, October, 1945 - per ton in carload lots, 92 per cent $SrSO_4$ finely powdered, $45. Strontianite - per ton, lump in carload lots, minimum 84 to 86 per cent $SrCO_3$, $55 Nominal.

Data pertaining to imports of strontium minerals or compounds are not shown separately in Canadian trade reports.

"SULPHUR (Including Pyrites) - Deposits of native sulphur of commercial grade have not been found in Canada, but sulphur occurs in combination with copper, lead, zinc, nickel, or iron in many base metal sulphide ore-bodies in various parts of the country. In the smelting of these ores sulphur dioxide gas is produced, but prior to 1925 this gas was a total waste as no facilities were available for the recovery from it of sulphur, or sulphur compounds. In practice this gas can be used directly for the manufacture of sulphuric acid, the production of liquid sulphur dioxide, or for the production of elemental sulphur. Sulphur used in the making of sulphuric acid is recovered from salvaged smelter gas in Ontario and British Columbia. Sulphuric acid is also made from pyrites by Nichols Chemical Company at its plants in Quebec, Ontario, and British Columbia.

"International Nickel Company's sulphuric acid plant at Copper Cliff, Ontario, which was erected in 1930, employs the contact process in the manufacture of acid from converter gas for the recovery of portions of its smelter gases. A plant has been in operation since 1925 at the Coniston smelter of the same company. These plants have been enlarged during the war and were operated at capacity during 1944. A plant using the contact process was erected in 1929 at Trail, British Columbia, by Consolidated Mining and Smelting Company.

"The high-grade sulphuric acid produced in the plant at Copper Cliff is marketed in several industries, and the acid made in the Trail plant is used chiefly for the manufacture of fertilizers. This plant commenced producing elemental sulphur from the smelter gases in 1936. This operation was continued until July, 1943, when the demand for sulphuric acid for fertilizer manufacture became so great that the production of elemental sulphur had to be discontinued. The lower tonnage of lead and zinc concentrates from the Sullivan mine at Kimberley tended to reduce sulphuric acid production in 1944, and it was necessary to ship and roast a large tonnage of Sullivan iron tailings to supply some of the acid required for fertilizers. Chemical and fertilizer production in 1944 broke all previous records. Sulphuric acid output in terms of 100 per cent acid was 331,700 tons, and fertilizer output was 327,200 tons.

"No plant in Canada is producing liquid sulphur dioxide from smelter gases, although this has been done experimentally.

"In British Columbia, part of the large output of pyrites from the Britannia mine at Britannia Beach was consigned to the acid plant of Nichols Chemical Company at Barnet, British Columbia, and part was exported to plants in the United States. A considerable tonnage of pyrites from previous years' operations has accumulated at Britannia Beach and is awaiting more favourable market conditions.

"In Quebec, at the plant of Noranda Mines, Limited, pyrites concentrate, a by-product of the milling of copper-gold ores, was marketed for the manufacture of acid used partly by the chemical industry and partly in the manufacture of pulp and paper by the sulphite process. Sulphuric acid is produced by Nichols Chemical Company at its plants at Valleyfield, Quebec, at Sulphide, Ontario, and at Barnet, British Columbia. The company obtains its sulphur from the roasting of pyrites.

"Iron pyrites concentrate is also produced in Quebec by Waite-Amulet Mines Limited, and in 1944 a relatively small tonnage of pyrites was also shipped from an old stock pile located at the Aldermac mine in Beauchastel township.

"Exports were: pyrites (sulphur content) 90,836 tons valued at $353,441, compared with 104,509 tons valued at $409,597 in 1943; sulphuric acid 18,960 tons valued at $269,133, compared with 31,414 tons valued at $481,749 in 1943. No exports of elemental sulphur are recorded.

"Imports of sulphur in all forms (crude, brimstone, etc.) were 235,955 tons valued at $3,875,649, compared with 218,527 tons valued at $3,524,006 in 1943. Imports of sulphuric acid were 190 tons valued at $24,542, compared with 220 tons valued at $28,095 in 1943.

"World production of elemental sulphur is estimated by the U.S. Bureau of Mines at over 4,300,000 long tons.

"The United States is the main source of the world production of crude sulphur. The output in 1943 amounted to 3,460,700 long tons, chiefly from the states of Texas and Louisiana.

"Sulphur is used in Canada chiefly in the production of sulphite pulp (211,500 tons in 1942) and for use in the making of artificial silk. It is used to a large extent also in the manufacture of sulphuric acid, explosives, and rubber, and in the production of fertilizers.

"Sulphur is one of the essential raw materials for war, such as, in the form of sulphuric acid for making explosives. The rayon industry consumes large quantities of sulphur. The expansion of the pulp and paper industry has also created increased demand for sulphur. With the construction of new sulphuric plants in Canada and the United States the consumption of sulphur was increased gradually throughout the war period.

"According to "Metal and Mineral Markets", New York, the price of sulphur in 1944 remained unchanged at $16 a long ton, f.o.b. mines. The prices at consumers' plants in Canada vary from $20 to $32 according to location, the difference being due to transportation costs. The average for the Dominion in 1943 was about $27.

"Pyrites is used in the making of sulphate pulp by E. B. Eddy Company, Hull, and by St. Lawrence Paper Mills Company, Trois Rivières, Quebec. A considerable tonnage is used in the making of sulphuric acid at the chemical plants of Nichols Chemical Company at Valleyfield, Quebec, Sulphide, Ontario, and Barnet, British Columbia.

"There is apparently no standard price in Canada for sulphur in pyrites. Most contracts are believed to be based on a price of 5 cents (or better) per unit (22.4 pounds) of sulphur per long ton, f.o.b. cars at point of production." (Bureau of Mines, Ottawa)

Table 30 - PRODUCTION OF SULPHUR (x) IN CANADA FOR YEARS SPECIFIED

Year	Tons	$	Year	Tons	$
1886	42,906(a)	193,077	1928	58,589(b)	321,033
1896	13,823	101,155	1929	42,781	350,843
1906	17,525	169,990	1930	37,750	314,835
1913	65,012	521,181	1931	50,107	429,457
1914	93,609	744,508	1932	53,172	470,014
1915	116,157	985,190	1933	57,373	510,299
1916	116,975	1,084,095	1934	51,537	515,502
1917	155,453	1,610,762	1935	67,446	634,235
1918	154,269	1,705,219	1936	122,132	1,033,055
1919	65,674	522,704	1937	130,913	1,154,992
1920	67,608	719,110	1938	112,395	1,044,817
1921	12,213	116,326	1939	211,278	1,668,025
1922	6,900	74,303	1940	170,630	1,298,018
1923	11,073	113,020	1941	260,023	1,702,786
1924	9,742	95,620	1942	303,714	1,994,891
1925	7,587	58,899	1943	257,515	1,753,425
1926	8,975	63,899	1944	248,088	1,755,739
1927	25,229	198,388			

(x) Sulphur in iron pyrites shipped plus sulphur recovered from non-ferrous smelter gases.

(a) Tonnage of pyrites shipped.

(b) 1928-1944 includes sulphur recovered from smelter gas.

Table 31 - PRODUCTION IN CANADA OF PYRITES WITH SULPHUR CONTENT, INCLUDING SULPHUR CONTAINED IN SULPHURIC ACID, ETC., MADE FROM SMELTER GASES, 1942-1944

	Pyrites (x)			Smelter Gas		Total Sulphur	
	Sales	Sulphur Content		Sulphur Content			
	Tons	Tons	Value	Tons	Value	Tons	Value
			$		$		$
1942							
Quebec	351,570	168,832	673,965	...	...	168,832	673,965
Ontario	...	...	...	18,634	186,340	18,634	186,340
British Columbia	27,923	13,947	111,576	102,301(/)	1,023,010	116,248	1,134,586
CANADA	379,493	182,779	785,541	120,935	1,209,350	303,714	1,994,891
1943							
Quebec	277,690	136,007	545,229	...	...	136,007	545,229
Ontario	...	...	...	16,907	169,070	16,907	169,070
British Columbia	6,886	3,442	27,536	101,159(/)	1,011,590	104,601	1,039,126
CANADA	284,576	139,449	572,765	118,066	1,180,660	257,515	1,753,425
1944							
Quebec	240,370	116,887	453,501	...	...	116,887	453,501
Ontario	...	...	...	17,876	178,760	17,876	178,760
British Columbia	9,701	4,886	39,088	108,439	1,084,390	113,325	1,123,478
CANADA	250,071	121,773	492,589	126,315	1,263,150	248,088	1,755,739

(x) Recovered from copper ore deposits.
(/) Includes any elemental sulphur and sulphur in sulphuric acid and direct ammonium sulphate.

Table 32 - CONSUMPTION OF SULPHUR BY SPECIFIED CANADIAN INDUSTRIES, 1941-1943

Industry	1941		1942		1943	
	Tons	$	Tons	$	Tons	$
Wood-pulp	201,575	5,062,266	211,466	5,687,331	206,766	5,739,113
Petroleum refining	51	2,649	31	1,561	47	2,360
Acids, alkalies and salts	44,734	1,031,913	65,056	1,694,232	69,236	1,866,322
Matches	65	3,393	80	4,119	76	3,997
Explosives	2,934	58,486	2,057	57,631	1,806	55,717
Insecticides	962	35,722	1,293	50,310	1,246	34,449
Adhesives	82	3,031	89	3,087	93	2,847
Chemicals, miscellaneous	½	40	½	27	7	393
Rubber	2,067	106,411	1,728	93,042	1,412	76,032
Sugar	147	6,877	142	7,411	104	4,913
Fruit and vegetable preparations	59	5,206	130	10,685	215	15,610
Other industries (x)	278	11,603	287	12,248	272	11,466

(x) Starch and glucose, dyeing and finishing of textiles.

"VOLCANIC DUST - Volcanic dust (pumicite 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 aluminium silicate (80 to 30 per cent) and of oxides and silicates or iron, sodium, magnesium, calcium, etc.

"Deposits of volcanic dust are found in Saskatchewan, Alberta, and British Columbia. There has been intermittent production from Waldeck, near Swift Current, and at Rockglen, 125 miles southeast of Swift Current, in Saskatchewan, and from near Williams Lake in British Columbia. There was no production in 1944, but in 1943 about 60 tons were shipped from the Rockglen deposit for insulation purposes

"Imports are grouped with a number of similar products (pumice, pumice stone, lava, and calcareous tufa), the value of which totalled $27,880 in 1944. Most of the pumice dust was used in scouring powders.

"The United States is the world's largest consumer of volcanic dust and pumice and has an annual output of over 125,000 tons. Consumption is mainly for scouring and cleansing compounds and as a concrete admixture and concrete aggregate. Minor uses are for insulation, glass bevelling, polishing aluminium, in the manufacture of fire-proof walls, building tiles, and as glazes in ceramics." (Bureau of Mines, Ottawa)

Prices are not quoted, but in the United States sales values in 1944 for cleansing and scouring were about $7.50 per ton; for acoustic plaster $27, for concrete admixture and aggregate, $1.25 per ton.

In 1945 pumice stone per pound f.o.b. New York or Chicago, in barrels, powdered 2½ cents to 4½ cents; lump 5 to 7½ cents. Tripoli per ton, burlap bags, paper liners, minimum carload 30 tons, f.o.b. Missouri; 4 mesh, rose and cream coloured $14.50; 110 mesh $16; air floated 200 mesh $26. (Bureau of Mines, Ottawa)

Table 33 - PRODUCTION OF MISCELLANEOUS NON-METALLIC MINERALS IN CANADA, 1943 and 1944

Item	Unit of measure	1943 Quantity	1943 Value	1944 Quantity	1944 Value
			$		$
Barite	ton	24,474	279,253	118,719	1,023,696
Corundum	ton	...	...	173	17,830
Diatomite	ton	98	3,351	13	437
Fluorspar	ton	11,210	518,424	6,924	217,701
Garnets (schist)	ton	...	...	3	125
Graphite	ton	1,903	197,451	1,582	179,457
Grindstones (b)	ton	164	6,225	225	12,000
Magnesitic dolomite (c)	...	...	1,260,056	...	1,139,231
Mineral waters	Imp.gal.	139,611	67,541	156,150	88,918
Phosphate (a)	ton	1,451	18,385	482	6,716
Silica brick	M	4,165	295,505	5,997	512,092
Sodium carbonate	ton	468	5,148	44	484
Sodium sulphate	ton	107,121	1,025,151	102,421	987,842
Volcanic dust	ton	50	257	...	...
TOTAL (Gross)	...	...	3,476,707	...	3,986,579
Sulphur production (x)	ton	257,515	1,753,425	248,088	1,755,739

(a) Represents apatite mined in Quebec and Ontario, usually a by-product in mica production.
(b) Includes sharpening stones, etc.
(c) Includes the value of calcined brucite granules shipped from Wakefield, Que.
(x) Includes sulphur content of pyrites at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid making or recovered as elemental sulphur, or in ammonium sulphate (direct). General statistics relating to production of sulphur included with those of the copper-gold mining and non-ferrous smelting industries.

Table 34 - PRINCIPAL STATISTICS RELATING TO MISCELLANEOUS NON-METAL MINING INDUSTRIES IN CANADA, 1943 and 1944

		1943	1944
Number of plants		54	52
Capital employed	$	3,522,842	...
Number of employees—On salary		84	116
On wages		827	749
Total		911	865
Salaries and wages—Salaries	$	155,593	240,499
Wages	$	1,207,933	1,259,751
Total	$	1,363,526	1,500,250
Selling value of products (gross)	$	3,476,707	3,986,579
Cost of fuel and electricity	$	823,347	706,929
Cost of process supplies used	$	382,648	462,999
Cost of containers	$	2,475	18,932
Selling value of products (net)	$	2,268,237	3,986,579

Table 35 - WAGE-EARNERS, BY MONTHS, IN THE MISCELLANEOUS NON-METAL MINING INDUSTRIES IN CANADA, 1940-1944

Month	1940	1941	1942	1943	1944				
					Mine			Mill	
					Surface		Underground		
					Male	Female		Male	Female
January	352	451	561	835	154	2	64	470	...
February	352	463	594	798	142	2	66	437	...
March	392	452	600	822	144	2	62	471	...
April	359	473	622	810	178	2	47	432	...
May	482	559	639	838	264	2	61	460	...
June	472	682	827	879	288	3	63	464	...
July	548	667	789	849	283	4	63	483	...
August	517	696	819	869	266	4	69	453	...
September	604	695	770	860	254	3	55	426	...
October	614	718	789	781	258	3	55	490	...
November	581	659	803	809	246	7	53	505	...
December	451	603	759	711	170	1	34	479	...
AVERAGE	480	601	725	827	222	5	58	464	...

Table 36 - HOURS WORKED PER WEEK BY WAGE-EARNERS, 1944 (In one week of month of highest employment)

Hours worked per week	Number of Wage-earners	
	Male	Female
50 hours or less	60	...
51-43 hours	84	1
44 hours	16	...
45-47 hours	27	...
48 hours	194	...
49-50 hours	43	...
51-54 hours	87	...
55 hours	58	...
56-64 hours	215	...
65 hours and over	177	...
TOTAL	961	1
Total wages paid in selected week $	30,451	26

Table 37 - FUEL AND ELECTRICITY USED IN THE MISCELLANEOUS NON-METAL MINING INDUSTRIES IN CANADA, 1943 and 1944

Kind	Unit of measure	1943		1944	
		Quantity	Cost	Quantity	Cost
			$		$
Bituminous coal—Canadian	ton	21,248	104,183	13,511	70,231
Imported	ton	51,637	281,454	30,531	281,254
Anthracite—From the United States	ton	11	195	20	336
Other	ton	3	35	...	...
Lignite coal	ton	18,839	59,488	21,334	65,667
Coke	ton	...	...	7	86
Gasoline	Imp.gal.	167,998	48,116	128,206	31,934
Kerosene or coal oil	Imp.gal.	1,745	355	814	164
Fuel oil and diesel oil	Imp.gal.	2,590,358	220,049	1,813,508	107,531
Wood (cords of 128 cubic feet)	cord	2,379	9,570	3,737	23,336
Gas—Manufactured	M cu.ft.	114,213	11,707	217,314	32,052
Natural	M cu.ft.	...	...	...	...
Other	...	...	...	...	...
Electricity purchased	K.W.H.	8,782,586	88,195	9,578,007	94,358
TOTAL	...	...	823,347	...	706,929
Electricity generated for own use	K.W.H.	2,699,998	...	6,497,349	...

DIRECTORY OF FIRMS IN THE MISCELLANEOUS NON-METAL MINING INDUSTRIES IN CANADA, 1944

Name of Operator, Province and Product	Head Office Address	Plant Location
(x) Active but not producing.		
Barite -		
Nova Scotia -		
Canadian Industrial Minerals Ltd.	Walton, N.S.	Walton
British Columbia -		
Summit Lime Works Ltd.	Box 273, Lethbridge, Alta.	Golden M.D.
Thrall, Ralph A.	Box 273, Lethbridge, Alta.	Golden M.D.
Brucite -		
Quebec -		
Aluminum Company of Canada Ltd.	Sun Life Building, Montreal	Wakefield
Corundum -		
Ontario -		
Wartime Metals Corp.	637 Craig St. W., Montreal, Que.	Raglan Tp.
Diatomite -		
Nova Scotia -		
G. W. Wightman (Mrs.)	Smith's Cove, N.S.	Digby Co.
British Columbia -		
Fairey and Co.	661 Taylor St., Vancouver	Cariboo M.D. Vancouver
Fluorspar -		
Nova Scotia -		
Papke, William	Trout River, N.S.	Inverness Co.
Quebec -		
Twin Valley Prospecting Synd.	529 Besserer St., Ottawa	Huddersfield Tp.
Ontario -		
Bassett Fluorspar Mining Synd. Ltd.	Room 908 .. 56 Toronto St., Toronto	Madoc Tp.
Detomac Mines Ltd.	805 Northern Ontario Bldg., Toronto	Huntingdon Tp.
Fluoroc Mines Ltd. (x)	Box 220, Trenton	Huntingdon Tp.
Gilman, R. T.	13 Govt. Road W., Kirkland Lake	Madoc Dist.
Millwood Fluorspar Mines Ltd.	Box 206, Madoc	Madoc Dist.
Montgomery, J. K.	Havelock	Cardiff Tp.
Reliance Fluorspar Mining Synd. Ltd.	Madoc	Huntingdon Tp.
Stocklosar, Chas. A.	Box 198, Madoc	Huntingdon Tp.
Tops Mining Synd. Ltd. (x)	c/o W. E. Clark, Harcourt	Cardiff Tp.
Garnet -		
Ontario -		
Niagara Garnet Co.	c/o Wm. A. Yarwood, 8573 Krull Parkway, Niagara Falls, N.Y.	River Valley
Graphite -		
Ontario -		
Black Donald Graphite Ltd.	Black Donald Mines	Brougham Tp.
Grindstones -		
New Brunswick -		
Read, H. C.	Bathurst	Stonehaven

DIRECTORY OF FIRMS IN THE MISCELLANEOUS NON-METAL MINING INDUSTRIES IN CANADA, 1944
(Continued)

Name of Operator, Province and Product	Head Office Address	Plant Location
(x) Active but not producing.		
Lithium Minerals -		
Manitoba -		
Lithium Corp. of Canada Ltd. (x)	403 Avenue Bldg., Winnipeg	Bernic and Cat Lakes
Sherritt Gordon Mines Ltd. (x)	25 King St. W., Toronto, Ont.	Herb Lake
Magnesitic Dolomite -		
Quebec -		
Canadian Refractories Ltd.	1050 Canada Cement Bldg., Montreal	Kilmar and Harrington
Mineral Waters -		
Quebec -		
Cie d'eau Minérale, La	632 Concord Ave., St. Hyacinthe	St. Hyacinthe
Eau Minérale Etoile	Ste. Généviève de Batiscan	Batiscan
Gurd, Charles & Co. Ltd.	1016 Bleury St., Montreal	Varennes
Lemay, Lucien	St. Francois du Lac	Nicolet Tp.
Levesque, Ernest (x)	Rivière-du-Loup Station	St. Louis de Kamouraska
Minard, Edward	Maskinongé	Maskinongé
Montclair-Richelieu Spring Water Co. Ltd.	Chambly Basin	Chambly
Pellerin, A., and Sons	St. Barnabe N.	St. Maurice
Sources Abenakis Springs Ltd.	366 rue Racine, Granby	St. François du Lac
Source Coulombia	L'Epiphanie	L'Epiphanie
Source d'eau Minérale Radnor	St. Maurice	St. Maurice
Usine d'Embouteillage Maski	St. Justin	St. Justin
Ontario -		
Carlsbad Springs, The	Carlsbad Springs	Gloucester Tp.
Deneault, J. F.	Bourget	Bourget
Gurd, Chas., & Co. Ltd. (x)	1016 Bleury St., Montreal, Que.	Caledonia Springs
Renaud, Victor	Blackburn	Blackburn
Phosphate -		
Quebec -		
Bigelow, Robert	Buckingham	Bowman Tp.
Blackburn Bros. Ltd.	85 Sparks St., Ottawa	Perkins
High-Rock Phosphates Ltd.	41 Main St., Buckingham	Portland W. Tp.
Victory Mines	517 Booth St., Ottawa, Ont.	Hull W. Tp.
Ontario -		
Ontario Phosphate Industries Ltd. (x)	room 1101 .. 62 Richmond St. W., Toronto	Bedford Tp.
Silica Brick -		
Nova Scotia -		
Dominion Steel & Coal Corp. Ltd.	Sydney	Sydney
Ontario -		
Algoma Steel Corp. Ltd.	Sault Ste. Marie	Sault Ste. Marie
Sodium Carbonate -		
British Columbia -		
Bishop, V. C. (Mrs.)	c/o Boyds Garage, Clinton	Clinton area
Davison, E. C.	2043 W. 42nd Ave., Vancouver	Clinton area

DIRECTORY OF FIRMS IN THE MISCELLANEOUS NON-METAL MINING INDUSTRIES IN CANADA, 1944
(Concluded)

Name of Operator, Province and Product	Head Office Address	Plant Location
(x) Active but not producing.		
Sodium Sulphate -		
Saskatchewan -		
Hart, Dr. D. C.	606 Broder Bldg., Regina	Snake Hole Lake
Horseshoe Lake Mining Co. Ltd. (x)	Ormiston	Ormiston
Mellor, John F.	Alsask	Alsask
Midwest Chemicals Ltd.	Palo	Whiteshore Lake
Natural Sodium Products Ltd.	Bishopric	Frederic Lake Alsask
Sybouts Sodium Sulphate Co. Ltd.	Gladmar	Gladmar
Sulphur (Pyrites) -		
Quebec -		
Aldermac Copper Corp. Ltd.	Dominion Square Bldg., Montreal	Arntfield
Noranda Mines Ltd.	Royal Bank Bldg., Toronto	Noranda
Waite-Amulet Mines Ltd.	Noranda	Duprat Tp.
Ontario -		
International Nickel Company of Canada Ltd. (≠)	Copper Cliff	Copper Cliff
British Columbia -		
Cons. Mining & Smelting Co. of Canada Ltd. (≠)	Trail	Trail
Britannia Mining & Smelting Co. Ltd.	Britannia Beach	Britannia Beach

(≠) Recover sulphur from smelter gas.

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