

# Gypsum and Anhydrite

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## **GYP SUM**

Canadian shipments of natural gypsum totaled 8.1 Mt valued at \$96.4 million in 2001, based on preliminary data (Table 1). This amount compares to 8.6 Mt valued at \$105.7 million in 2000, based on final data. The reported 8.5% decrease in shipments resulted mainly from reduced shipments to selected market regions in the United States, based on preliminary data from Statistics Canada and the Gypsum Association. In addition to shipments of natural gypsum in 2001, domestic shipments of commercial-quality, synthetic, flue-gas desulphurization (FGD) gypsum from coal-fired generating stations are estimated to be about 380 000 t/y. Total use of FGD in Canada, including imports, is estimated to be 530 000 t/y.

## **Canadian Industry**

Most producers of natural gypsum in Canada are closely integrated in both mining and wallboard manufacturing. Five companies operate ten mines and a total of thirteen wallboard plants accounting for an estimated 1900 employees. The major gypsum mining and related production plants are listed in Table 2. In addition, two companies produce FGD gypsum for the manufacture of wallboard in Canada. These are: 1) Ontario Power Generation Inc. (OPG), which sells its product under long-term contract to Westroc Industries Ltd., located near Toronto, Ontario; and 2) NB Power (Belledune Generating Station) in New Brunswick, which sells its product to CGC Inc. in Montréal, Quebec. (Both OPG and NB Power use the wet limestone system for recovering FGD gypsum.)

In Atlantic Canada, Nova Scotia accounts for 82% of Canada's output of natural gypsum and nearly all of

its exports. Most gypsum deposits being mined in the Atlantic provinces are characterized by their high quality, amenability to inexpensive mining methods, and close access to coastal bulk-shipping facilities.

Georgia-Pacific Corporation, operating in Nova Scotia, continued work to develop its new gypsum mine at Melford, Cape Breton, to eventually replace its current operation in this region.

In New Brunswick, Plaster Rock Gypsum and Manufacturing Company supplied agricultural markets from its gypsum crushing plant in Plaster Rock.

In Quebec, most demand for gypsum is satisfied by shipments of raw material, including synthetic gypsum from Atlantic Canada.

In Ontario, developments remained essentially the same; however, in Manitoba, Georgia-Pacific Corporation, as part of its rationalization plan in North America, closed its gypsum mine in Amaranth and its wallboard manufacturing plant in Winnipeg.

## **World Developments and Trade**

Natural gypsum is by far the most important source of raw material for this mineral's many uses. However, synthetic gypsum produced mainly by the FGD process accounts for 4-5% of the total combined output of crude and commercial-quality synthetic gypsum produced in Canada.

Stricter environmental regulations worldwide have acted as a driver to reduce sulphur dioxide regulations in many countries. In the United States, of 19 newly built plants or expansions since 1998, nearly all use synthetic (mainly FGD) gypsum. The production of synthetic gypsum in the United States is estimated to be 6.1 Mt, accounting for about 25% of the combined output of crude and synthetic gypsum, or about 18% of the apparent use. (This amount represents a twofold increase in the production of synthetic gypsum during the five-year period from 1997 to 2001, according to the U.S. Geological Survey [USGS]).

World production of gypsum in 2001 is an estimated 109 Mt, based mainly on USGS sources (Office of

Minerals Information's web site at [www.usgs.gov](http://www.usgs.gov)). The United States ranked number one with production of 18.8 Mt, followed by Iran, 11.0 Mt; Canada, 8.1 Mt; Mexico, 7.6 Mt; and Spain, 7.5 Mt.

Canada's imports of gypsum from the United States and Mexico (Table 1) are used by both wallboard and cement manufacturers. Imports from Spain, however, are reportedly for use only by specific cement manufacturers.

In the United States, the construction of several major new plants and expansions designed to use only synthetic gypsum continued during 2001.

## Processing and Markets

The gypsum wallboard industry mainly serves the residential, institutional and commercial building sectors. In North America, wallboard manufacturing accounts for an estimated 75% of gypsum use, cement processing accounts for 10-15%, and agriculture and industrial processes account for the remainder of uses.

Canadian wallboard plants in 2001 shipped about 294 million m<sup>2</sup> (3.16 billion square ft) of finished products compared to about 280 million m<sup>2</sup> in 2000, according to Statistics Canada.

Shipments of wallboard by U.S. producers in 2001 were 2.73 billion m<sup>2</sup> (29.34 billion square ft), according to the Gypsum Association. (This amount represents an increase of approximately 4% compared to the previous 12-month period.)

The Portland cement industry requires crushed, non-calcined gypsum acting as a set regulator in a proportion up to 5% by total weight. This mineral is ground with the primary stage clinker to produce a secondary stage cement powder for use mainly in concrete products. Based on this proportion of gypsum, the total amount of gypsum required by cement producers in Canada is estimated to be 500 000-550 000 t/y.

Other uses for gypsum relate mainly to agriculture as a soil conditioner and as a mineral filler in joint compounds, plastics and paints, and in certain glass-making technologies.

A portion of the gypsum waste generated annually by wallboard manufacturing, installation and demolition is recycled. Although data are not available, it is estimated that 100 000-200 000 t/y of gypsum are recycled; this amount would represent 5-10% of the gypsum used for making wallboard in Canada.

Process Research ORTECH Inc. sponsored Gypsum and Fly Ash 2002 – 7th International Science and Technology Conference and Short Course, held in

Toronto in June 2002. This series of conferences has contributed greatly to improving communication and the dissemination of new information among power utilities and other synthetic gypsum producers, users, and equipment suppliers. Also, with renewed interest in the importance of fly ash as a major coal combustion product (CCP) used as a supplementary cementing material (SCM) to partially replace energy-intensive Portland cement, this conference attracted a wide range of delegates. (The use of CCPs in Canada is highlighted in a separate commodity chapter entitled *Cement*, refer to Table 4.)

## Prices

Prices for gypsum in merchant markets are negotiated among buyers and sellers, and published figures are not always relevant. In Canada, the average reported value for crude gypsum, f.o.b. mine, is about \$11.60/t for the five-year period from 1997 to 2001.

## Outlook

Canadian shipments of gypsum in 2002 are expected to be higher, based mainly on lower interest rates, continuing economic growth, and an increase in residential construction. In Canada, housing starts were 150 000 in 1999, 151 653 in 2000, and 162 733 in 2001; starts in 2002 are forecast to be about 200 000, according to the Canada Mortgage and Housing Corporation. However, the values of building permits in the commercial and institutional sectors during mid-2002 were weaker than at the same time in 2001.

Diverse uses of gypsum related to building plasters, Portland cement, fillers and pigments, soil conditioners, and fertilizers as a diluent are important and tend to expand with overall economic growth. The present structure of the industry in Canada is not expected to change significantly, although the future availability of low-cost synthetic gypsum resulting from more strenuous emission controls may serve to increase demand for this mineral.

Based on a recent study, FGD systems to capture sulphur dioxide from power plant stacks may double by 2006. In addition, it has been stated that limestone wet scrubbing with a gypsum by-product will continue to be the leading desulphurization technology used on all continents. However, lime-based systems and ammonia scrubbers will also be important ([www.mcilvainecompany.com](http://www.mcilvainecompany.com)).

## ANHYDRITE

Production and trade statistics for anhydrite are included with gypsum. Anhydrite, the anhydrous form of gypsum (about twice as hard and also denser than gypsum), is produced by Fundy Gypsum Com-

pany at Wentworth, Nova Scotia, and by Little Narrows Gypsum Company at Little Narrows, Nova Scotia.

Shipments of anhydrite in 2000 were about 200 000 t, mainly to the United States for use as a peanut crop fertilizer, and to Quebec and Ontario for final-stage processing of Portland cement. Similarly, shipments in 2001 were an estimated 125 000 t, according to the Nova Scotia Department of Natural Resources.

Test work on the use of anhydrite in floor screed and suspended floor systems, comprising part of an earlier Canada-Nova Scotia cooperative mineral development project, showed promise as new uses for Canadian gypsum. Similarly, testing of anhydrite (in combination with water and special chemicals) as a mine "pack" construction material to improve underground support in coal mines has been encouraging.

*Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 64. (2) Information in this review was current as of June 30, 2002. (3) This and other reviews, including previous editions, are available on the Internet at [www.nrcan.gc.ca/mms/cmy/index\\_e.html](http://www.nrcan.gc.ca/mms/cmy/index_e.html).*

#### NOTE TO READERS

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#### TARIFFS

Item No.	Description	Canada			United States
		MFN	GPT	USA	Canada
2520.10	Gypsum; anhydrite	Free	Free	Free	Free
2520.20	Plasters	Free	Free	Free	Free
68.09	Articles of plaster or of compositions based on plaster; Boards, sheets, panels, tiles and similar articles, not ornamented				
6809.11	Faced or reinforced with paper or paperboard only				
6809.11.10	Gypsum wallboard	6%	Free	Free	Free
6809.11.90	Other	6%	Free	Free	Free
6809.19.00	Other	6.5%	6.5%	Free	Free
6809.90	Other articles				
6809.90.10	Models and casts, of a kind used in the manufacture of dental prostheses	Free	Free	Free	Free
6809.90.90	Other	6.5%	3%	Free	Free

Sources: *Customs Tariff*, effective January 2002, Canada Customs and Revenue Agency; *Harmonized Tariff Schedule of the United States*, 2002.

TABLE 1. CANADA, GYPSUM PRODUCTION AND TRADE, 1999-2001

Item No.	1999		2000		2001 (p)	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
<b>PRODUCTION (shipments)</b>						
Crude gypsum						
Newfoundland and Labrador	x	x	x	x	x	x
Nova Scotia	7 483 604	83 637	6 953 440	81 337	6 677 908	76 034
Ontario	x	x	x	x	x	x
Manitoba	x	x	x	x	x	x
British Columbia	x	x	x	x	x	x
Total (1)	9 345 342	106 634	8 572 464	105 655	8 119 233	96 436
<b>IMPORTS</b>						
2520.10	Gypsum, anhydrite					
United States	83 336	9 220	78 882	10 240	155 897	12 232
Mexico	37 514	2 353	75 673	1 763	87 204	1 424
United Kingdom	83	122	30	16	-	-
Brazil	89	127	-	-	-	-
Other countries	26	21	19	26	59	19
Total	121 048	11 843	154 604	12 045	243 160	13 675
2520.20	Gypsum; anhydrite; plasters					
United States	28 609	9 619	36 194	11 197	36 916	11 960
Japan	73	64	122	106	256	168
Australia	-	-	-	-	78	96
Germany	31	24	51	46	76	70
Italy	(r) 20	(r) 18	132	82	68	49
Ecuador	-	-	-	-	71	23
Mexico	30	8	114	21	-	...
Other countries	126	73	100	47	104	40
Total	(r) 28 889	(r) 9 896	36 713	11 499	37 570	12 406
	(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
6809.11	Plasterboards, etc., not ornamental; faced or reinforced with paper or paperboard					
United States	..	5 152	..	7 475	..	15 495
Sweden	-	-	..	...	..	90
United Kingdom	..	1 988	..	35	..	83
Singapore	-	-	-	-	..	72
Germany	..	1 897	..	1	..	18
Poland	..	1 931	-	-	-	-
Other countries	..	10	..	60	..	5
Total	..	10 978	..	7 571	..	15 763
6809.19	Plasterboards, etc., not ornamental; faced or reinforced, n.e.s.					
United States	..	9 469	..	10 822	..	13 267
Mexico	..	...	..	...	..	134
France	..	...	..	...	..	59
Other countries	..	33	..	50	..	52
Total	..	9 502	..	10 872	..	13 512
6809.90	Articles of plaster or compositions based on plaster					
Mexico	..	557	..	1 531	..	2 639
United States	..	4 293	..	3 525	..	2 000
China	..	448	..	559	..	1 140
United Kingdom	..	601	..	507	..	245
Other countries	..	168	..	147	..	196
Total	..	6 067	..	6 269	..	6 220
Total imports of gypsum and gypsum products						
	..	(r) 48 196	..	48 256	..	61 576
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
<b>EXPORTS</b>						
2520.10	Gypsum, anhydrite					
United States	6 224 766	88 343	6 318 451	97 430	5 596 557	83 356
Japan	-	-	171	11	-	-
Other countries	64	18	64	3	-	-
Total	6 224 830	88 361	6 318 686	97 444	5 596 557	83 356

TABLE 1 (cont'd)

Item No.	1999		2000		2001 (p)		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
<b>EXPORTS (cont'd)</b>							
2520.20	Gypsum; anhydrite; plasters						
	United States	1 791	946	765	651	2 118	1 897
	Cuba	–	–	–	–	79	119
	China	–	–	–	–	21	55
	Bermuda	21	14	74	45	21	11
	France	–	–	99	73	–	–
	Other countries	23	13	69	39	27	18
	<b>Total</b>	<b>1 835</b>	<b>973</b>	<b>1 007</b>	<b>808</b>	<b>2 266</b>	<b>2 100</b>
		<b>(square metres)</b>		<b>(square metres)</b>		<b>(square metres)</b>	
6810.11	Plasterboards, etc., not ornamental; faced or reinforced with paper or paperboard						
	United States	134 337 396	300 984	73 254 228	129 152	73 074 740	117 665
	Cuba	150 092	353	14 017	35	24 040	87
	Saint Kitts and Nevis	33 200	84	–	–	29 680	74
	Bermuda	3 109	12	10 300	26	13 180	33
	Latvia	–	–	4 672	8	7 031	32
	Saint Pierre and Miquelon	14 352	24	8 767	6	7 949	26
	Taiwan	–	–	–	–	6 907	21
	France	–	–	–	–	590	16
	Trinidad and Tobago	10 600	33	32 658	81	5 308	16
	Argentina	–	–	–	–	3 329	8
	Japan	11 100	28	–	–	440	3
	South Korea	5 206	13	–	–	–	–
	Australia	24 300	67	–	–	–	–
	New Zealand	9 807	17	–	–	–	–
	Guyana	1 543	4	–	–	–	–
	Chile	10 600	27	513	4	–	–
	Venezuela	42 100	106	–	–	–	–
	Barbados	43 700	110	–	–	–	–
	Namibia	4 170	10	–	–	–	–
	Croatia	12 400	31	5 400	14	–	–
	Saint Lucia	12 200	31	–	–	–	–
	Saint Vincent and the Grenadines	1 920	5	–	–	–	–
	Czech Republic	9 600	24	–	–	–	–
	Netherlands Antilles	21 150	53	–	–	–	–
	Aruba	21 010	53	–	–	–	–
	Hungary	–	–	12 122	47	–	–
	Portugal	10 400	26	19 000	48	–	–
	Saudi Arabia	–	–	26 155	65	–	–
	Hong Kong	–	–	26 042	50	–	–
	India	–	–	4 950	12	–	–
	Germany	11 400	28	14 900	37	–	–
	United Kingdom	11 664	29	–	–	–	–
	China	7 900	20	17 200	43	–	–
	<b>Total</b>	<b>134 820 919</b>	<b>302 172</b>	<b>73 450 924</b>	<b>129 628</b>	<b>73 173 194</b>	<b>117 981</b>
		<b>(n.a.)</b>	<b>(\$000)</b>	<b>(n.a.)</b>	<b>(\$000)</b>	<b>(n.a.)</b>	<b>(\$000)</b>
6809.19	Plasterboards, etc., not ornamental; faced or reinforced, n.e.s.						
	United States	..	39 230	..	28 110	..	29 694
	Chile	..	168	..	269	..	491
	Finland	–	–	..	9	..	126
	Japan	–	–	–	–	..	94
	Cuba	–	–	..	139	–	–
	Other countries	..	124	..	71	..	121
	<b>Total</b>	<b>..</b>	<b>39 522</b>	<b>..</b>	<b>28 598</b>	<b>..</b>	<b>30 528</b>
6809.90	Articles of plaster or compositions based on plaster						
	United States	..	29 572	..	29 759	..	35 570
	Finland	..	110	..	123	..	56
	United Kingdom	..	79	..	62	..	52
	Bermuda	..	13	..	21	..	50
	Bahamas	..	432	–	–	..	47
	United Arab Emirates	..	360	..	22	–	–
	Other countries	..	226	..	115	..	98
	<b>Total</b>	<b>..</b>	<b>30 792</b>	<b>..</b>	<b>30 102</b>	<b>..</b>	<b>36 873</b>
	<b>Total exports of gypsum and gypsum products</b>	<b>..</b>	<b>461 820</b>	<b>..</b>	<b>286 580</b>	<b>..</b>	<b>269 836</b>

Sources: Natural Resources Canada; Statistics Canada.

– Nil; . . Not available; . . . Amount too small to be expressed; n.a. Not applicable; n.e.s. Not elsewhere specified; (p) Preliminary (r) Revised; x Confidential.

(1) Totals do not include gypsum produced or shipped for use by Canadian Portland cement producers.

Note: Numbers may not add to totals due to rounding.

**TABLE 2. CANADA, GYPSUM MINING AND GYPSUM PRODUCTS MANUFACTURING OPERATIONS, 2001**

Company	Location	Operation
<b>NEWFOUNDLAND AND LABRADOR</b>		
Lafarge Gypsum Canada Inc.	Fischells Brook Corner Brook	Open-pit mining Wallboard manufacture
<b>NOVA SCOTIA</b>		
CGC Inc.	Port Hawkesbury	Fibre-gypsum board manufacture
Fundy Gypsum Company	Wentworth and Miller Creek	Open-pit mining of gypsum and anhydrite
Georgia-Pacific Corporation	Sugar Camp	Open-pit mining
Little Narrows Gypsum Company	Little Narrows	Open-pit mining of gypsum and anhydrite
National Gypsum (Canada) Ltd.	Milford	Open-pit mining
<b>NEW BRUNSWICK</b>		
Westroc Inc.	McAdam	Wallboard manufacture
<b>QUEBEC</b>		
CGC Inc.	Montréal Saint-Jérôme	Wallboard manufacture Wallboard plant mothballed
Georgia-Pacific Corporation	Montréal	Distribution terminal only
Westroc Inc.	Montréal	Wallboard manufacture
<b>ONTARIO</b>		
CGC Inc.	Hagersville	Underground mining and wallboard manufacture
Georgia-Pacific Corporation	Caledonia	Underground mining and wallboard manufacture
Westroc Inc.	Clarkson	Wallboard manufacture
<b>MANITOBA</b>		
Westroc Inc.	Amaranth Winnipeg	Open-pit mining Wallboard manufacture
<b>ALBERTA</b>		
Georgia-Pacific Corporation	Edmonton	Wallboard manufacture
Westroc Inc.	Calgary	Wallboard manufacture
<b>BRITISH COLUMBIA</b>		
Georgia-Pacific Corporation	Canal Flats Vancouver	Open-pit mining Gypsum products manufacture
Westroc Inc.	Vancouver Windermere	Gypsum products manufacture Open-pit mining

Source: Natural Resources Canada.

**TABLE 3. CANADA, GYPSUM PRODUCTION, TRADE AND USE, 1980 AND 1985-2001**

	Production (1)	Imports (2)	Exports	Apparent Use (3)
	(tonnes)			
1980	7 336 000	154 717	4 960 240	2 530 477
1985	7 760 783	121 802	5 879 664	2 002 921
1986	8 802 805	221 644	5 921 982	3 102 467
1987	9 093 926	217 625	5 704 853	3 606 698
1988 (a)	8 813 760	274 917	5 651 286	3 437 391
1989	8 179 588	291 373	5 357 055	3 113 906
1990	7 977 685	318 114	5 757 327	2 538 472
1991	6 727 221	259 863	4 940 193	2 046 891
1992	7 294 700	260 505	5 010 649	2 544 556
1993	7 563 369	280 581	5 315 618	2 528 332
1994	8 587 303	292 156	5 942 572	2 936 887
1995	8 054 741	177 327	5 565 427	2 666 641
1996	8 201 774	247 208	5 526 010	2 922 972
1997	8 627 772	220 914	5 981 974	2 866 712
1998	8 306 534	96 593	5 552 146	2 850 981
1999	9 345 342	121 048	6 224 830	3 241 560
2000	8 572 464	154 604	6 318 686	2 408 382
2001 (p)	8 119 233	243 160	5 596 557	2 765 836

Sources: Natural Resources Canada; Statistics Canada.

(p) Preliminary.

(a) Beginning in 1988, imports and exports are based on the new Harmonized System and may not be in complete accordance with previous method of reporting. Imports and exports include HS class 2520.10.00 (gypsum, anhydrite).

(1) Producers' shipments of crude gypsum. (2) Includes crude and ground, but not calcined. (3) Production plus imports minus exports.

**TABLE 4. CANADA, VALUE OF CONSTRUCTION BY TYPE, 1996-2001**

	1996	1997	1998	1999	2000	2001
	(\$ billions)					
<b>BUILDING CONSTRUCTION</b>						
Residential investment	32.3	36.5	36.0	38.8	40.8	43.6
Non-residential building investment	19.6	22.5	22.4	24.2	25.3	26.3
Total building construction	51.9	59.0	58.4	63.0	66.1	69.9
<b>ENGINEERING CONSTRUCTION</b>						
Mining and oil and gas extraction	13.9	18.2	16.7	15.4	19.3	21.1
Transportation and warehousing	2.0	2.2	5.0	5.0	4.1	3.4
Other engineering	15.2	14.7	14.5	16.6	18.3	18.9
Total engineering construction	31.1	35.1	36.2	37.0	41.7	43.4
Total all components	83.0	94.1	94.6	100.0	107.8	113.3

Sources: Natural Resources Canada; Statistics Canada, CANSIM II (Table 026-0013 – Residential Values, by Type of Investment and Related Table 031-0002 – Flows and Stocks of Fixed Non-Residential Capital, by North American Industry Classification System). (More information can be obtained on the Internet at the CANSIM II site at [www.statcan.ca/english/CANSIM](http://www.statcan.ca/english/CANSIM).)

Notes: Numbers may not add to totals due to rounding. Residential construction includes value of new construction, renovations and acquisition costs.

**TABLE 5. WORLD PRODUCTION OF GYPSUM,  
2000 AND 2001**

	2000	2001(e)
	(000 tonnes)	
Canada	8 570	8 100
Australia	3 800	4 000
China	6 800	6 800
France	4 500	4 500
India	2 210	2 220
Iran	11 000	11 000
Japan	5 600	6 000
Mexico	7 000	7 600
Spain	7 500	7 500
Thailand	6 000	6 000
United Kingdom	1 500	1 400
United States	19 500	18 800
Other countries	22 200	24 900
<b>Total world</b>	<b>106 180</b>	<b>108 820</b>

Sources: Natural Resources Canada; U.S. Geological Survey,  
January 2002.  
(e) Estimated.