

Gypsum and Anhydrite

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GYPSUM

Canadian shipments of natural gypsum totalled 8.1 Mt valued at \$87.9 million in 1998, based on preliminary data. This compares to 8.6 Mt valued at \$95.3 million in 1997, based on final data. The decrease in shipments of natural gypsum of about 6% resulted from weaker levels of construction activity in Canada as well as from a decrease in exports to the United States, according to preliminary statistics from Statistics Canada. In addition to shipments of natural gypsum, shipments of commercial-quality, synthetic flue-gas derived (FGD) gypsum from coal-fired generating stations are estimated to be about 350 000 t/y.

The Canadian Industry

Most gypsum producers in Canada are closely integrated in both mining and wallboard manufacturing. Six companies operate 12 mines and 13 wallboard plants with a total of about 1900 employees. The major gypsum mining and related production plants are listed in Table 2.

In Atlantic Canada, Nova Scotia accounts for nearly 80% of Canada's output of natural gypsum and nearly all of its exports (Table 1). 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.

In Newfoundland, Lafarge Canada Inc. arranged to purchase, in late 1998, the gypsum reserves owned by Atlantic Gypsum Resources, Inc. and the wallboard manufacturing plant owned by affiliate Atlantic Gypsum Limited, a division of Atlantic Group Limited. (The Lafarge group of companies

became directly involved in the North American gypsum business in 1996 with an acquisition in the United States of two plants from Georgia-Pacific Corp.)

In addition to the manufacture of wallboard, Newfoundland gypsum is used as a set regulator in cement by North Star Cement Ltd.

CGC Inc. continued to operate the gypsum fibre board plant in Port Hawkesbury, Nova Scotia. This plant was purchased from Louisiana Pacific Corporation in 1997. Natural gypsum is purchased locally, perlite is imported, and large quantities of recycled paper are backhauled, mainly from the United States. (This project was the first in Atlantic Canada to manufacture gypsum board products for both regional and export markets.)

Technical evaluation and environmental assessment continued at the new gypsum occurrence owned by Tusket Mining Limited at a new gypsum deposit situated at Murchyville in central Nova Scotia. Possible reserves of more than 300 Mt have been delineated at the site, which is located about 60 km from Sheet Harbour.

In Quebec, there is no production of natural or commercial-quality synthetic gypsum. CGC continued to use synthetic gypsum at its Montréal wallboard plant, which is now capable of using desulphogypsum from its \$11 million facility at Belledune, New Brunswick. (This facility was built in cooperation with New Brunswick Power Corporation.)

In Ontario, two underground mines remain in operation. All of Ontario's production of natural gypsum is now used on site since Westroc Industries Limited closed its mine at Drumbo in 1995. Westroc now uses 100% synthetic gypsum, provided under a long-term contract with Ontario Power Generation Inc. (formerly Ontario Hydro) to maintain output of wallboard at its Mississauga, Ontario, plant. This contract is for approximately 200 000 t/y of desulphogypsum from Hydro's Lambton facility, which is the site of the first flue-gas desulphurization (FGD) system at a thermal-electric generating station in Ontario.

In western Canada, production of natural gypsum from Amaranth in Manitoba and from Windermere

(Elkhorn II deposit) and Canal Flats in British Columbia serve the Prairie region and a portion of the B.C. market not served by imports. The Georgia-Pacific Corporation (GPC) plant in Surrey, British Columbia, meets most of its requirements for natural gypsum under a long-term contract with a 49%-owned Mexican affiliate.

Several companies continue to use recycled gypsum wallboard in their production processes. The newly acquired GPC wallboard plant located in Surrey, British Columbia, was the first in North America to use large quantities. This was possible through arrangements with a reclaimer, New West Gypsum, now based in Oakville, Ontario. Up to one fifth of the raw material needs of some plants in Canada include recycled material – a combination of about 75% scrap from new construction sites (post-construction material) and 25% waste from wallboard plants. Westroc currently recycles about 20 000 t and 30 000 t of board annually at its Vancouver and Mississauga plants, respectively.

World Developments and Trade

World reserves of gypsum are widespread and large; North American reserves are estimated to be more than 1.5 billion t. World production of gypsum in 1998 was an estimated 104.7 Mt, based mainly on an estimate by the U.S. Geological Survey (refer to the Office of Minerals Information web site at <http://www.usgs.gov>). The United States ranked number one with 19.0 Mt, followed by Thailand (8.6 Mt), Iran (8.5 Mt) and Canada (8.1 Mt). Shipments of wallboard by U.S. producers were 2.5 billion m², based on estimates made in late 1998. (This amount is approximately 6% more than the previous year.)

U.S. imports of gypsum from Spain amounted to more than 1.0 Mt in 1998, mainly because of relatively low east-to-west backhaul freight rates. Canada's imports of gypsum from Mexico, as described earlier, as well as those from the United States, are used by both wallboard and cement manufacturers. Imports from Spain, however, are used only by specific cement manufacturers.

The Canadian International Trade Tribunal (CITT) concluded in early 1998 that normal values and export prices now prevail for gypsum board originating in or exported from the United States. As a result of this ruling, anti-dumping duty liabilities have been discontinued.

Major developments in the United States continue to influence primarily North American consumption of natural gypsum and synthetic gypsum. These developments include: a new USG Corporation wallboard plant in Pennsylvania utilizing synthetic gypsum as well as reclaimed paper to be on stream in 2000; a

new Lafarge Corporation wallboard plant in Kentucky, near Cincinnati, using synthetic gypsum and reclaimed paper, also to be on stream in 2000; a new National Gypsum wallboard plant in Pennsylvania, using synthetic gypsum; and new plants by Georgia Pacific Corp. in Georgia and by Standard Gypsum in Tennessee. Other new plants and expansions are also planned early in the new century.

Processing and Markets

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. In general, the wallboard industry serves the residential, institutional and commercial building sectors. In the United States, an estimated 4.6 Mt/y of synthetic FGD gypsum is consumed as a complete or partial substitute for natural gypsum in the manufacture of wallboard, according to the U.S. Geological Survey. U.S. shipments of wallboard in 1998 were at near-full capacity, amounting to about 27 billion ft² (2.5 billion m²), a record for the industry, according to the Washington-based Gypsum Association (GA). (Canadian wallboard plants operated at a capacity of about 3.77 billion ft² (350 million m²), also according to the GA.) Housing starts have become a less reliable indicator of the demand for gypsum wallboard because this product's improved fire-retarding qualities, as well as increased renovation activity, have encouraged its more general use.

The Portland cement industry requires crushed, non-calcined gypsum, acting as a set regulator in a proportion up to 5% by total weight, ground with the primary stage cement clinker to produce the final cement product. Based on this proportion of gypsum, the total amount required by cement producers in Canada is estimated to be about 600 000 t/y.

For agricultural purposes, specifications mainly relate to the degree of fineness. Gypsum combines with potassium-aluminum silicates in the soil, resulting in the release of potassium for use as a nutrient. Gypsum also serves to reduce sub-soil acidity, which is particularly beneficial in aluminum-rich lateritic soils. In addition, it provides a source of calcium and sulphur trioxide, and helps break up hard soils, allowing better aeration and water penetration and retention.

For filler uses, gypsum is dried and finely ground to a range of particle sizes for use in joint compounds (mainly with gypsum wallboard), plastics, paint and paper. Relatively pure uncalcined gypsum, depending on glass batch chemistry, may also substitute for salt cake (sodium sulphate) in glass manufacturing. Special high-purity gypsum may be used in foods and pharmaceutical products.

The increased use of lime/limestone FGD technology, along with the implications relating to industrial minerals, prompted a cooperative project by Natural Resources Canada (NRCan) and the former U.S. Bureau of Mines (now the Office of Minerals Information, U.S. Geological Survey) to produce a bibliography on the subject. A free copy of *Flue Gas Desulfurization and Industrial Minerals: A Bibliography*, which has more than 4000 references covering the period 1982 through June 1993, can be obtained from NRCan or the U.S. Geological Survey.

ORTECH International plans its Sixth International Conference on Flue-Gas Desulphurization and Synthetic Gypsum in Toronto in May 2000. This series of conferences has contributed greatly to improving communication and the dissemination of new information among power utilities and other synthetic gypsum producers, consumers and equipment suppliers.

Prices

Prices for gypsum in merchant markets are negotiated among buyers and sellers, and published figures have little relevance. In the United States, average prices for crude material, f.o.b. mine, were about US\$7.10/t during the five-year period from 1994 to 1998, according to preliminary information from the U.S. Geological Survey.

Outlook

Canadian shipments of gypsum in 1999 are expected to increase moderately because of an increase in construction activity. Housing starts in Canada were 125 000 in 1996, 149 000 in 1997, and about 137 000 in 1998. Based on information from the Canada Mortgage and Housing Corporation, housing starts are forecast to be about 145 000 in 1999. With real economic growth in both Canada and the United States expected to continue, the outlook continues to be positive in the office and industrial building sectors.

Housing starts in the United States are expected to stabilize following a 10% increase in 1998. However, total construction is expected to remain firm based on relatively high consumer confidence and strength in repair and renovation work, as well as office construction.

Although new construction materials are being introduced, demand for gypsum wallboard is expected to remain popular because of its low price, ease of installation, and well-recognized fire-retarding properties. Diverse uses relating 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 much, although the future availability of synthetic gypsum resulting from more strenuous emission controls will influence developments in some areas. The recycling of scrap and waste gypsum from construction sites and wallboard manufacturing lines will continue to become more important in both Canada and the United States.

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

Shipments of anhydrite in 1997 were 180 100 t for all uses, based on final figures; similarly, shipments in 1998 were an estimated 139 763 t, according to the Nova Scotia Department of Natural Resources. These shipments were mainly to the United States for use as a peanut crop fertilizer and for manufacturing Portland cement. Smaller quantities were shipped to Quebec and Ontario for the production of cement.

Test work on the use of anhydrite in floor screed and suspended floor systems, which had been carried out as part of a Canada-Nova Scotia cooperative mineral development agreement, showed promise as new uses for Canadian gypsum. Similarly, testing on the use 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 65. (2) Information in this review was current as of January 30, 1999.

TARIFFS

Item No.	Description	Canada			United States
		MFN	GPT	USA	Canada
2520.10	Gypsum; anhydrite	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%	3%	Free	Free
6809.90	Other articles				
6809.90.10	Models and casts, of a kind used in the manufacture of dental prosthesis	Free	Free	Free	Free
6809.90.90	Other	6.5%	3%	Free	Free

Sources: Customs Tariff, effective January 1999, Revenue Canada; Harmonized Tariff Schedule of the United States, 1999.

TABLE 1. CANADA, GYPSUM PRODUCTION AND TRADE, 1996-98

Item No.	1996		1997		1998P	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
PRODUCTION (shipments)						
Crude gypsum						
	6 578 674	67 668	6 851 977	74 108	6 415 343	67 762
Nova Scotia	x	x	x	x	x	x
Manitoba	x	x	x	x	x	x
British Columbia	x	x	x	x	x	x
Newfoundland	x	x	x	x	x	x
Total ¹	8 201 774	85 415	8 627 772	95 263	8 094 532	87 972
IMPORTS						
2520.10	Gypsum, anhydrite					
	114 537	4 261	111 472	6 736	82 403	5 268
United States	132 163	1 603	109 290	1 768	14 084	1 681
Mexico	29	2	20	10	9	11
China	-	-	-	-	10	11
Indonesia	479	34	132	25	85	17
Other countries						
Total	247 208	5 900	220 914	8 539	96 591	6 988
2520.20	Gypsum; anhydrite; plasters					
	32 932	8 819	31 540	8 981	38 216	12 341
United States	34	36	30	25	60	43
Japan	27	8	11	7	47	40
Italy	-	-	11	3	31	23
United Kingdom	-	-	-	-	18	15
New Zealand	84	72	136	54	92	43
Other countries						
Total	33 077	8 935	31 728	9 070	38 464	12 505
	(square metres)		(square metres)		(square metres)	
6809.11	Plasterboards, etc., not ornamental; faced or reinforced with paper or paperboard					
	..	509	..	2 340	..	3 039
United States	..	124	..	97	..	108
United Kingdom	..	15	..	34	..	4
Other countries						
Total	..	648	..	2 471	..	3 151
6809.19	Plasterboards, etc., not ornamental; faced or reinforced, n.e.s.					
	..	3 466	..	4 414	..	6 622
United States	-	-	..	2	..	22
Mexico	..	11	..	17	..	19
Taiwan	-	-	18
France	..	5	..	167	..	18
Other countries						
Total	..	3 482	..	4 600	..	6 699

TABLE 1 (cont'd)

Item No.	1996		1997		1998p	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
IMPORTS (cont'd)						
6809.90	Articles of plaster or compositions based on plaster, n.e.s.					
	United States	3 804	..	3 973	..	4 248
	Mexico	326	..	430	..	814
	China	553	..	655	..	684
	United Kingdom	848	..	757	..	615
	Thailand	124r	..	70	..	194
	Germany	4	..	3	..	118
	Italy	14	..	36	..	33
	Other countries	150	..	173	..	110
	Total	5 823r	..	6 097	..	6 816
	Total imports of gypsum and gypsum products	24 788r	..	30 777	..	36 159
EXPORTS						
2520.10	Gypsum, anhydrite					
	United States	5 486 553	61 739	5 934 326	75 489	5 560 769
	Denmark	39 347	409	20 892	528	22 029
	Venezuela	—	—	26 415	255	—
	Other countries	110	83	341	124	—
	Total	5 526 010	62 231	5 981 974	76 396	5 582 798
2520.20	Gypsum; anhydrite; plasters					
	United States	2 567	1 209	1 247	840	1 444
	Bermuda	42	12	—	—	40
	Japan	35	56	24	12	23
	France	16	10	36	10	23
	Other countries	248	182	43	45	—
	Total	2 908	1 469	1 350	907	1 530
		(square metres)		(square metres)		(square metres)
6809.11	Plasterboards, etc., not ornamental; faced or reinforced with paper or paperboard					
	United States	78 135 664	139 989	93 679 180	176 880	102 086 319
	France	—	—	—	—	43 332
	Cuba	59 234	147	30 623	123	48 100
	Barbados	13 100	36	18 110	43	73 501
	Bermuda	2 500	5	—	—	40 230
	Trinidad and Tobago	—	—	10 610	27	29 405
	Israel	—	—	—	—	33 084
	Chile	—	—	98 000	198	17 500
	Russia	11 983	33	4 800	16	18 809
	Portugal	73 425	74	37 765	76	10 600
	Netherlands Antilles	—	—	—	—	3 982
	Saint Pierre and Miquelon	6 894	18	—	—	3 600
	Other countries	207 985	299	101 427	538	—
	Total	78 510 785	140 601	93 980 515	177 901	102 408 462
6809.19	Plasterboards, etc., not ornamental; faced or reinforced, n.e.s.					
	United States	..	13 462	..	15 148	..
	Italy	—	—	—	—	..
	United Kingdom	..	74	..	90	..
	Chile	—	—	—	—	..
	Bermuda	—	—	..	54	..
	Netherlands	—	—	—	—	..
	Other countries	..	454	..	283	..
	Total	..	13 990	..	15 575	..
6809.90	Articles of plaster or compositions based on plaster					
	United States	..	10 284	..	16 886	..
	Bahamas	—	—	—	—	..
	Israel	..	5	..	—	..
	New Zealand	..	39	..	103	..
	China	—	—	—	—	..
	Other countries	..	2 152	..	1 163	..
	Total	..	12 480	..	18 152	..
	Total exports of gypsum and gypsum products	..	230 771	..	288 931	..

Sources: Natural Resources Canada; Statistics Canada.

— Nil; . . Not available; n.e.s. Not elsewhere specified; p Preliminary; 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, 1998

Company	Location	Operation
NEWFOUNDLAND		
Lafarge Gypsum Canada Inc.	Fischells Brook Corner Brook	Open-pit mining Wallboard manufacture
NOVA SCOTIA		
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
Georgia-Pacific Corporation	McKay Settlement	Open-pit mining
Little Narrows Gypsum Company	Little Narrows	Open pit mining of gypsum and anhydrite
National Gypsum (Canada) Ltd.	Milford	Open-pit mining
NEW BRUNSWICK		
Westroc Industries Limited	McAdam	Wallboard manufacture
QUEBEC		
CGC Inc.	Montréal	Wallboard manufacture
Georgia-Pacific Corporation	St-Jerome	Wallboard plant mothballed
Westroc Industries Limited	Montréal	Distribution terminal only Wallboard manufacture
ONTARIO		
CGC Inc.	Hagersville	Underground mining and wallboard manufacture
Georgia-Pacific Corporation	Caledonia	Underground mining and wallboard manufacture
Westroc Industries Limited	Clarkson	Wallboard manufacture
MANITOBA		
Georgia-Pacific Corporation	Amaranth	Open-pit mining
Westroc Industries Limited	Winnipeg	Wallboard manufacture
	Amaranth	Open-pit mining
	Winnipeg	Wallboard manufacture
ALBERTA		
Georgia-Pacific Corporation	Edmonton	Wallboard manufacture
Westroc Industries Limited	Calgary	Wallboard manufacture
BRITISH COLUMBIA		
Georgia-Pacific Corporation	Canal Flats	Open-pit mining
	Vancouver	Gypsum products manufacture
Westroc Industries Limited	Vancouver	Gypsum products manufacture
	Windermere	Open-pit mining

Source: Natural Resources Canada.

TABLE 3. CANADA, GYPSUM PRODUCTION, TRADE AND CONSUMPTION, 1975, 1980 AND 1985-98

	Production ¹	Imports ²	Exports	Apparent Consumption ³
	(tonnes)			
1975	5 719 451	553 338	3 691 676	2 581 113
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 ^p	8 094 532	96 591	5 582 798	2 608 325

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, 1994-96

	1994	1995	1996
	(\$ millions)		
BUILDING CONSTRUCTION			
Residential	34 922	29 186	32 575
Industrial	3 006	3 243	4 227
Commercial	6 251	6 265	6 945
Institutional	4 931	4 982	4 906
Other	1 948	2 095	2 360
Total building	51 058	45 770	51 013
ENGINEERING CONSTRUCTION			
Marine	492	445	447
Transportation	6 032	6 436	5 874
Waterworks	904	1 140	1 358
Sewage, dams, sanitary systems	1 501	1 585	1 397
Electric power	3 965	3 441	2 934
Railway, telephones	1 446	1 298	1 880
Gas and oil facilities	13 721	13 474	12 891
Other	2 325	2 803	2 495
Total engineering	30 386	30 621	29 276
Total construction	81 444	76 391	80 289

Sources: Natural Resources Canada; Statistics Canada, catalogue no. 61-223

(additional information is also available on the Internet at <http://www.statcan.ca/english/Pgdb/Economy/Manufacturing/manuf18.htm> or <http://www.cmhc-schl.gc.ca/MkInfo/store/#nho>).

Notes: Numbers may not add to totals due to rounding. Expenditures include value of new construction as well as major renovation work purchased.

TABLE 5. WORLD PRODUCTION OF GYPSUM, 1997 AND 1998

	1997	1998 ^e
	(000 tonnes)	
Canada	8 600	8 100
Australia	2 100	2 200
China	7 800	8 000
France	5 000	5 000
Iran	8 500	8 500
Japan	5 500	5 500
Mexico	5 900	5 900
Spain	7 400	7 400
Thailand	8 600	8 600
United Kingdom	2 000	2 000
United States	18 600	19 000
Other countries	24 100	24 500
Total world	104 100	104 700

Sources: Natural Resources Canada; U.S. Geological Survey, January 1999.

^e Estimated.