

# Lime

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“Lime” is a general term referring to burned or calcined limestone (burnt lime or quicklime) and its secondary products, including hydrated lime (calcium hydroxide), also referred to as slaked lime. In the calcining process, quicklime (CaO or CaO.MgO) begins to form at the dissociation temperature of limestone. Temperatures are maintained sufficiently long until there is a complete breakdown of the limestone and a release of the carbon dioxide content. High-calcium quicklime containing mainly CaO and less than 5% MgO is the most common type of lime produced. However, dolomitic quicklime (or dolime) and its hydrated products are also produced; these products contain 35-40% MgO.

## CANADIAN INDUSTRY

Canadian shipments of all lime in 2001 amounted to 2.22 Mt valued at \$212 million based on preliminary data. These amounts are about 12% lower than in 2000 (Tables 1 and 2). Quicklime accounted for about 90% of the total volume and value of shipments. Production figures do not include some captive production from pulp and paper plants that burn sludge to recover lime for re-use in the causticization process. Similarly, beginning with 1996 data, General Chemical Canada Ltd. has not been included in the production figures because this company's output, in some cases, is related to the manufacture of derived chemicals.

The lime industry in Canada comprises 14 operating plants from New Brunswick to British Columbia as of year-end 2001 (Figure 1 and Table 3). Two plants closed in 2001: the Hazel plant in Alberta, owned by Graymont Western Canada Inc., and the Haileybury plant in Ontario owned by Miller Minerals, a division of Miller Paving Limited. Total employment in the industry in 1999 (still the most recent year for which

Statistics Canada data are available), was approximately 765, compared to 830 in 1998.

The Graymont group of companies, with seven plants across Canada and several plants in the United States, now accounts for an estimated 30% of total lime capacity in North America. Carmeuse North America Group, with complete or partial ownership of three plants in Ontario, is the leading producer of lime in North America. Chemical Lime Company of Canada Inc., with one operation in British Columbia, is the second largest lime producer in North America.

## USE

The types or forms of lime commercially available are essentially the same as reported in detail in the chapter on lime appearing in the 1998 edition of the *Canadian Minerals Yearbook*.

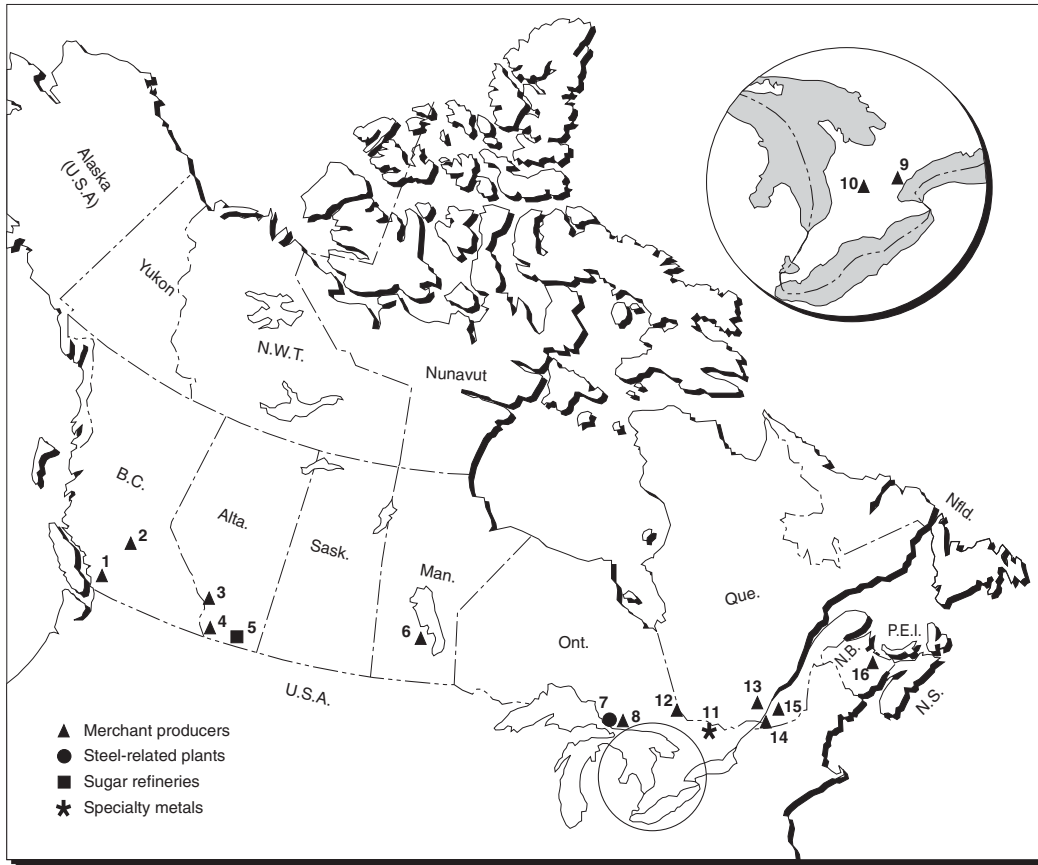
The use of lime in Canada, or essentially its complete consumption in the manufacture of numerous products, relates mainly to the merchant market, which is served by the mainstream lime producers.

The use of quicklime, based on reported shipments for the merchant market, amounted to 1 447 722 t in 2001. The major end uses were steel-making (41%), environmental control (13%), pulp and paper (19%), chemicals (12%), and other industrial uses, including metal concentration (15%). Hydrated lime shipments in the merchant market amounted to 135 836 t in 2001 and were sold mainly for environmental control (63%), other industrial uses (18%), agricultural uses (3%), and other miscellaneous uses related mainly to road and soil stabilization and other construction and masonry (15%).

## ENERGY AND TECHNOLOGY

Energy costs to produce quicklime account for about 40% of total production costs, one of the highest ratios in the mineral processing sector. Calcining takes place mainly in vertical (shaft-type) kilns or rotary-type kilns, the latter technology being most common in North America. Preheater systems and

**Figure 1**  
**Lime Producers in Canada, 2001**



Numbers refer to locations on map above.

**MERCHANT PRODUCERS**

- 1. Chemical Lime Company of Canada Inc., Fort Langley
- 2. Graymont Western Canada Inc., Pavilion Lake
- 3. Graymont Western Canada Inc., Exshaw
- 4. Graymont Western Canada Inc., Summit plant, Hazell<sup>1</sup>
- 6. Graymont Western Canada Inc., Faulkner
- 8. Carmeuse North America Group, Spragge
- 9. Lafarge Lime (Canada) Inc., Dundas Division
- 10. Carmeuse North America Group, Ingersoll
- 12. Miller Minerals, Haileybury<sup>2</sup>
- 13. Graymont (QC) Inc., Joliette
- 14. Graymont (QC) Inc., Bedford
- 15. Graymont (QC) Inc., Marbleton
- 16. Graymont (NB) Inc., Havelock

**STEEL-RELATED PRODUCERS**

- 7. Algoma Steel Inc., Sault Ste. Marie

**SUGAR REFINERIES**

- 5. Rogers Sugar Ltd., Taber

**SPECIALTY METALS**

- 11. Timminco Limited, Haley Station

<sup>1</sup> Closed in October 2001.

<sup>2</sup> Closed in January 2001.

computerized process control systems are now commonplace.

About 50% of the kilns in service in Canada use natural gas, with petroleum coke, coal and heating oils accounting for the energy inputs required for the calcining process. Kiln efficiencies depend on the type of design and generally range from 4 to 5 gigajoules per tonne (GJ/t) of calcined lime for shaft kilns to as much as 13 GJ/t for long rotary kilns not equipped with preheaters. About 60% of carbon dioxide emissions relate to the decomposition of limestone (calcium carbonate) whereas the remaining 40% are energy-related emissions.

## PRICES

Published prices for lime represent only a broad range. Actual prices vary according to marketing strategies and supply and demand. Average prices for high-calcium quicklime and high-calcium hydrated lime, f.o.b. plant, in Ontario, in bulk, were quoted at \$70.80/t and \$80.40/t respectively at the end of 2001.

## INTERNATIONAL DEVELOPMENTS

World lime production was an estimated 115 Mt in 2001, compared to 116 Mt in 2000 (Table 5). China and the United States, accounting for 22 Mt and 19 Mt respectively, were followed by Germany and Japan, each with 7.6 Mt.

Canada ranks in the top 10 lime-producing countries because of relatively large chemical and industrial requirements, according to the final 2000 information. Reserves of limestone and related non-renewable mineral/rock resources are relatively large; however, land-use constraints in some regions are becoming more onerous. The proximity of lime plants to U.S. markets has resulted in a favourable balance of trade in lime products throughout the period 1975-2000, as shown in Table 2.

The United States produced 18.7 Mt of lime in 2001, compared to 19.6 Mt in both 2000 and 1999, according to preliminary figures. Apparent use amounted to 18.8 Mt in 2001 compared to 19.6 Mt in 2000. Environmental uses for lime in the United States, which include flue gas sulphur removal, water treatment and waste-water treatment, have grown rapidly and are the third most important uses after metallurgical, chemical and industrial uses.

## OUTLOOK

The production of lime in Canada in 2002 is expected to be about the same as the previous year based on

higher demand by the steel industry, stable markets for pulp and paper, and a recovery in exports.

Lime is now marketed to several industries more as a specialty chemical than as a commodity because certain uses demand stricter specifications relating to ISO standards. In particular, these standards may apply to: 1) lime and dolime for steel-making; 2) the processing of lime for precipitated calcium carbonate (PCC) for a range of industrial uses; 3) lime for flue-gas desulphurization technology to make commercial-quality synthetic (FGD) gypsum; and 4) high-purity lime for water treatment. The use of lime in the environmental sector is expected to increase in the short term given the importance of treating effluents in the industrial and mining sectors.

*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 February 1, 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
2522.10	Quicklime	Free	Free	Free	Free
2522.20	Slaked lime	Free	Free	Free	Free
2522.30	Hydraulic lime	Free	Free	Free	Free

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

**TABLE 1. CANADA, LIME PRODUCTION AND TRADE, 2000 AND 2001**

Item No.	2000		2001(p)	
	(tonnes)	(\$000)	(tonnes)	(\$000)
<b>PRODUCTION (1)</b>				
By type				
Quicklime	2 271 277	209 696	2 011 500	188 833
Hydrated lime	254 092	27 905	209 410	23 602
Total	2 525 369	237 601	2 220 910	212 435
By province/territory				
Newfoundland and Labrador	—	—	—	—
Prince Edward Island	—	—	—	—
Nova Scotia	—	—	—	—
New Brunswick	x	x	x	x
Quebec	x	x	x	x
Ontario	1 293 381	115 280	1 067 288	96 849
Manitoba	x	x	x	x
Saskatchewan	—	—	—	—
Alberta	x	x	x	x
British Columbia	x	x	x	x
Yukon	—	—	—	—
Northwest Territories	—	—	—	—
Nunavut	—	—	—	—
Total	2 525 369	237 601	2 220 910	212 435
<b>IMPORTS (2)</b>				
2518.20	Calcined dolomite			
United States	3 810	761	19 436	2 683
Canada	320	35	—	—
Total	4 130	796	19 436	2 683
2522.10	Quicklime			
United States	45 267	4 767	75 566	8 470
Switzerland	218	23	219	28
United Kingdom	—	—	71	11
Canada	1	...	27	3
India	7	1	11	2
Finland	—	—	...	...
Total	45 493	4 791	75 894	8 514
2522.20	Slaked lime			
United States	7 054	1 538	5 548	1 281
United Kingdom	—	—	2	1
Japan	—	—	...	...
France	51	15	—	—
Total	7 105	1 553	5 550	1 282
2522.30	Hydraulic lime			
United States	9 686	1 718	12 873	2 070
Germany	—	—	2	1
United Kingdom	13	4	—	—
Italy	...	...	—	—
Jordan	...	...	—	—
Total	9 699	1 722	12 875	2 071

TABLE 1 (cont'd)

Item No.	2000		2001(p)		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
<b>EXPORTS</b>					
2518.20	Calcined dolomite United States	15 749	4 112	11 134	4 648
	Total	15 749	4 112	11 134	4 648
2522.10	Quicklime United States	68 236	9 625	87 588	14 297
	Total	68 236	9 625	87 588	14 297
2522.20	Slaked lime United States	12 382	1 801	5 836	966
	France	5	1	2	1
	Total	12 387	1 802	5 838	967
2522.30	Hydraulic lime United States	1	5	59	42
	China	7	3	31	14
	Total	8	8	90	56

Sources: Natural Resources Canada; Statistics Canada.

– Nil; . . . Amount too small to be expressed; (p) Preliminary; x Confidential.

(1) Producers' shipments and quantities used by producers. (2) Includes re-imports.

Notes: Numbers may not add to totals due to rounding. HS code 2522.30, as interpreted, applies mainly to hydrated lime.

TABLE 2. CANADA, LIME PRODUCTION, TRADE AND APPARENT USE, 1975, 1980 AND 1985-2001

	Production (1)			Imports	Exports	Apparent Use (2)
	Quick	Hydrated	Total			
	(tonnes)					
1975	1 533 944	199 195	1 733 139	30 099	234 034	1 529 204
1980	2 364 000	190 000	2 554 000	40 901	403 166	2 191 735
1985	2 054 294	157 286	2 211 580	23 056	194 097	2 040 539
1986	2 069 043	173 534	2 242 577	46 917	189 512	2 099 982
1987	2 140 793	189 278	2 330 071	44 290	163 767	2 210 594
1988 (a)	2 306 831	211 151	2 517 982	32 543	122 900	2 427 625
1989	2 349 312	202 622	2 551 934	39 095	83 608	2 507 421
1990	2 137 996	202 741	2 340 737	43 715	138 409	2 246 043
1991	2 184 836	190 424	2 375 260	45 012	134 405	2 285 867
1992	2 193 752	190 592	2 384 344	55 706	173 248	2 266 802
1993	2 186 749	192 247	2 378 996	52 690	190 068	2 241 618
1994	2 250 205	198 818	2 449 023	66 886	193 902	2 322 007
1995	2 244 800	216 916	2 461 716	52 884	266 475	2 248 125
1996	2 134 437	267 595	2 402 032	36 639	216 849	2 221 822
1997	2 219 385	257 186	2 476 571	47 382	224 232	2 299 721
1998	2 204 957	256 086	2 461 043	(r) 34 031	171 446	(r) 2 323 628
1999	2 299 705	265 746	2 565 451	54 535	96 058	2 523 928
2000	2 271 277	254 092	2 525 369	62 296	80 631	2 507 034
2001 (p)	2 011 500	209 410	2 220 910	94 319	93 516	2 221 713

Sources: Natural Resources Canada; Statistics Canada.

(p) Preliminary; (r) Revised.

(a) Beginning in 1988, exports and imports are based on the new Harmonized System and may not be in complete accordance with previous method of reporting. Imports and exports include HS classes 2522.10, 2522.20 and 2522.30.

(1) Producers' shipments and quantities used by producers. (2) Production plus imports, less exports.

**TABLE 3. CANADIAN LIME INDUSTRY, 2001**

Company	Plant Location	Calcining Capacity (000 t/y)	Market	Type of Quicklime and Other Products
<b>NEW BRUNSWICK</b>				
Graymont (NB) Inc.	Havelock	175	Merchant	High-calcium (1)
<b>QUEBEC</b>				
Graymont (QC) Inc.	Marbleton	330	Merchant	High-calcium (1)
Graymont (QC) Inc.	Joliette	200	Merchant/captive	High-calcium (1)
Graymont (QC) Inc.	Bedford	200	Merchant	High-calcium
<b>ONTARIO</b>				
Algoma Steel Inc.	Sault Ste. Marie	200	Captive	High-calcium and dolomitic
Beachville Lime Limited	Ingersoll	600	Merchant	High-calcium (1) and dolomitic
Miller Minerals, a division of Miller Paving Limited (2)	Haileybury	40	Merchant	High-calcium
Northern Lime Limited	Spragge	200	Merchant	High-calcium and dolomitic
Lafarge Lime (Canada) Inc., Dundas Division	Dundas	345	Merchant	High-calcium and dolomitic
Timminco Limited	Haley Station	53	Captive	Dolomitic
<b>MANITOBA</b>				
Graymont Western Canada Inc.	Faulkner	117	Merchant	High-calcium
<b>ALBERTA</b>				
Rogers Sugar Ltd.	Taber	66	Captive	High-calcium
Graymont Western Canada Inc.	Exshaw	180	Merchant	High-calcium (1)
Graymont Western Canada Inc., Summit plant (3)	Hazell	50	Merchant	High-calcium and dolomitic (1)
<b>BRITISH COLUMBIA</b>				
Graymont Western Canada Inc.	Pavilion Lake	235	Merchant	High-calcium
Chemical Lime Company of Canada Inc.	Fort Langley	135	Merchant	High-calcium (1)

Source: Natural Resources Canada.

(1) Production of hydrated lime. (2) Closed in January 2001. (3) Closed in October 2001.

Note: Lantic Sugar Limited operates sugar refineries in Quebec and New Brunswick.

**TABLE 4. CANADA, USE<sup>(1)</sup> OF DOMESTIC LIME, QUICK AND HYDRATED, 1998-2001**

End Uses	1998	1999	2000	2001
(tonnes)				
<b>CHEMICAL AND INDUSTRIAL</b>				
Steel-making	707 482	780 877	632 284	530 605
Water and sewage treatment	310 510	296 053	224 074	197 817
Water purification	48 366	51 323	37 445	48 420
Gas scrubbing	15 060	16 309	7 629	6 742
Metal concentration	158 482	138 431	153 469	176 213
Pulp and paper mills	200 824	213 627	218 878	253 287
Chemicals	193 693	194 362	161 408	163 070
Other industrial uses	96 416	101 102	109 645	44 765
<b>CONSTRUCTION</b>				
Road and soil stabilization	14 323	15 810	9 586	11 159
Mason and finishing lime	1 684	1 591	917	8 757
Other	17 807	22 126	11 259	3 096
<b>AGRICULTURE</b>				
	1 051	2 512	4 699	3 791
<b>Total use</b>	<b>1 765 697</b>	<b>1 834 124</b>	<b>1 571 293</b>	<b>1 447 722</b>

Source: Natural Resources Canada, based on producing companies' surveys, 1998-2001.

(1) Includes merchant market only; excludes companies that are completely captive producers/users.

**TABLE 5. WORLD PRODUCTION OF QUICKLIME AND  
HYDRATED LIME, INCLUDING DEAD-BURNED DOLOMITE SOLD  
AND USED, 1997-2001**

	1997	1998	1999	2000	2001(p)
	(000 tonnes)				
Canada	2 500	2 460	2 570	2 500	2 200
Brazil	5 700	5 700	5 700	5 700	6 300
China	20 500	21 000	21 500	21 500	22 000
France	2 800	2 800	2 400	2 400	2 400
Germany	8 000	7 600	7 600	7 600	7 600
Italy (1)	3 500	3 500	3 500	3 500	3 500
Japan (2)	7 850	8 100	7 750	7 700	7 600
Mexico	6 600	6 600	6 600	6 600	6 000
Poland	2 500	2 500	2 500	2 500	2 500
United Kingdom	2 500	2 500	2 500	2 500	2 500
United States	19 700	20 100	19 600	19 600	18 700
Other countries	37 850	33 050	33 650	33 995	33 500
<b>Total</b>	<b>120 000</b>	<b>115 910</b>	<b>115 870</b>	<b>116 095</b>	<b>114 800</b>

Sources: Natural Resources Canada; Statistics Canada; U.S. Geological Survey.

(p) Preliminary.

(1) Includes hydraulic lime. (2) Quicklime only.