

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 2002 amounted to 2.24 Mt valued at \$220 million based on preliminary data. These amounts are marginally higher than the previous year (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 15 operating plants from New Brunswick to British Columbia as of year-end 2002 (Figure 1 and Table 3). The Haileybury plant in Ontario, owned by Miller Minerals, a division of Miller Paving Limited, remained closed in 2002. Total employment by the merchant producers in 2001 (the most recent

year for which Statistics Canada data are available) was approximately 699, compared to 843 in 2000 and 765 in 1999.

The Graymont group of companies, with eight 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 that appeared in the 1998 edition of the *Canadian Minerals Yearbook*.

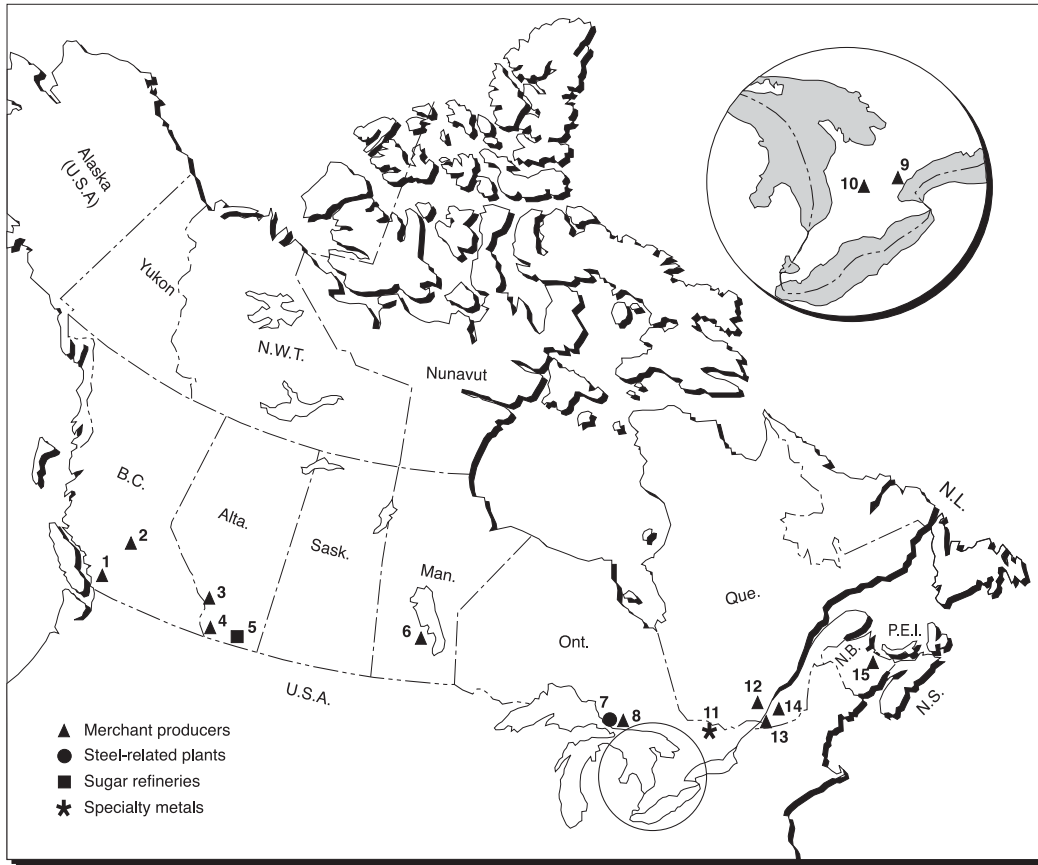
The use of lime in Canada, or essentially its complete consumption in the manufacture of numerous products, relates mainly to the merchant market, which is served by the mainstream lime producers.

The use of quicklime, based on reported shipments for the merchant market, amounted to 1 522 451 t in 2002, compared to 1 308 095 t (revised) in 2001. The major end uses for quicklime in 2002 were steel-making (48%), environmental control (12%), pulp and paper (16%), chemicals (11%), and other industrial uses, including metal concentration (13%). Hydrated lime shipments in the merchant market amounted to 165 694 t in 2002, compared to 139 605 t (revised) in 2001. The major uses for this lime in 2002 were environmental control (64%), other industrial uses (22%), agricultural uses (2%), and other miscellaneous uses related mainly to road and soil stabilization and other construction and masonry (12%).

ENERGY AND TECHNOLOGY

Energy costs to produce quicklime account for about 40% of total production costs, one of the highest ratios in the

Figure 1
Lime Producers in Canada, 2002



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, Hazell¹
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. Graymont (QC) Inc., Joliette
13. Graymont (QC) Inc., Bedford
14. Graymont (QC) Inc., Marbleton
15. 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

¹ Plant remained closed in 2002.

mineral-processing sector. Calcining of limestone and/or dolomitic limestone takes place mainly in vertical (shaft-type) kilns or rotary-type kilns, the latter technology being most common in North America. Preheater systems and 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; however, these process emissions vary considerably depending upon the chemical composition of the limestones used. Most of the remaining emissions are accounted for by fuel needs.

PRICES

The actual prices for lime products vary according to marketing strategies and supply and demand. The average reported values f.o.b. plant for quicklime and hydrated lime, based on producers' shipments as listed in Table 1, were \$96.50/t and \$121/t, respectively, in 2002.

INTERNATIONAL DEVELOPMENTS

World lime production was an estimated 116 Mt in 2002, compared to 118 Mt in 2001 (Table 5). China and the United States, accounting for 23 Mt and 18 Mt, respectively, were followed by Russia, Japan and Germany with 8.0 Mt, 7.5 Mt and 7.0 Mt, respectively.

Canada ranks in the top 10 lime-producing countries because of relatively large chemical and industrial requirements, according to the final 2001 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 1980-2002, as shown in Table 2.

The United States produced 18.4 Mt of lime in 2002, compared to 18.9 Mt in 2001, according to preliminary figures. Apparent use amounted to 18.5 Mt in 2002 compared to 19.0 Mt in 2001. 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 2003 is expected to decline moderately based on lower mid-year shipments of 3% and weaker markets for domestic steel. However, the demand for lime by pulp and paper producers and by other consumers is expected to remain firm.

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 June 2003. (3) This and other reviews, including previous editions, are available on the Internet at www.nrcan.gc.ca/mms/cmty/com_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: Canadian *Customs Tariff*, effective January 2003, Canada Customs and Revenue Agency; *Harmonized Tariff Schedule of the United States*, 2003.

TABLE 1. CANADA, LIME PRODUCTION AND TRADE, 2001 AND 2002

Item No.	2001		2002(p)	
	(tonnes)	(\$000)	(tonnes)	(\$000)
PRODUCTION (1)				
By type				
Quicklime	2 007 078	189 672	2 045 017	197 210
Hydrated lime	205 568	24 159	192 261	23 253
Total	2 212 646	213 831	2 237 278	220 463
By province				
New Brunswick	x	x	x	x
Quebec	x	x	x	x
Ontario	1 066 204	96 746	1 117 716	103 876
Manitoba	x	x	x	x
Alberta	x	x	x	x
British Columbia	x	x	x	x
Total	2 212 646	213 831	2 237 278	220 463
IMPORTS (2)				
2518.20	Calcined dolomite			
	United States	19 436	2 683	46 590
	Italy	-	-	25
Total		19 436	2 683	46 615
2522.10	Quicklime			
	United States	75 610	8 475	55 474
	United Kingdom	71	11	406
	Switzerland	219	28	100
	Canada	27	3	18
	India	11	2	6
	Finland	-	-	-
Total		75 938	8 519	56 004
2522.20	Slaked lime			
	United States	5 548	1 281	5 459
	Germany	-	-	5
	France	-	-	1
	Belgium	-	-	-
	Japan	-	-	-
	United Kingdom	2	1	-
Total		5 550	1 282	5 465
2522.30	Hydraulic lime			
	United States	12 661	2 000	8 505
	France	-	-	289
	Germany	2	1	5
	United Kingdom	-	-	1
	Belgium	-	-	-
	Italy	-	-	-
	Jordan	-	-	-
Total		12 663	2 001	8 800

TABLE 1 (cont'd)

Item No.	2001		2002(p)		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
EXPORTS					
2518.20	Calcined dolomite United States	11 134	4 648	9 785	1 214
2522.10	Quicklime United States	87 588	14 297	113 458	22 395
2522.20	Slaked lime United States France	5 836 2	966 1	6 374 2	969 1
	Total	5 838	967	6 376	970
2522.30	Hydraulic lime United States China	59 31	42 14	162 66	61 31
	Total	90	56	228	92

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, 1980 AND 1985-2002

	Production (1)			Imports	Exports	Apparent Use (2)
	Quick	Hydrated	Total			
	(tonnes)					
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	2 007 078	205 568	2 212 646	94 151	93 516	2 213 281
2002 (p)	2 045 017	192 261	2 237 278	70 269	120 062	2 187 485

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, 2002

Company	Plant Location	Calcining Capacity (000 t/y)	Market	Type of Quicklime and Other Products
NEW BRUNSWICK				
Graymont (NB) Inc.	Havelock	175	Merchant	High-calcium (1)
QUEBEC				
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
ONTARIO				
Algoma Steel Inc.	Sault Ste. Marie	200	Captive	High-calcium and dolomitic
Beachville Lime Limited	Ingersoll	600	Merchant	High-calcium (1) and dolomitic
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
MANITOBA				
Graymont Western Canada Inc.	Faulkner	117	Merchant	High-calcium
ALBERTA				
Rogers Sugar Ltd.	Taber	66	Captive	High-calcium
Graymont Western Canada Inc.	Exshaw	180	Merchant	High-calcium (1)
Graymont Western Canada Inc., Summit plant	Hazell	50	Merchant	High-calcium and dolomitic (1)
BRITISH COLUMBIA				
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.

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

TABLE 4. CANADA, USE⁽¹⁾ OF DOMESTIC LIME, QUICK AND HYDRATED, 1998-2002

End Uses	1998	1999	2000	2001	2002
(tonnes)					
CHEMICAL AND INDUSTRIAL					
Steel-making	707 482	780 877	632 284	530 605	730 180
Water and sewage treatment	310 510	296 053	224 074	197 817	233 036
Water purification	48 366	51 323	37 445	48 420	38 590
Gas scrubbing	15 060	16 309	7 629	6 742	22 803
Metal concentration	158 482	138 431	153 469	176 213	141 434
Pulp and paper mills	200 824	213 627	218 878	253 287	240 646
Chemicals	193 693	194 362	161 408	163 070	167 952
Other industrial uses	96 416	101 102	109 645	44 765	88 500
CONSTRUCTION					
Road and soil stabilization	14 323	15 810	9 586	11 159	10 408
Mason and finishing lime	1 684	1 591	917	8 757	7 550
Other	17 807	22 126	11 259	3 096	3 754
AGRICULTURE					
	1 051	2 512	4 699	3 791	3 292
Total use	1 765 697	1 834 124	1 571 293	1 447 722	1 688 145

Source: Natural Resources Canada, based on producing companies' surveys, 1998-2002.

(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, 1998-2002**

	1998	1999	2000	2001	2002 (p)
	(000 tonnes)				
Canada	2 460	2 570	2 500	2 210	2 237
Brazil	5 700	5 700	5 700	6 300	6 300
China	21 000	21 500	21 500	22 000	23 000
France	2 800	2 400	2 400	2 400	2 400
Germany	7 600	7 600	7 600	7 000	7 000
Italy (1)	3 500	3 500	3 500	3 500	3 500
Japan (2)	8 100	7 750	7 700	8 100	7 500
Mexico	6 600	6 600	6 600	6 500	6 500
Poland	2 500	2 500	2 500	2 200	2 200
Russia	(3)	(3)	(3)	8 000	8 000
United Kingdom	2 500	2 500	2 500	2 500	2 500
United States	20 100	19 600	19 600	18 900	18 400
Other countries	33 050	33 650	33 995	28 056	26 500
Total	115 910	115 870	116 095	117 666	116 037

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

(p) Preliminary.

(1) Includes hydraulic lime. (2) Quicklime only. (3) Included with other countries.