

# Cement

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**S**hipments of cement in 1998 were estimated to be 12.1 Mt valued at \$1.13 billion, based on preliminary data. This compares to shipments of 11.7 Mt valued at \$1.06 billion in 1997, based on final data. Demand for cement in Ontario remained relatively strong; however, in British Columbia, there was a substantial decrease in demand, according to the Portland Cement Association. Overall construction activity in Canada was weaker, affected mainly by an 8% drop in residential construction. The extended \$6 billion cost-shared program for infrastructure renewal contributed to total activity, although new funding for the existing program expired in 1998.

## **CANADIAN INDUSTRY**

The Canadian cement industry is diversified and mainly integrated with the construction aggregates and concrete products sectors. Information on the aggregates sector is included in a separate chapter entitled *Mineral Aggregates*.

Clinker-producing and finish-grinding capacities of cement plants, on a company-by-company basis, are listed in Table 2. Reported kiln capacity in 1997 was about 14.2 Mt with about 13.1 Mt active, according to the most recent figures available. Clinker production is more indicative of ultimate cement production capacity because clinker can be stockpiled for later use or sale. The overall output of the cement industry is best represented by total cement shipments plus clinker exports, as shown in Table 3. The average kiln capacity has increased from about 300 000 t/y in 1980 to 470 000 t/y in 1997; the average kiln age based on clinker capacity is reported to be about 20 years, according to the Portland Cement Association.

In Atlantic Canada, two cement plants obtain raw materials from on site or nearby. These plants account for about 4% of Canada's total clinker-producing capacity. Nova Scotia and Newfoundland are the only producers of cement in the region.

In Quebec, four clinker-producing plants account for about 21% of Canada's output. St. Lawrence Cement Inc. (SLC) is the dominant manufacturer of cement and a leading producer of concrete and aggregates in eastern Canada. Its major markets, in competition with Lafarge Canada Inc. and Ciment Québec Inc., are in Quebec, the Maritime provinces and the north-eastern United States. Considering the northeastern region of North America as a whole, there are generally four to six distribution terminals for each cement clinker plant.

In Ontario, clinker-producing plants account for about 48% of Canadian capacity. SLC, Blue Circle Canada Inc. and Lafarge Canada Inc. are the largest producers. Lafarge's raw materials handling is extensive; for example, limestone for its plant at Bath is quarried on site and silica is supplied from Potsdam sandstone in Pittsburgh Township, about 50 km east of Bath. Iron oxide and gypsum are purchased from Hamilton and Nova Scotia, respectively. Lafarge's Woodstock plant obtains limestone on site and other raw materials mainly from sources in southern Ontario.

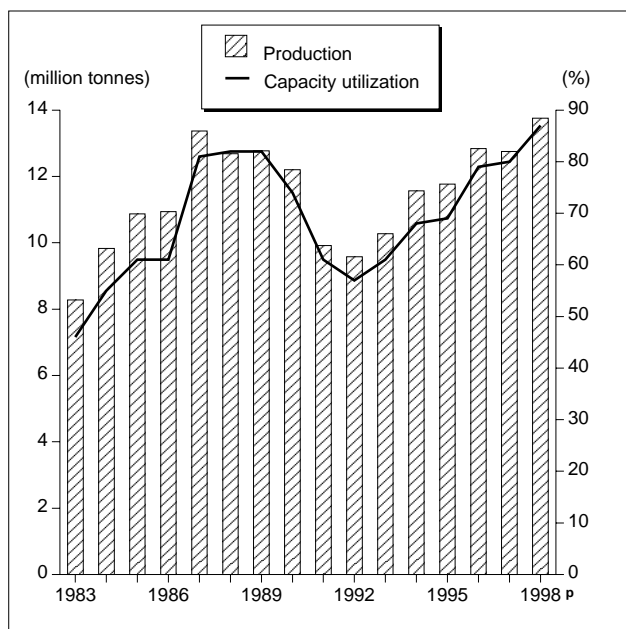
SLC, controlled by Holderbank Financière Glaris of Switzerland, completed an expansion at its Mississauga plant in 1998. (Also, SLC announced plans to build a 2-Mt/y cement plant near Greenport, New York.) In addition to plans to expand its North American cement capacity, SLC plans to produce slag granules from by-products of steel production at Sault Ste. Marie, Ontario, and in the Philadelphia-Camden area in the United States. (The capacity of the Ontario slag granules plant is expected to be about 450 000 t/y.)

ESSROC Canada Inc., part of the Italcementi Group of Companies, announced plans to increase cement production capacity at its Picton, Ontario, plant. These plans are part of a three-year investment plan by the company to increase the capacity of its North American cement plants by 500 000 t.

In western Canada, two companies, CBR/Heidelberg and Lafarge Canada Inc., operate two clinker-producing plants in the Prairie provinces and three in British Columbia. Western Canada accounts for about 27% of the country's clinker-producing capacity, roughly in proportion to its share of total Canadian consumption. Lafarge Canada Inc. continued construction of its new \$140 million cement plant on site at its Richmond, British Columbia, operation. Overall capital costs will be lower than a "greenfield" development because existing sites and substantial equipment and infrastructure are already in place.

CBR/Heidelberg affiliate Inland Cement Limited continues to ship cement from its relatively large Edmonton operation to Regina and Winnipeg for wide distribution.

**Figure 1**  
**Canadian Cement Production, 1983-98**



Sources: Statistics Canada; Portland Cement Association.  
<sup>P</sup>Preliminary.

Note: Cement production includes clinker exports.

## WORLD DEVELOPMENTS

Multinational companies with widespread production and distribution networks continued to become more dominant in world cement markets. Despite a recession, expansions continued, even in Asia. Exports of cement from China have increased, including first-time shipments to the United States.

World cement production in 1997 was 1515 Mt, according to estimates by the U.S. Geological Survey. China is the world's largest producer (493 Mt), fol-

lowed by Japan (92 Mt) and the United States (84 Mt).

In the United States, Florida Rock Industries continued work on its new 700 000-t/y plant in Florida.

The U.S. antidumping order against grey Portland cement clinker from Mexico remained in effect in 1997. In accordance with earlier rulings, Cemex (Cementos Mexicanos, S.A.), which is the largest cement producer in North America, must continue to tender cash deposits based on related customs values of imports and dumping margins.

## CONSUMPTION AND TRADE

Cross-border trade of both cement and clinker with the United States varies considerably from year to year depending on demand. Canadian cement production efficiencies and a lower-valued Canadian dollar continue to make Canadian cement and clinker competitive in U.S. markets. Annual exports of cement to the United States amount to 3-4 Mt and account for about one third of total Canadian shipments. These shipments are mainly destined for the southern Great Lakes region and the northwestern Pacific states. Canada's annual imports of cement are about 0.5 Mt directed mainly to the northern Great Lakes region and the two most westerly provinces.

Low-cost marine transportation has influenced world trade considerably. Total U.S. imports of cement (excluding clinker) for consumption were about 18 Mt in 1998, or 17% of apparent consumption.

## TECHNOLOGY

Energy conservation programs by the Canadian cement industry have reduced the energy consumption per unit of production by about 25% since 1974. Although the number of kilns has decreased, their individual capacities have increased and the more efficient dry-process plants will account for more than 95% of total clinker capacity when Lafarge Canada's Richmond plant is fully on stream in the year 2000. The fuel mix has changed considerably away from natural gas and petroleum products toward coal and/or coke. In 1997, of 17 clinker-producing plants, 8 reported using coal and/or coke as their primary fuel. Eight plants reported using waste as an alternative or supplemental fuel, according to the Canadian Portland Cement Association (CPCA). Waste was used at one plant as a primary fuel. In 1997, the Canadian cement industry consumed, on average, 4637 megajoules per tonne of production, of which 4071 megajoules (88%) were derived from fossil fuels (Table 2).

Suitable waste materials are an attractive alternative fuel because pyro-processing accounts for more than 80% of total energy needs, or 30-40% of total production costs. In the context of sustainable development, it is apparent that improved waste management involving combustion technology is leading to greater conservation of non-renewable fossil fuels.

NRCan announced in October 1998 its creation of the International Centre for the Sustainable Development of the Cement and Concrete Industry. Although this centre will draw on some current initiatives and the expertise of the Canada Centre for Mineral and Energy Technology (CANMET), it will be dependent on new partnerships with industry, academic institutions, and other governments for strengthening global efforts relevant to the sustainable development of cement and concrete. Ideas, advice and financial support for the new International Centre are being sought in order to promote the use of environmentally friendly and energy-efficient materials.

CANMET is involved in specialized R&D and in major technical and coordinating roles. This organization continued its Advanced Concrete Programs, which contribute to infrastructure durability, waste reduction and energy saving.

Based on an agreement with the Electric Power Research Institute (EPRI) of Palo Alto, California, CANMET is involved in a multi-year, cost-shared contract on blended cements. Past cooperative research into supplementary cementing materials (SCMs) has led to the production of a ground granulated blast furnace slag for use as a cementitious material in concrete. (As noted above in the Canadian industry section under Ontario, SLC will produce slag granules to be used as a relatively low-cost, low-energy-intensive SCM in both Canada and the United States.)

In 1998, international conferences sponsored by the Committee for the Organization of CANMET/ACI Conferences, as well as others, included the Sixth CANMET/ACI International Conference on Fly Ash, Silica Fume, Slag and Natural Pozzolans in Concrete in Bangkok, Thailand, and the CANMET/ACI/JCI Fourth International Conference on Recent Advances in Concrete Technology in Tokushima, Japan. Also in 1998, CANMET, along with ACI, the National Research Council (NRC), Environment Canada, and Public Works and Government Services Canada, sponsored the Three-Day CANMET/ACI International Symposium on Sustainable Development of the Cement and Concrete Industry.

In April 1999, the above-mentioned committee, as well as others, will sponsor the two-day CANMET/ACI International Symposium on Concrete Technology for Sustainable Development to be held in Vancouver. In 2000, this committee will sponsor two

international conferences: the Fifth CANMET/ACI International Conference on Durability of Concrete from June 4 to 9 in Barcelona, Spain, and the Sixth CANMET/ACI International Conference on Superplasticizers and Other Chemical Admixtures in Concrete from October 10 to 13 in Nice, France.

Research efforts to develop new superplasticizers for use in conjunction with supplementary cementing materials for high-performance concrete have increased in recent years. As a result of this, a new publication entitled *Superplasticizers: Properties and Applications in Concrete*, by Ramachandran, Malhotra, Jolicoeur and Spiratos, was compiled to integrate the chemistry and applications concerned. This publication, which includes 14 chapters and more than 400 pages, can be obtained from the Materials Technology Laboratory (MTL) of Natural Resources Canada's CANMET by contacting Lynn Stafford at tel. (613) 995-8815.

Also during 1998, Natural Resources Canada, mainly in collaboration with the Canadian Industry Program for Energy Conservation (CIPEC), continued to develop long-term strategies related to major energy-consuming sectors, including cement and lime.

## OUTLOOK

Cement shipments in 1999 are expected to increase mainly based on relatively low interest rates, continued recent strength in both residential and non-residential building construction, and a stable demand for exports.

In 1998, housing starts were about 137 000, according to the Canada Mortgage and Housing Corporation. By way of comparison, housing starts were 125 000 in 1996, 149 000 in 1997, and are expected to be about 145 000 in 1999. With real economic growth in both Canada and the United States forecast to continue, the outlook continues to be positive for the office and industrial building sectors. (Further information can be obtained on the Internet at [www.cmhc-schl.gc.ca/cmhc.html](http://www.cmhc-schl.gc.ca/cmhc.html).)

Energy management will continue to concentrate on gains in efficiency based on timely switching among the available choices of common fuels. However, most longer-term cost savings are expected to result from the partial substitution of fossil fuels by waste-derived fuels. For example, in the case of Refuse Derived Fuel (RDF), about 70% (by volume) of municipal solid waste from post-recycled curbside garbage could be extracted for use by the cement industry. This would reduce by about two thirds the volume of material for disposal as landfill. Under certain circumstances using RDF, reductions in requirements for traditional fuels have been predicted to be as high as 20-25%.

The use of supplementary cements incorporating fly ash, silica fume or other pozzolans, and classified accordingly as various types of blended cements, is expected to become more important in modern cement and concrete practices.

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 February 1, 1999.

### TARIFFS

Item No.	Description	Canada			United States
		MFN	GPT	USA	Canada
25.23	Portland cement, aluminous cement, slag cement, supersulphate cement and similar hydraulic cements, whether or not coloured or in the form of clinkers				
2523.10	Cement clinkers	Free	Free	Free	Free
	Portland cement:				
2523.21	White cement, whether or not artificially coloured	Free	Free	Free	Free
2523.29	Other	Free	Free	Free	Free
2523.30	Aluminous cement	Free	Free	Free	Free
2523.90	Other hydraulic cements	Free	Free	Free	Free
68.10	Articles of cement, of concrete or of artificial stone, whether or not reinforced				
	Tiles, flagstones, bricks and similar articles:				
6810.11	Building blocks and bricks	3%	Free	Free	Free
6810.19	Other	5%	Free	Free	Free
6810.91	Prefabricated structural components for building or civil engineering	5%	Free	Free	Free
6810.99	Other				
6810.99.10	Pipes	5%	Free	Free	Free
6810.99.90	Other	5%	Free	Free	Free

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

**TABLE 1. CANADA, CEMENT PRODUCTION AND TRADE, 1996-98**

Item No.	1996		1997		1998P	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
<b>PRODUCTION<sup>1</sup></b> (all forms)						
Ontario	5 211 930	384 570	5 247 620	446 497	5 425 250	477 265
Alberta	x	x	x	x	x	x
Quebec	2 849 392	207 379	2 610 187	209 200	2 629 000	214 551
British Columbia	1 743 203	176 566	1 822 108	175 373	1 883 786	187 458
Nova Scotia	x	x	x	x	x	x
Newfoundland	x	x	x	x	x	x
Total	11 587 365	964 380	11 736 272	1 062 708	12 064 000	1 126 875
<b>IMPORTS</b>						
2523.10 Cement clinker						
Thailand	-	-	-	-	76 507	4 743
Mexico	-	-	58 195	3 316	78 802	3 711
Bermuda	-	-	27 096	1 807	20 811	1 018
Lebanon	-	-	-	-	10 995	479
United States	41	2	15	1	288	24
Belgium	-	-	25 730	1 712	-	-
Total	41	2	111 036	6 836	187 403	9 975
2523.21 Portland cement, white, whether or not artificially coloured						
United States	3 834	670	9 096	1 484	13 166	2 530
Mexico	-	-	-	-	2 690	493
Germany	29	5	-	-	448	69
Other countries	67	18	189	34	281	63
Total	3 930	693	9 285	1 518	16 585	3 155

TABLE 1 (cont'd)

Item No.	1996		1997		1998p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
<b>IMPORTS (cont'd)</b>							
2523.29	Portland cement, n.e.s.						
	United States	569 570	41 945	588 974	44 030	497 177	40 021
	Lebanon	-	-	-	-	5 450	597
	Colombia	-	-	2 423	249	2 757	300
	France	-	-	977	109	2 123	170
	Mexico	-	-	-	-	753	75
	Other countries	5 533	1 764	7 972	435	217	15
	<b>Total</b>	<b>575 103</b>	<b>43 709</b>	<b>600 346</b>	<b>44 823</b>	<b>508 477</b>	<b>41 178</b>
2523.30	Aluminous cement						
	United States	10 391	5 434	10 936	6 523	13 586	8 075
	France	84	66	139	76	270	156
	Other countries	77	49	3	..	3	1
	<b>Total</b>	<b>10 552</b>	<b>5 549</b>	<b>11 078</b>	<b>6 599</b>	<b>13 859</b>	<b>8 232</b>
2523.90	Hydraulic cement, n.e.s.						
	United States	37 232	5 043	29 875	5 055	45 594	5 871
	Belgium	-	-	3 425	698	9 770	2 279
	United Kingdom	1 329	343	2 412	583	3 636	715
	Japan	681	134	275	79	334	92
	Colombia	2 020	203	1 638	164	773	77
	China	-	-	1	..	634	72
	Other countries	821	206	249	62	541	122
	<b>Total</b>	<b>42 083</b>	<b>5 929</b>	<b>37 875</b>	<b>6 641</b>	<b>61 282</b>	<b>9 228</b>
6810.11	Building blocks and bricks of cement, concrete or artificial stone						
	United States	..	1 301	..	1 600	..	2 800
	Brazil	-	-	-	-	..	61
	United Kingdom	..	155	..	295	..	49
	Other countries	..	17	..	29	..	1
	<b>Total</b>	<b>..</b>	<b>1 473</b>	<b>..</b>	<b>1 924</b>	<b>..</b>	<b>2 911</b>
6810.19	Tiles, flagstones and similar articles of cement/concrete or artificial stone						
	United States	..	11 963	..	15 490	..	17 625
	Italy	..	1 058	..	1 142	..	1 280
	Malta	-	-	..	403	..	175
	Portugal	..	35	-	-	..	132
	Spain	..	55	..	89	..	128
	India	..	46	..	264	..	77
	Israel	-	-	..	2	..	41
	Germany	..	85	..	115	..	24
	Other countries	..	400	..	146	..	127
	<b>Total</b>	<b>..</b>	<b>13 642</b>	<b>..</b>	<b>17 651</b>	<b>..</b>	<b>19 609</b>
6810.20	Pipes of cement or concrete						
		-	-	-	-	-	-
6810.91	Prefabricated structural components of buildings, etc., of cement/concrete, etc.						
	United States	..	3 060	..	2 470	..	6 906
	United Kingdom	..	474	..	962	..	899
	Other countries	..	43	..	134	..	111
	<b>Total</b>	<b>..</b>	<b>3 577</b>	<b>..</b>	<b>3 566</b>	<b>..</b>	<b>7 916</b>
6810.99	Articles of cement, of concrete or of artificial stone, n.e.s.						
	United States	..	11 912	..	14 354	..	16 695
	China	..	861 <sup>r</sup>	..	1 256	..	3 957
	United Kingdom	..	234	..	647	..	1 041
	Mexico	..	94	..	178	..	333
	Italy	..	422	..	302	..	245
	Philippines	..	46	..	83	..	228
	Hong Kong	..	24	..	50	..	215
	Germany	..	398	..	86	..	100
	France	..	25	..	4	..	51
	Other countries	..	181 <sup>r</sup>	..	131	..	73
	<b>Total</b>	<b>..</b>	<b>14 197<sup>r</sup></b>	<b>..</b>	<b>17 091</b>	<b>..</b>	<b>22 938</b>
<b>EXPORTS</b>							
2523.10	Cement clinker						
	United States	1 252 863	72 324	1 019 308	72 025	1 696 195	94 087
	<b>Total</b>	<b>1 252 863</b>	<b>72 324</b>	<b>1 019 308</b>	<b>72 025</b>	<b>1 696 195</b>	<b>94 087</b>

TABLE 1 (cont'd)

Item No.	1996		1997		1998P		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
<b>EXPORTS (cont'd)</b>							
2523.21	Portland cement, white, whether or not artificially coloured						
	United States	134 818	17 317	215 058	25 062	481 350	51 218
	St. Pierre and Miquelon	153	23	92	17	122	23
	Other countries	221	34	—	—	75	27
	Total	135 192	17 374	215 150	25 079	481 547	51 268
2523.29	Portland cement, n.e.s.						
	United States	3 953 140	259 010	4 086 333	290 508	3 745 283	258 066
	St. Pierre and Miquelon	1 087	188	451	83	361	63
	Singapore	18	9	—	—	20	12
	Other countries	98	31	60	5	—	—
	Total	3 954 343	259 238	4 086 844	290 596	3 745 664	258 141
2523.30	Aluminous cement						
	Philippines	172	6	—	—	—	—
	Total	172	6	—	—	—	—
2523.90	Hydraulic cement, n.e.s.						
	United States	10 942	2 649	28 644	7 098	72 446	12 554
	Chile	10	39	—	—	123	71
	Singapore	10	9	77	33	93	67
	Bolivia	—	—	—	—	10	40
	Other countries	836	435	353	216	72	32
	Total	11 798	3 132	29 074	7 347	72 744	12 764
6810.11	Building blocks and bricks of cement, concrete or artificial stone						
	United States	..	15 034	..	24 538	..	35 964
	Taiwan	..	..	..	..	..	257
	Japan	..	163	..	257	..	161
	Ukraine	..	..	..	87	..	156
	India	..	53	..	54	..	42
	Netherlands	..	..	..	..	..	25
	Other countries	..	1 370	..	107	..	22
	Total	..	16 620	..	25 043	..	36 627
6810.19	Tiles, flagstones and similar articles of cement/concrete or artificial stone						
	United States	..	15 497	..	16 188	..	23 226
	Japan	..	29	..	954	..	2 484
	Russia	..	..	..	28	..	16
	Other countries	..	398	..	247	..	20
	Total	..	15 924	..	17 417	..	25 746
6810.20	Pipes of cement or concrete						
		..	..	..	..	..	..
6810.91	Prefabricated structural components of buildings, etc., of cement/concrete, etc.						
	United States	..	62 836	..	60 334	..	68 593
	Guatemala	..	..	..	..	..	538
	United Kingdom	..	120	..	444	..	84
	Bermuda	..	11	..	..	..	46
	Japan	..	..	..	30	..	30
	Other countries	..	165	..	188	..	75
	Total	..	63 132	..	60 996	..	69 366
6810.99	Articles of cement, of concrete or of artificial stone, n.e.s.						
	United States	..	30 243	..	41 816	..	45 466
	United Kingdom	..	24	..	3 259	..	1 975
	Italy	..	..	..	14	..	250
	Honduras	..	..	..	..	..	177
	Japan	..	76	..	216	..	63
	Chile	..	17	..	16	..	51
	United Arab Emirates	..	..	..	..	..	40
	France	..	..	..	..	..	37
	Other countries	..	480	..	369	..	141
	Total	..	30 840	..	45 690	..	48 200

Sources: Natural Resources Canada; Statistics Canada.

— Nil; .. Not available; n.e.s. Not elsewhere specified; P Preliminary; x Confidential.

1 Producers' shipments plus quantities used by producers.

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

**TABLE 2. CEMENT PLANTS, APPROXIMATE ANNUAL GRINDING CAPACITY, END OF 1997**

Company	Plant	Wet (W) Dry (D) Preheater (x) Precalciner (c)	Fuel (Coal, Oil, Gas, Waste)	No. of Kilns	Grinding Capacity	Clinker Capacity
(000 t/y)						
<b>ATLANTIC REGION</b>						
Lafarge Canada Inc.	Brookfield, N.S.	D	C,Wa	2	610	476 <sup>b</sup>
North Star Cement Limited	Corner Brook, Nfld.	Dx	O,Wa	1	245	158
Subtotal, Atlantic region				3	855	634
<b>QUEBEC</b>						
Lafarge Canada Inc.	St. Constant	D	C,Wa	2	1 160	950
Ciment Québec Inc.	St. Basile	W,Dc	C,O,G,Wa	3	995	1 077 <sup>a</sup>
St. Lawrence Cement Inc.	Joliette	D	C,Wa	4	1 475	900
Subtotal, Quebec region				9	3 630	2 927
<b>ONTARIO</b>						
Lafarge Canada Inc.	Woodstock	W	C	2	775	509
	Bath	D	C	1	1 090	987
Federal White Cement Ltd.	Woodstock	Dx	O	1	200	184
ESSROC Canada Inc.	Pictou	D,Dx	C,G	2	792	1 125
St. Lawrence Cement Inc.	Mississauga	W,Dc	C,O,Wa	3	1 987	1 759 <sup>a</sup>
Blue Circle Canada Inc.	Bowmanville	Dc	C	1	1 213	1 550
	St. Marys	Dx	C,G	1	788	680
Subtotal, Ontario region				11	6 845	6 794
<b>PRAIRIE REGION</b>						
Lafarge Canada Inc.	Exshaw, Alta.	D,Dc	G	2	1 388	1 075
Inland Cement Limited (Cimenteries CBR/Heidelberg)	Edmonton, Alta.	Dc	G	1	1 380	930
Subtotal, Prairie region				3	2 768	2 005
<b>BRITISH COLUMBIA</b>						
Lafarge Canada Inc.	Kamloops	D	C,G	1	278	205
	Richmond	W	G,Wa	2	480	508
Tilbury Cement Limited (Cimenteries CBR/Heidelberg)	Delta	Dx	C,G,Wa	1	1 000	1 105
Subtotal, B.C. region				4	1 758	1 818
Total Canada (9 companies)				30	15 856	14 178

Source: Market and Economic Research Department, Portland Cement Association.

<sup>a</sup> Two kilns inactive. <sup>b</sup> One kiln inactive.

Note: Total active kiln capacity including white cement is approximately 13.1 Mt/y.

**TABLE 3. CANADA, CEMENT PLANTS, KILNS AND CAPACITY UTILIZATION, 1980-98**

	Clinker-Producing Plants	Kilns	Approximate Cement Grinding Capacity	Portland and Masonry Cement Production <sup>1</sup>	Clinker Exports	Approximate Total Production <sup>2</sup>	Capacity Utilization
			(t/y)	(t)	(t)	(t)	(%)
1980	23	47	16 363 000	10 274 000	726 087	11 000 087	67
1981	23	48	16 771 000	10 145 000	524 006	10 669 006	64
1982	23	48	16 771 000	8 418 000	290 329	8 708 329	50
1983	23	49	17 900 000	7 870 878	404 793	8 275 671	46
1984	23	49	17 900 000	9 387 466	440 297	9 827 763	55
1985	23	49	17 900 000	10 192 442	676 596	10 869 038	61
1986	23	49	17 900 000	10 611 223	324 000	10 935 223	61
1987	20	40	16 600 000	12 603 164	767 338	13 370 502	81
1988	20	40	15 506 000	12 349 873	331 796	12 681 669	82
1989	20	38	15 546 000	12 590 637	178 491	12 769 128	82
1990	20	38	16 439 000	11 745 152	460 075	12 205 227	74
1991	20	34	16 262 000	9 372 219	544 870	9 917 089	61
1992	18	34 <sup>a</sup>	16 800 000	8 593 399	988 348	9 581 747	57
1993	18	34 <sup>a</sup>	16 800 000	9 393 581	882 935	10 276 516	61
1994	18	34 <sup>a</sup>	17 021 000 <sup>r</sup>	10 584 414	981 024	11 565 438	68
1995	18	34 <sup>a</sup>	16 157 000 <sup>r</sup>	10 440 329	1 329 548	11 769 877	69
1996	18	32	16 252 000	11 587 365	1 252 863	12 840 228	79
1997	17	30	15 856 000	11 736 272	1 019 308	12 755 580	80
1998 <sup>p</sup>	17	30	15 856 000	12 064 000	1 696 195	13 760 195	87

Sources: Statistics Canada; Portland Cement Association.

<sup>p</sup> Preliminary <sup>r</sup> Revised.<sup>a</sup> Includes inactive kilns.<sup>1</sup> Producers' shipments and amounts used by producers. <sup>2</sup> Cement shipments plus clinker exports.**TABLE 4. CANADA, VALUE OF CONSTRUCTION BY TYPE, 1994-96**

	1994	1995	1996
	(\$ millions)		
<b>BUILDING CONSTRUCTION</b>			
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
<b>ENGINEERING CONSTRUCTION</b>			
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 can also be obtained on the Internet at

<http://www.statcan.ca/english/Pgdb/Economy/Manufacturing/manuf18.htm> or<http://www.cmhc-schl.gc.ca/MktInfo/store/#nho>).

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



**TABLE 5. WORLD PRODUCTION OF CEMENT, 1997 AND 1998<sup>e</sup>**

	1997	1998 <sup>e</sup>
	(000 tonnes)	
China	492 600	495 000
Japan	91 938	91 000
United States	84 255	87 200
India	80 000 <sup>e</sup>	85 000
South Korea	60 000	59 000
Germany	37 000 <sup>e</sup>	37 000
Italy	34 000	33 500
Turkey	36 000	37 000
Russia	26 600	25 000
Thailand	36 000 <sup>e</sup>	34 000
Canada	11 736	12 100
Other countries	524 871	504 200
Total world	1 515 000 <sup>e</sup>	1 500 000

Sources: Natural Resources Canada; U.S. Geological Survey, January 1999.  
<sup>e</sup> Estimated.