

Mineral Aggregates

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INTRODUCTION

Mineral aggregate production in Canada consists of natural sand and gravel and crushed stone products. These products are used in the construction, manufacturing, chemical and metallurgical industries. The production of construction aggregates is a very important part of the Canadian economy with operations near most communities. These urban mining activities are largely invisible to the general public when in operation; however, public interest increases when new or expanded quarries are proposed. Total volumes of sand, gravel and crushed stone extracted in Canada each year make this commodity the largest by volume of any mineral mined in Canada.

Natural sands and gravels are unconsolidated deposits that are extracted from glacially derived materials and river channels. Limestone, granite and shale are also mined and crushed to provide aggregates for the construction, chemical and metallurgical industries.

This review also includes data on the production and use of lightweight aggregates comprising vermiculite, perlite, pumice, and expanded clays and shale.

CANADIAN INDUSTRY

In Canada, total production of sand and gravel in 2005 was 245.5 Mt valued at \$1.165 billion. This compares to 2004 production of 250.1 Mt, a decrease of 1.8%. Production of crushed stone in 2004 used for aggregate, road metal, ballast and miscellaneous uses totaled 124.7 Mt (Table 1, by use). Table 2 shows the production of sand and gravel by province. The use of crushed limestone in cement plants was unchanged in 2004, while crushed limestone production for Canadian lime plants increased 18.8%. Figure 1 shows the sand and gravel production trend for the largest

producing provinces for the period 1995-2005. Figure 2 shows the relative percentage of chemical stone and crushed stone produced in Canada since 1993. There was a sharp increase in crushed stone production in 2004.

According to *Aggregates and Roadbuilding Magazine*, the top five construction aggregate operations in Canada in 2005 were: the Texada Island quarry in British Columbia (Texada Quarrying Ltd.) - 5.59 Mt; the Sechelt pit in British Columbia (Construction Aggregates Ltd.) - 5.1 Mt; the Manitoulin quarry in Ontario (Lafarge Canada Inc.) - 5.0 Mt; the Dundas quarry in Ontario (Lafarge Canada Inc.) - 4.24 Mt; and the Porcupine Mountain quarry in Nova Scotia (Martin Marietta Materials Inc.) - 4.2 Mt. The production levels reported at the Texada Island quarry represent an increase of 11.8% over 2004, while production at Manitoulin and Dundas in Ontario declined by 7.2% and 10.9%, respectively, from the previous year.

INDUSTRY DEVELOPMENTS

Lafarge North America Inc. announced plans to upgrade facilities at its Texada Island limestone quarry, northwest of Vancouver, British Columbia. Plans include the construction of a 4000-st/h (short tons/hour) shiploader and modifications to a barge-loading facility.

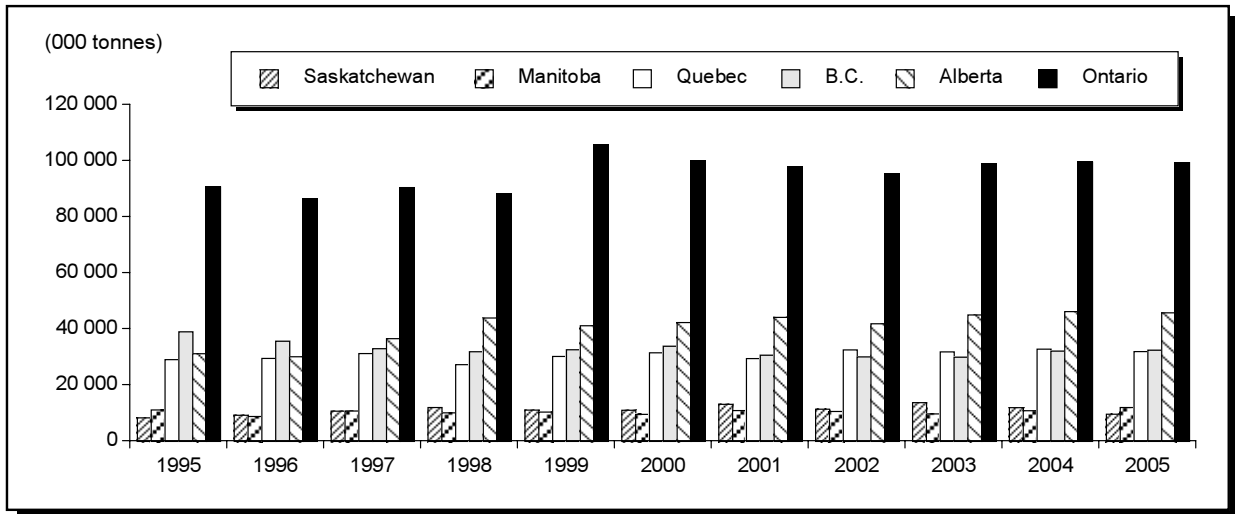
Polaris Minerals Corporation reported that its subsidiary Orca Sand & Gravel Ltd. has received a mining permit for a new sand and gravel operation at Port McNeill on northern Vancouver Island, B.C. Orca plans to produce up to 6 Mt of construction aggregates that will be shipped to the San Francisco area beginning in early 2007. The deposit is reported to contain approximately 120 Mt of sand and gravel. Orca is working in partnership with 'Namgis First Nation and has entered into agreements with other Aboriginal communities for development of the site.

Birch Mountain Resources Ltd. of Calgary, Alberta, has commenced production of construction aggregates at its Muskeg Valley quarry, located near Fort McMurray, Alberta. The company plans to produce 500 000 t of limestone aggregates initially. It continues to work through the permitting process for the adjacent Hammerstone project, which will produce material for the construction sector, as well as a quicklime plant, scheduled for operation in 2008.

Dufferin Aggregates announced that it has received approvals from the Ontario Municipal Board and the Environmental Review Tribunal for an expansion at its Milton quarry northwest of Toronto, Ontario. This expansion will allow for an additional 12 years of production. The Milton quarry produces 3-4 Mt of construction aggregates annually to supply the greater Toronto area.

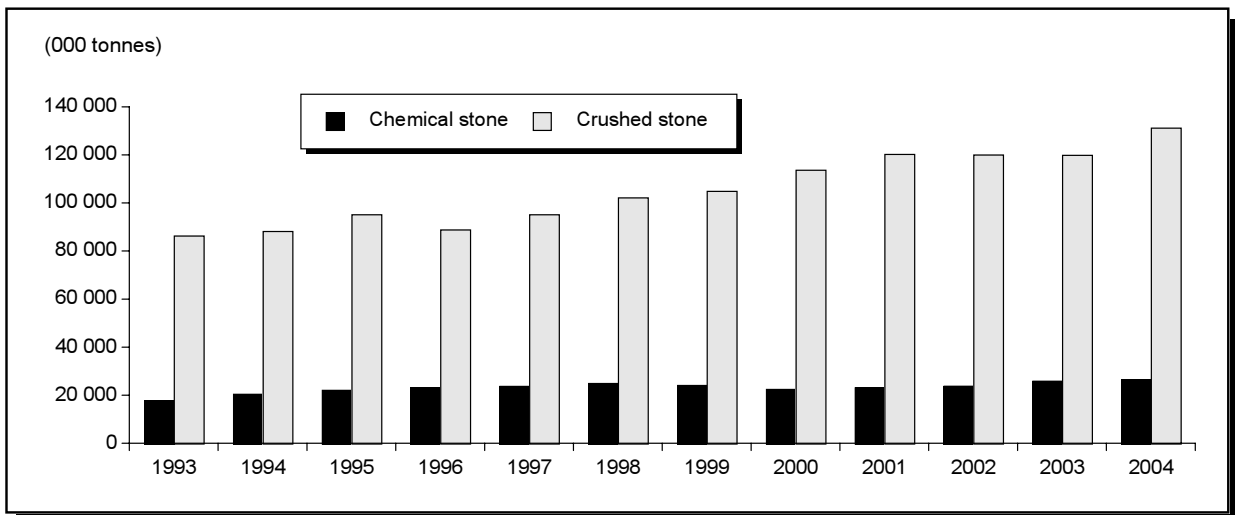
In the United States, a new transportation funding reauthorization bill, the *Safe, Accountable, Flexible and Efficient Transportation Equity Act - A Legacy for Users* (SAFETEA-LU), was signed into law. The bill provides \$286.4 billion in funding over five years and represents a 38% increase in funding levels compared to previous legislation (*the Transportation Equity Act, TEA-21*). This

Figure 1
Canadian Sand and Gravel Production, 1995-2005



Source: Natural Resources Canada.

Figure 2
Canadian Crushed Stone Production, 1993-2004



Source: Natural Resources Canada.

funding will go towards infrastructure projects such as the Interstate highway system, bridge reconstruction, and other federal construction projects.

Holcim Ltd. completed its purchase of Aggregate Industries plc for US\$3.4 billion. Aggregate Industries has extensive operations in the United Kingdom and United States specializing in the aggregates, ready-mix concrete and asphalt markets.

USE

High-quality aggregates, including sand, gravel and crushed stone, are key ingredients in ready-mix concrete, pre-cast concrete products, asphalt pavements and sub-surface fill. Aggregate is usually described as either coarse aggregate (greater than 4.75 mm) or fine aggregate (passing 4.75 mm). Aggregates generally make up about 95% of the total mass of hot-mix asphalt and 90% by mass of concrete. Hot-mix asphalt contains about equal amounts of coarse and fine aggregates whereas concrete contains more coarse than fine aggregate. Construction aggregate specifications deal with such parameters as particle shape and size distribution, strength and hardness, durability and porosity, and chemical reactivity.

Statistics on the use of crushed stone for 2003 and 2004 are provided in Table 1. The production trend for the period 1995-2004 is shown in Figure 3. A breakdown of sand and gravel use by region for 2003 and 2004 can be found in Table 3. In a typical concrete mixture, one cubic metre (m³) of concrete contains about 800 kg of sand and

1300 kg of crushed stone. One kilometre of six-lane expressway requires about 52 000 t of aggregate while a new home typically uses 440 t (Ontario Stone, Sand & Gravel Association).

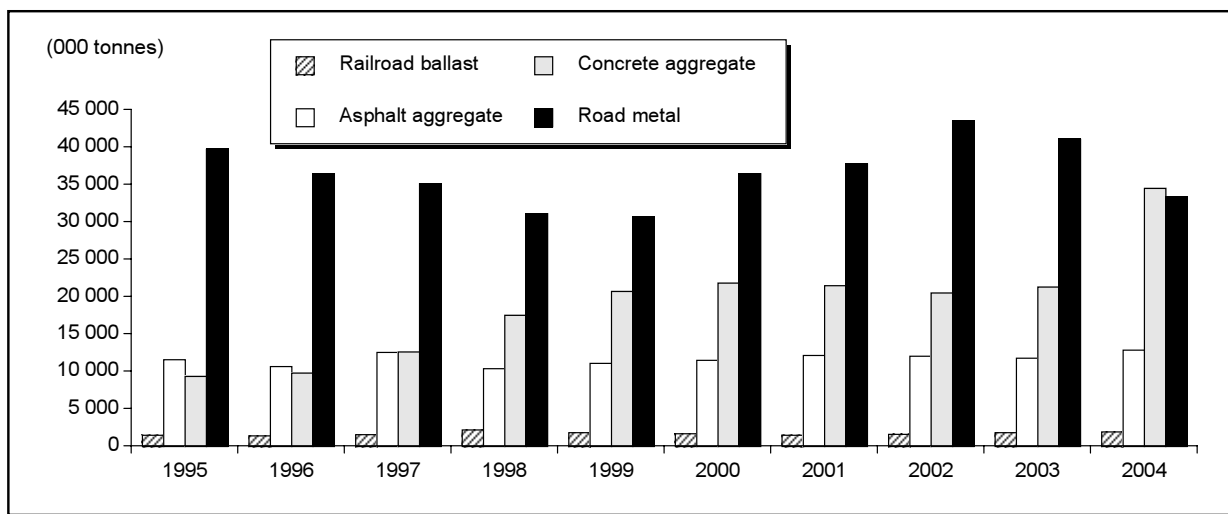
TRADE

Most Canadian aggregate exports are shipped by bulk freighter from quarries along the British Columbia and Nova Scotia coasts to markets in Washington, California, New England and Florida. Exports are also shipped across the Great Lakes into New York, Ohio and Michigan.

Export and import data for sand and gravel and crushed stone products are given in Table 4. Included are natural sands and gravel, granules and chippings, uncalcined and calcined dolomite, and crushed limestone. In 2005, Canada exported 6.6 Mt of gravel and crushed stone valued at \$58 million, of which 95% went to the United States. In addition, exports of crushed, uncalcined dolomite amounted to 2.96 Mt valued at \$28.7 million and exports of crushed limestone for the cement and lime industries totaled 2.8 Mt valued at \$17.6 million.

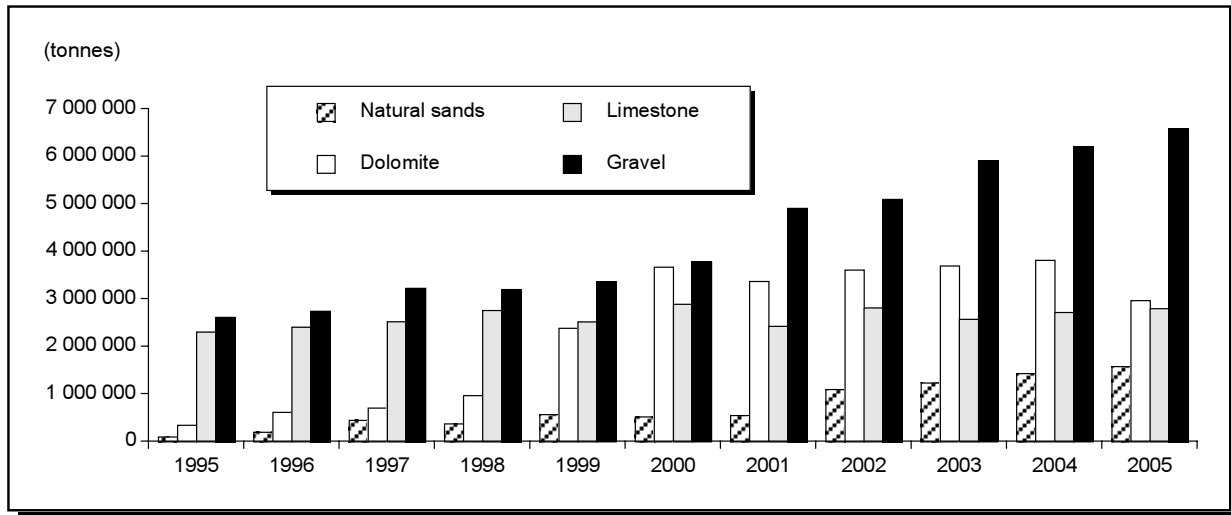
Trends in aggregate exports and imports for the period 1995-2005 are shown in Figures 4 and 5, respectively. Imports of limestone for use in lime or cement were down 53% to 647 000 t. Imports of gravel and construction stone declined 6.3% to 2.153 Mt. Three of the top five producing quarries in 2004 ship bulk tonnages by water, and these operations increased their collective production by 28% in 2005.

Figure 3
Canadian Crushed Stone Production by Use, 1995-2004



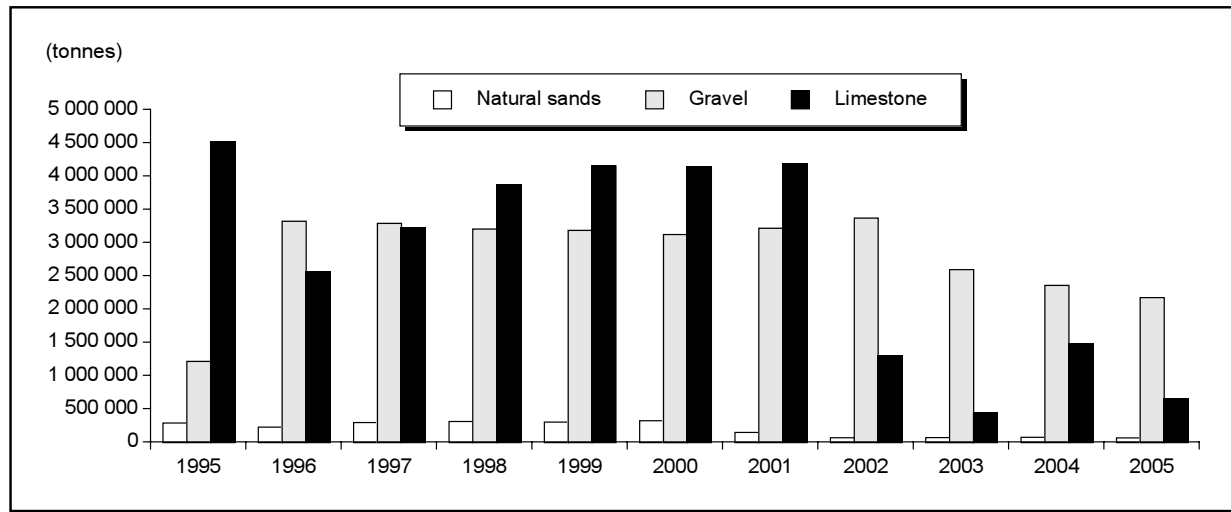
Source: Natural Resources Canada.

Figure 4
Canadian Aggregate Exports, 1995-2005



Source: Natural Resources Canada.

Figure 5
Canadian Aggregate Imports, 1995-2005



Source: Natural Resources Canada.

Note: Dolomite imports are less than 5000 t per year.

LIGHTWEIGHT AGGREGATES

Most lightweight aggregate products are produced by rapidly heating clay or shale to high temperatures, causing the rock to expand and become less dense. These expanded products are then used in the manufacture of lightweight concrete products, such as pre-cast blocks, that are less costly to produce and transport. Low-compressive-strength concrete can be made using perlite or vermiculite as an aggregate, while expanded clays, shale, pumice and slag are used for lightweight structural concretes and concrete block. A list of lightweight aggregate producers is given in Table 5. Trade data are found in Table 6. Table 7 shows production and shipments of expanded clay and shale, as well as expanded perlite and exfoliated vermiculite. Use data for various lightweight aggregates can be found in Tables 8-11. Figure 6 gives the trend in lightweight aggregate production for the period 1995-2004. Canada is a net importer of lightweight aggregates, mainly perlite and vermiculite, which are processed at expansion plants in Canada. Vermiculite ore is imported from South Africa, the United States and Uganda. Unexpanded perlite is imported from the United States and Greece. Smaller amounts of expanded perlite and vermiculite are imported into Canada from U.S. expansion plants.

Pumice

Pumice is a light, porous, glassy volcanic rock that forms during explosive eruptions. When used as an aggregate in the manufacture of lightweight concrete products, it provides a lower thermal conductivity and a higher fire rating

than conventional concrete. It also has six times the flexural strength of normal concrete. It is used as a filler in paint and asphalt mixes, as an absorbent and chemical carrier, and for filtration purposes. In Canada, pumice is produced by Great Pacific Pumice Inc. from Mt. Meager in British Columbia and by Canada Pumice Corporation at the Nazko quarry near Quesnel, B.C. Pumice is also imported from the United States and Turkey.

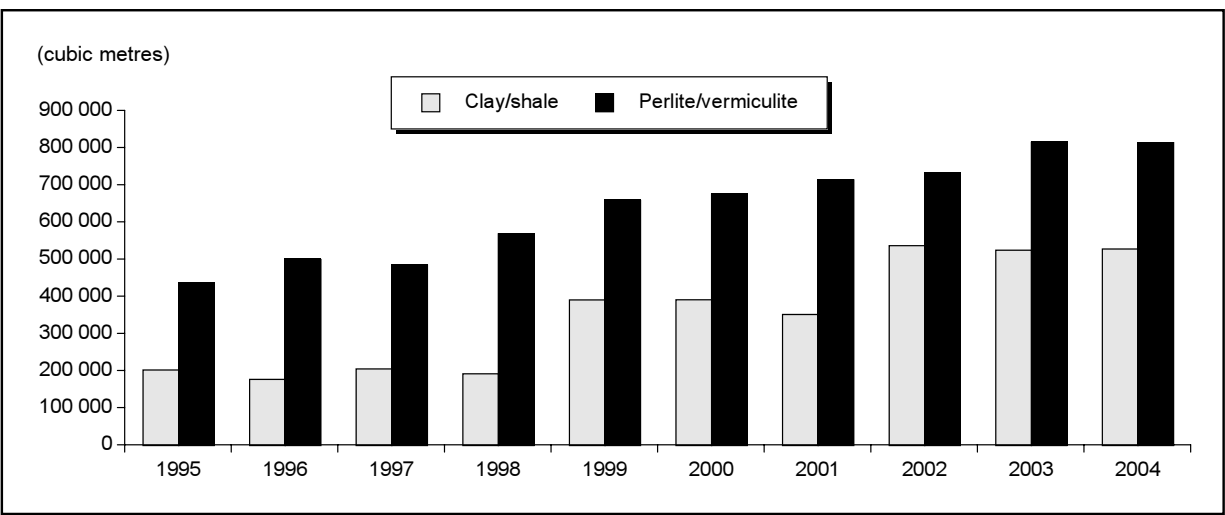
Perlite

Perlite is a natural volcanic glass that contains 2-5% chemically combined water. When quickly heated to above 1600°F, perlite expands its volume from 4 to 20 times. Under careful kiln retention times, the expanded product can weigh as little as 30-60 kg/m³. Perlite is widely used as a loose-fill masonry insulation and as an aggregate in concrete where it imparts lightweight, fire-resistant and insulating properties. It is also a constituent of ceiling tiles. Perlite insulating concrete is one third the weight of regular concrete and has 20 times the insulating value. Horticultural applications include use as an additive in soil-less growing mixes and as a chemical carrier. Industrial uses include abrasives, fillers and refractory brick manufacture. Perlite is imported into Canada primarily from the island of Milos, Greece, and from the United States.

Vermiculite

Vermiculite is a general term applied to mica-like, platy minerals that contain up to 4% water, chemically trapped between the mica sheets. Upon rapid heating to temperatures in excess of 900°C, the trapped water changes to

Figure 6
Canadian Lightweight Aggregates Produced, 1995-2004



Source: Natural Resources Canada.

steam, forcing the mineral sheets to expand, forming an exfoliated vermiculite product. The expanded vermiculite is very lightweight and displays excellent fire-resistance and sound-insulating properties. Its uses in Canada are mainly for horticultural and other industrial applications. Crude vermiculite ore is imported into Canada for processing from mines owned by W.R. Grace and Company in Enoree, South Carolina, and from mines owned by Virginia Vermiculite Ltd. in Woodruff, South Carolina, and Louisa County, Virginia, as well as from the Palabora region of South Africa and from Uganda (Table 6, imports). Vermiculite processing plants are located in New Brunswick, Quebec, Ontario, Manitoba and Alberta (Table 5).

Expanded Clays, Shale

Raw clay materials are dried and heated in a kiln to produce a lightweight aggregate suitable for use in concrete applications and in the manufacture of lightweight concrete blocks. Shale is mined, crushed and screened, and then heated. Concrete made from expanded clays and shale has special thermal and acoustical properties and can be used in special applications such as highway bridges with longer single spans.

PRICES

Prices for sand and gravel and crushed stone aggregates are set by producers and customers, and vary depending on product specifications, region, and distance to markets. Prices for construction aggregates in Ontario ranged from \$3.60/t for sub-base material to \$11.50/t for quarry stone. The average value of sand and gravel, taken from Table 2, is \$4.75/t. The average value of concrete aggregate for 2004, taken from Table 1, was \$8.48/t. Asphalt aggregate is valued at \$6.70/t.

Raw vermiculite ore is US\$187-\$276/t (ex-U.S. plant), an increase of about 25%, according to the U.S. Geological Survey. Prices reported by *Mineral Price Watch* were US\$160-\$260/t f.o.b. Rotterdam for South African ore. *Mineral Price Watch* reports prices for crushed and graded perlite ore of US\$32-\$60/t f.o.b. Turkey. Expanded perlite sells for US\$190-\$660/t depending on the end use, quality and other product specifications. According to the U.S. Geological Survey, the price for pumice depends largely on end use. In 2005, pumice for abrasives was US\$228.24/t, for concrete admixture and aggregate was US\$21.42/t, and for horticultural use was US\$16.30/t.

OUTLOOK

Mineral aggregate demand in 2006 is expected to maintain current levels or to increase slightly. Canada Mortgage

and Housing Corporation is predicting housing starts at levels comparable with 2005 at around 233 000 units. Exports of construction aggregates to the United States should rise in the coming years with the start of production from new coastal quarries in British Columbia.

Dwindling permitted reserves of construction aggregates in parts of Ontario will continue to be a concern for the industry. It is estimated that current permitted reserves in the greater Toronto area will be exhausted within 10 years at current extraction rates. Efforts to permit new quarries or expand existing ones have been met with significant opposition from local community groups. If new resources close to market are not accessible, demand will be satisfied from more distant quarries, increasing costs to consumers and to the environment and infrastructure.

RELEVANT AGGREGATE INDUSTRY WEB SITES

Aggregate Producers Association of British Columbia
www.gravelbc.ca

Alberta Sand and Gravel Association
www.asga.ab.ca

Road Builders and Heavy Construction Association
of Saskatchewan
www.rbhca.sk.ca

Manitoba Heavy Construction Association Inc.
www.mhca.mb.ca

Ontario Stone, Sand & Gravel Association
www.ontariossga.com

Association des constructeurs de routes et grands travaux
du Québec
www.acrgtq.qc.ca

National Stone, Sand & Gravel Association
www.nssga.org

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 June 2006. (3) This and other reviews, including previous editions, are available on the Internet at www.nrcan.gc.ca/mms/cmy/com_e.html.

NOTE TO READERS

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TABLE 1. CANADA, STONE PRODUCTION, 2003-05

Item No.	2003		2004		2005 (p)	
	(000 t)	(\$000)	(000 t)	(\$000)	(000 t)	(\$000)
BY PROVINCE/TERRITORY (1)						
Newfoundland and Labrador	3 678	24 014	4 624	28 767	5 288	34 209
Nova Scotia	9 744	64 582	10 118	67 896	10 756	72 994
New Brunswick	5 802	34 590	5 256	32 762	4 998	33 241
Quebec	38 963	303 529	42 578	346 163	40 550	335 204
Ontario	54 622	512 297	59 584	585 117	57 876	552 013
Manitoba	3 804	18 535	3 583	18 604	3 941	19 880
Alberta	511	6 374	370	6 228	369	6 077
British Columbia	7 099	57 509	9 112	66 494	9 590	69 937
Northwest Territories	304	2 446	763	3 733	1 506	9 648
Total	124 528	1 023 876	135 988	1 155 765	134 873	1 133 203
BY USE (2)						
Stone (Dimension)						
Dimension stone						
Rough	538	59 864	535	62 442	..	..
Monumental and ornamental stone (n.f.)	90	5 872	77	6 492	..	..
Other (flagstone, curbstone, paving blocks, etc.)	142	13 680	118	18 158	..	..
Total dimension stone	769	79 417	730	87 091	..	..
Stone (Crushed)						
Crushed stone for						
Concrete aggregate	21 320	164 154	34 520	292 828	..	..
Asphalt aggregate	11 798	78 211	12 867	85 721	..	..
Road metal	41 076	263 301	33 421	207 698	..	..
Railroad ballast (includes traprock)	1 833	15 181	1 934	16 784	..	..
Other uses	38 683	235 232	41 978	269 301	..	..
Chemical and metallurgical						
Cement plants, Canada	17 967	55 936	17 750	56 185	..	..
Cement plants, foreign	382	1 876	1 773	9 341	..	..
Flux in iron and steel furnaces	282	1 449	209	813	..	..
Flux in nonferrous smelters	46	623	51	887	..	..
Glass factories	19	146	28	317	..	..
Lime plants, Canada	3 048	17 447	3 622	25 510	..	..
Lime plants, foreign	1 942	15 012	609	6 749	..	..
Pulp and paper mills	62	567	75	699	..	..
Sugar refineries	2	10	2	10	..	..
Other chemical uses	2 334	11 821	2 461	15 265	..	..
Miscellaneous stone						
Manufacture of artificial stone	134	626	12	652	..	..
Roofing granules	657	28 290	798	14 786	..	..
Poultry grit	195	2 361	145	978	..	..
Stucco dash	18	2 897	21	3 223	..	..
Terrazzo chips	10	801	9	740	..	..
Rock wool	57	814	45	541	..	..
Rubble and riprap	769	5 112	628	4 067	..	..
Other uses	1 172	9 277	2 493	16 869	..	..
Pulverized stone						
Whiting	46	4 471	49	4 920	..	..
Asphalt filler	141	189	185	1 176	..	..
Agricultural purposes and fertilizer plants	749	14 200	601	11 802	..	..
Other uses	1 425	92 202	1 695	106 879	..	..
Total crushed stone	146 169	1 022 205	157 982	1 154 741	..	..
Total all stone	146 939	1 101 622	158 712	1 241 832	..	..

Sources: Natural Resources Canada; Statistics Canada.

.. Not available; n.f. Not finished or dressed; (p) Preliminary.

(1) Data exclude stone used in the Canadian cement, lime and clay industries. (2) Data include stone used in the Canadian cement, lime and clay industries.

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

TABLE 2. CANADA, PRODUCTION OF SAND AND GRAVEL (1) AND CRUSHED STONE BY PROVINCE AND TERRITORY, 2003-05

	2003		2004		2005 (p)	
	(000 t)	(\$000)	(000 t)	(\$000)	(000 t)	(\$000)
PRODUCTION (All Forms)						
Newfoundland and Labrador	2 629	7 391	2 729	7 670	2 816	8 171
Prince Edward Island	x	x	x	x	x	x
Nova Scotia	x	x	x	x	x	x
New Brunswick	3 448	12 395	3 131	11 350	3 170	11 094
Quebec	31 878	104 584	32 854	116 014	31 992	107 330
Ontario	98 726	437 893	99 581	451 134	99 382	463 376
Manitoba	9 735	32 185	10 914	38 972	12 012	43 234
Saskatchewan	13 743	48 827	11 992	46 490	9 641	35 428
Alberta	45 077	275 219	46 273	283 265	45 799	289 220
British Columbia	29 983	168 791	32 158	172 027	32 493	171 341
Yukon	3 238	7 096	3 588	7 526	1 564	5 247
Northwest Territories	489	3 813	872	3 242	793	3 077
Total	244 532	1 122 717	250 067	1 167 648	245 534	1 165 047

Sources: Natural Resources Canada; Statistics Canada.

(p) Preliminary; x Confidential.

Notes: (1) Production represents shipments of natural gravel, sand and crushed gravel. Does not include shipments to Canadian cement plants. Production values for quartz are excluded from the sand and gravel production. Numbers may not add to totals due to rounding.

TABLE 3. AVAILABLE DATA ON USE (2) OF SAND AND GRAVEL, BY REGION, 2003 AND 2004

	Year	Atlantic	Quebec	Ontario	Western	Canada
		Provinces			Provinces (1)	
(000 tonnes)						
Fill	2003	332	2 639	6 864	6 268	16 102
	2004	489	2 777	7 229	6 674	17 170
Road bed, surface	2003	5 482	17 793	33 536	47 574	104 385
	2004	5 462	18 685	33 938	49 898	107 983
Roads, ice control	2003	619	1 386	2 086	2 796	6 887
	2004	848	2 204	2 097	2 318	7 466
Concrete aggregate	2003	2 171	3 747	12 742	21 065	39 725
	2004	2 207	4 517	12 639	17 796	37 159
Asphalt aggregate	2003	773	2 982	6 882	10 968	21 605
	2004	784	2 599	5 391	11 848	20 621
Railroad ballast	2003	1	144	32	159	336
	2004	53	296	296	134	778
Backfill for mines	2003	1 153	17	1 257	2	2 430
	2004	870	23	1 396	—	2 289
Mortar sand	2003	53	434	2 315	140	2 943
	2004	42	337	2 931	143	3 453
Other purposes	2003	1 259	2 737	33 661	13 354	51 012
	2004	1 308	1 416	33 839	17 228	53 792
Total	2003	11 843	31 879	99 375	102 326	245 425
	2004	12 063	32 854	99 756	106 039	250 711

Sources: Natural Resources Canada; Statistics Canada.

— Nil.

(1) The western provinces include the Yukon, the Northwest Territories and Nunavut. (2) Data include shipments by producers regardless of industrial classification. Data include sand and gravel used in Canadian cement plants. Data exclude production of natural silica sand and of silica sand manufactured from quartz or silica rock.

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

TABLE 4. CANADA, SAND AND GRAVEL AND CRUSHED STONE TRADE, 2003-05

Item No.	2003		2004		2005 (p)		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
EXPORTS							
2505.90	Natural sands n.e.s., excluding metal-bearing sands						
	United States	1 232 557	8 864	1 431 687	9 117	1 578 667	9 899
	Saint Pierre and Miquelon	414	31	25	5	587	12
	Turks and Caicos Islands	-	-	-	-	110	5
	Turkey	-	-	-	-	12	4
	France	38	12	53	8	13	3
	United Kingdom	-	-	8	...	80	2
	Belgium	-	-	-	-	762	2
	Kuwait	-	-	-	-	248	1
	Lithuania	-	-	-	-	216	1
	Norway	-	-	-	-	126	1
	Portugal	-	-	-	-	475	1
	Other countries	50	11	619	4	173	-
	Total	1 233 059	8 918	1 432 392	9 134	1 581 469	9 931
2517.10	Pebbles, gravel, broken or crushed stone used for aggregates, etc.						
	United States	5 669 294	57 982	5 795 879	56 862	6 302 073	56 787
	Bermuda	-	-	650	4	122 395	797
	Bahamas	25 962	503	-	-	73 503	373
	Barbados	29 878	342	351 660	2 153	57 794	344
	Hong Kong	33	18	25	19	13 912	82
	Panama	351	1	43	...	12 026	72
	Saint Pierre and Miquelon	-	-	-	-	1 234	7
	Other countries	183 180	3 306	56 545	1 010	487	1
	Total	5 908 698	62 152	6 204 802	60 048	6 583 424	58 463
2517.41	Marble granules, chippings and powder of 25.15 or 25.16, heat-treated or not						
	United States	45 972	7 196	45 054	8 140	41 243	7 170
	Italy	-	-	30	4	-	-
	Total	45 972	7 196	45 084	8 144	41 243	7 170
2517.49	Granules, chippings and powder, n.e.s., of 25.15 or 25.16, heat-treated or not						
	United States	22 499	285	9 039	505	9 772	581
	Norway	-	-	-	-	409	30
	Latvia	-	-	9 452	35	4 752	20
	South Africa	-	-	-	-	130	10
	Antigua and Barbuda	-	-	25	2	236	5
	Other countries	570	46	155	16	159	7
	Total	23 069	331	18 671	558	15 458	653
2518.10	Dolomite, not calcined						
	United States	3 197 514	28 888	3 428 194	28 488	2 393 680	20 809
	Venezuela	324 609	3 482	345 711	4 294	516 597	7 293
	Trinidad and Tobago	70 046	560	43 633	764	58 190	691
	Brazil	46 667	333	-	-	-	-
	Mexico	58 471	518	-	-	-	-
	United Kingdom	-	-	14	3	-	-
	Total	3 697 307	33 781	3 817 552	33 549	2 968 467	28 793
2518.20	Calcined dolomite						
	United States	9 913	1 151	21 590	2 743	43 682	5 247
2521.00	Limestone flux; limestone and other calcareous stone used for lime or cement						
	United States	2 568 400	17 746	2 717 654	17 184	2 773 498	16 891
	Brazil	-	-	-	-	20 000	644
	Hungary	-	-	-	-	10	35
	Bermuda	-	-	1 554	9	4 791	20
	Other countries	7 313	128	381	2	278	1
	Total	2 575 713	17 874	2 719 589	17 195	2 798 577	17 591
	Total exports	13 493 731	131 403	14 259 680	131 371	14 032 320	127 848

TABLE 4 (cont'd)

Item No.	2003		2004		2005 (p)	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
IMPORTS						
2505.90	Natural sands n.e.s., excluding metal-bearing sands					
	69 248	7 727	73 926	6 612	65 816	5 439
	United States					
	1 562	413	1 928	487	1 760	469
	China					
	1 134	122	1 478	99	197	66
	Australia					
	193	36	164	44	19	58
	United Kingdom					
	13	0	339	36	237	32
	Canada					
	1 164	212	328	27	407	29
	Other countries					
	Total	73 314	8 510	78 163	7 305	68 436
2517.10	Pebbles, gravel, broken or crushed stone used for aggregates, etc.					
	2 526 177	15 051	2 300 750	15 311	2 153 880	14 903
	United States					
	21 605	259	41 166	335	11 319	396
	China					
	649	34	3 784	24	3 467	135
	Philippines					
	278	32	2 115	29	2 374	30
	Brazil					
	159	2	18	1	5	30
	Germany					
	15	7	398	11	289	28
	Mexico					
	–	–	–	–	5 057	24
	Tunisia					
	8	1	10	1	13	23
	Italy					
	1 914	21	1 990	22	635	22
	France					
	12 362	151	80	18	20	16
	United Kingdom					
	3	...	5	...	1 386	13
	Sweden					
	34 840	549	11 101	96	349	24
	Other countries					
	Total	2 598 010	16 107	2 361 417	15 848	2 178 794
2517.20	Macadam of slag, dross or similar industrial waste, etc.					
	542	3	2 748	24	11 879	99
	United States					
	9	–	–	–	359	3
	Other countries					
	Total	551	3	2 748	24	12 238
2517.30	Tarred macadam					
	201	8	620	29	828	38
	United States					
	–	–	–	–	1	...
	Other countries					
	Total	201	8	620	29	829
2517.41	Marble granules, chippings and powder of 25.15 or 25.16, heat-treated or not					
	80 668	15 242	98 002	18 662	68 522	11 309
	United States					
	–	–	–	–	139	57
	Israel					
	157	25	56	9	111	19
	Italy					
	–	–	–	–	84	17
	Bulgaria					
	528	59	35	8	62	18
	Other countries					
	Total	81 353	15 326	98 093	18 679	68 918
2517.49	Granules, chippings and powder, n.e.s., of 25.15 or 25.16, heat-treated or not					
	20 840	1 638	15 971	1 487	103 321	1 844
	United States					
	734	68	860	47	2 774	55
	China					
	345	32	922	44	129	29
	France					
	–	–	–	–	...	11
	New Zealand					
	1 168	104	993	65	1 122	30
	Other countries					
	Total	23 087	1 842	18 746	1 643	107 346
2518.10	Dolomite, not calcined					
	2 711	512	3 350	569	4 518	619
	United States					
	46	9	99	31	75	11
	Germany					
	110	11	118	31	4	–
	Other countries					
	Total	2 867	532	3 567	631	4 597
2518.20	Calcined dolomite					
	48 774	6 462	52 739	6 733	60 507	7 250
	United States					
	–	–	–	–	1	–
	Other countries					
	Total	48 774	6 462	52 739	6 733	60 508
2518.30	Dolomite ramming mix					
	1 223	438	893	337	799	302
	United States					
	135	59	79	34	70	27
	Austria					
	Total	1 358	497	972	371	869

TABLE 4 (cont'd)

Item No.	2003		2004		2005 (p)		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS (cont'd)							
2521.00	Limestone flux; limestone and other calcareous stone used for lime or cement						
	United States	442 065	15 704	1 368 933	14 213	646 827	13 807
	Portugal	539	105	108 107	57	1 214	137
	India	—	—	—	—	3 477	101
	Italy	12	3	—	—	83	86
	China	29	5	5	1	249	47
	France	23	31	4	...	986	34
	Israel	530	29	871	24	444	18
	Other countries	237	47	466	38	208	31
	Total	443 435	15 924	1 478 386	14 333	653 488	14 261
	Total imports	3 272 950	65 211	4 095 451	65 596	3 156 023	57 736

Sources: Natural Resources Canada; Statistics Canada.

— Nil; ... Amount too small to be expressed; n.e.s. Not elsewhere specified; (p) Preliminary.

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

TABLE 5. LIGHTWEIGHT AGGREGATE PRODUCERS IN CANADA, 2005

Company	Location	Commodity	Remarks
ATLANTIC PROVINCES			
Fafard Peat Moss Company Ltd.	Inkerman, N.B.	Perlite, vermiculite	Processed for use in horticulture.
Le Groupe Berger Ltée	Escuminac, N.B.	Vermiculite, perlite	Processed for use in horticulture.
Perlite Canada Inc.	Lamenque, N.B.	Vermiculite	Processed for use in horticulture.
Sun Gro Horticulture Canada Ltd.	Maisonnette, N.B.	Perlite	Processed for use in horticulture.
QUEBEC			
Le Groupe Berger Ltée	Saint-Modeste	Perlite, vermiculite	Processed for use in horticulture.
Normiska Corp.	Lachine (plant)	Vermiculite, perlite	Vermiculite processed for use in loose insulation, horticulture and concrete products; perlite processed for use in horticulture.
Premier Horticulture	Rivière-du-Loup	Perlite, vermiculite	Processed for use in horticulture.
Perlite Canada Inc.	Baie-du-Febvre	Perlite, vermiculite	Processed for use in horticulture.
ONTARIO			
Algoma Steel Inc.	Sault Ste. Marie	Slag	Used in cement.
Grace Canada, Inc.	Ajax	Vermiculite, perlite	Vermiculite processed for use in horticulture, as loose insulation, and in friction materials; perlite processed for use in gypsum, plaster, horticulture, refractories and as loose insulation.
Lafarge Canada Inc., Hamilton Slag Division	Hamilton	Slag	Used in concrete products industry.
PRAIRIE PROVINCES			
Cindercrete Products Ltd.	Regina, Sask.	Expanded clay	Processed for concrete products industry.
Grace Canada, Inc.	Winnipeg, Man.	Vermiculite, perlite	Perlite processed for use in gypsum plaster, loose insulation and horticulture.
	Edmonton, Alta.	Vermiculite, perlite	Vermiculite processed for use in horticulture friction material and loose insulation.
Inland Heidelberg Cement Group	Calgary, Alta.	Expanded clay	Processed for concrete products industry, for use in horticulture, and for loose insulation.
Sun Gro Horticulture Canada Ltd.	Elma, Man.	Perlite	Processed for use in horticulture.
	Seba Beach, Alta.	Perlite	Processed for use in horticulture.
BRITISH COLUMBIA			
Basalite Concrete Products, LLC	Surrey	Pumice	Purchased for concrete products industry.
Canada Pumice Corporation	Abbotsford	Pumice, shale	A range of pumice and shale products for construction, horticulture and landscaping material.
Great Pacific Pumice Inc.	Vancouver	Pumice	Used in horticulture, concrete products industry, and as loose insulation.
Teck Cominco Metals Ltd.	Trail	Slag	Used in concrete products industry.

Source: Natural Resources Canada, reported from NRCan 2005 preliminary survey questionnaire "Production of Lightweight Aggregates in Canada."

TABLE 6. CANADA, EXPORTS AND IMPORTS OF VERMICULITE, PERLITE AND PUMICE, 2003-05

Item No.	2003		2004		2005 (p)	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS						
2513.11	Pumice stone, crude or in irregular pieces, including crushed pumice					
	Bermuda	—	—	—	11	10
	France	—	—	...	...	...
	Cambodia	3	4	—	—	—
	Finland	20	12	—	—	—
	Mexico	—	—	10	8	—
	Total	23	16	10	8	11
2513.19	Pumice stone, other					
	United States	13	52	—	—	—
	Australia	—	—	...	...	—
	Germany	—	—	2	2	—
	Total	13	52	2	2	—
2530.10	Vermiculite, perlite and chlorites, unexpanded					
	United States	1 116	167	565	155	967
	India	—	—	—	—	20
	Chile	8	3	10	5	12
	Saint Vincent and the Grenadines	2	1	—	—	—
	Total	1 126	171	575	160	999
6806.20	Exfoliated vermiculite, expanded clays, foamed slag and similar expanded mineral materials (including intermixtures thereof)					
	United States	998	859	10 502	7 718	1 098
	Iceland	—	—	...	...	5
	Romania	—	—	—	—	3
	Other countries	32	81	45	173	5
	Total	1 030	940	10 547	7 891	1 111
	Total exports	2 192	1 179	11 134	8 061	2 121
IMPORTS						
2513.11	Pumice stone, crude or in irregular pieces, including crushed pumice					
	United States	5 935	720	6 595	634	6 688
	Taiwan	304	83	500	189	168
	China	18	4	46	11	319
	Turkey	2 306	204	1 659	156	760
	Italy	79	22	45	11	302
	Other countries	41	9	30	5	4
	Total	8 683	1 042	8 875	1 006	8 241
2513.19	Pumice stone, other					
	United States	3 636	918	3 861	776	4 183
	China	165	41	80	45	349
	Taiwan	1 342	311	59	44	10
	Philippines	14	3	1	3	5
	Russian Federation	—	—	15	41	15
	South Korea	213	43	8	3	3
	France	66	17	7	3	15
	Germany	273	28	10	7	13
	Other countries	548	107	400	37	5
	Total	6 257	1 468	4 441	959	4 598
2530.10.00.10	Vermiculite, unexpanded					
	South Africa	12 119	2 954	9 686	2 164	9 516
	United States	12 270	2 331	9 827	1 866	9 310
	Uganda	1 513	379	5 189	1 453	2 266
	Japan	—	—	—	—	5
	China	2 486	349	—	—	—
	Other countries	134	27	47	14	—
	Total	28 522	6 040	24 749	5 497	21 097
	Total	28 522	6 040	24 749	5 497	21 097

TABLE 6 (cont'd)

Item No.	2003		2004		2005 (p)		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS (cont'd)							
2530.10.00.20	Perlite, unexpanded						
	Greece	37 869	3 459	30 741	3 211	36 653	4 129
	United States	27 735	4 324	24 210	3 636	22 939	3 200
	Philippines	–	–	43	5	22	2
	South Africa	123	40	...	...	–	–
	Morocco	–	–	6	4	–	–
	Total	65 727	7 823	55 000	6 856	59 614	7 331
3802.90.00.20	Activated perlite, other than that to be employed in filtering						
	United States	186	101	256	144	214	112
	Other countries	1	–	...	...	...	...
	Total	187	101	256	144	214	112
6806.20.00.10	Exfoliated (expanded) vermiculite						
	United States	908	2 767	2 738	2 336	4 377	2 564
	Austria	42	110	110	256	152	152
	Other countries	4	13	14	22	118	159
	Total	954	2 890	2 862	2 614	4 647	2 875
6806.20.00.20	Expanded perlite						
	United States	13 777	9 127	16 445	9 868	17 327	9 834
	Netherlands	–	–	–	–	55	17
	Germany	67	57	39	13	23	13
	Mexico	22	35	12	7	12	9
	South Africa	–	–	7	6	9	5
	Total	13 866	9 219	16 503	9 894	17 426	9 878
	Total imports	124 196	28 583	112 686	26 970	115 837	27 525

Sources: Natural Resources Canada; Statistics Canada.
– Nil; . . . Amount too small to be expressed; (p) Preliminary.
Note: Numbers may not add to totals due to rounding.

TABLE 7. CANADA, LIGHTWEIGHT AGGREGATES PRODUCED, SOLD AND USED, 2003 AND 2004

	2003				2004			
	Produced		Sold and Used		Produced		Sold and Used	
	(m ³)	(\$)	(m ³)	(\$)	(m ³)	(\$)	(m ³)	(\$)
FROM DOMESTIC AND/OR IMPORTED RAW MATERIALS								
Expanded clay, shale and slag (1)	525 399	12 872 940	366 695	9 630 411	528 429	13 491 487	365 173	9 939 959
FROM IMPORTED CRUDE MATERIALS								
Expanded perlite and exfoliated vermiculite (1)	815 707	58 109 920	812 701	57 896 416	814 816	57 087 033	814 185	57 043 471
Total	1 341 106	70 982 860	1 179 396	67 526 827	1 343 245	70 578 520	1 179 358	66 983 430

Source: Natural Resources Canada, reported from NRCAN survey questionnaire "Production of Lightweight Aggregates in Canada" (see Table 5 for list of establishments surveyed).

(1) Combined to avoid disclosing confidential company data.

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

TABLE 8. CANADA, SALES OF EXPANDED SLAG, PERCENTAGE BY END USE, 2002-04

Use	2002	2003	2004
	(%)		
Concrete block manufacture	70.0	80.0	85.0
Ready-mix concrete	5.0	15.0	10.0
Miscellaneous uses	25.0	5.0	5.0

Source: Natural Resources Canada, reported from NRCan survey questionnaire "Production of Lightweight Aggregates in Canada."
Notes: See Table 5 for list of establishments surveyed. Sales also imply quantities consumed for own use. Numbers may not add to totals due to rounding.

TABLE 9. CANADA, SALES OF EXPANDED CLAY AND SHALE, PERCENTAGE BY END USE, 2002-04

Use	2002	2003	2004
	(%)		
Concrete block manufacture	64.3	77.8	70.0
Loose insulation	23.3	7.8	20.4
Pre-cast concrete manufacture	0.8	4.7	2.7
Ready-mix concrete	6.7	4.7	6.4
Horticulture and miscellaneous uses	4.9	5.1	0.5

Source: Natural Resources Canada, reported from NRCan survey questionnaire "Production of Lightweight Aggregates in Canada."
Notes: See Table 5 for list of establishments surveyed. Sales also imply quantities consumed for own use. Numbers may not add to totals due to rounding.

TABLE 10. CANADA, SALES OF EXPANDED PERLITE, PERCENTAGE BY END USE, 2002-04

Use	2002	2003	2004
	(%)		
Horticulture and agriculture	95.0	96.6	87.6
Loose insulation and miscellaneous uses	3.8	2.9	11.3
Insulation in gypsum products	0.6	0.4	0.4
in other construction materials	0.6	0.1	0.7

Source: Natural Resources Canada, reported from NRCan survey questionnaire "Production of Lightweight Aggregates in Canada."
Notes: See Table 5 for list of establishments surveyed. Sales also imply quantities consumed for own use. Numbers may not add to totals due to rounding.

TABLE 11. CANADA, SALES OF EXPANDED VERMICULITE, PERCENTAGE BY END USE, 2002-04

Use	2002	2003	2004
	(%)		
Horticulture	75.3	87.6	85.7
Loose insulation	5.8	1.7	2.1
Miscellaneous uses	18.8	10.7	12.2

Source: Natural Resources Canada, reported from NRCan survey questionnaire "Production of Lightweight Aggregates in Canada."
Notes: See Table 5 for list of establishments surveyed. Sales also imply quantities consumed for own use. Numbers may not add to totals due to rounding.