

Mineral Aggregates

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INTRODUCTION

Mineral aggregate production in Canada consists of natural sands and gravels, and crushed stone products. These products are used in the construction, manufacturing, chemical and metallurgical industries. Natural sands and gravels are unconsolidated deposits that are mined 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. Also included in this report are data on the production and use of lightweight aggregates, which include vermiculite, perlite, pumice, and expanded clays and shale.

CANADIAN INDUSTRY

Total Canadian production of sand and gravel for 2003 was 235.6 Mt valued at \$1.047 billion (Table 2). Production of crushed stone in 2002 used for aggregate, road metal, ballast and miscellaneous uses totalled 114.9 Mt (Table 1). The top six sand and gravel-producing provinces, in terms of tonnes produced since 1992, are Ontario, Alberta, British Columbia, Quebec, Manitoba and Saskatchewan. Figure 1 shows the sand and gravel production trend for these provinces for the period 1992-2003. Production peaked in Ontario in 1999 at 105.7 Mt after several years of growth in the 15% range, and has slowly declined since then. In Quebec, production dropped 12% in 2003 compared to 2002. Aggregate production in the other regions of Canada is growing at a maximum annual rate of 2%. Table 2 shows the production of sand and gravel by province. Figure 2 shows the relative percentage of chemical stone and crushed stone produced in Canada since 1993. Chemical stone production, mainly for cement and lime, has remained steady while crushed construction aggregate has steadily increased to 2001. Table 3 provides a breakdown of sand and gravel use by region. The sand

and gravel industry in Canada employed 3145 workers in 2002 (Statistics Canada catalogue no. 26-226-XIB).

According to *Aggregates and Roadbuilding Magazine*, the top five quarries in Canada in 2002 were: Milton quarry, Ontario (Dufferin Aggregates) - 4.82 Mt; Gilles Bay quarry, British Columbia (Texada Quarrying Ltd.) - 4.2 Mt; Dundas quarry, Ontario (Lafarge) - 4.16 Mt; Blubber Bay quarry, British Columbia (Ash Grove Cement) - 3.57 Mt; and Manitoulin quarry, Ontario (Lafarge) - 3.5 Mt. The Milton quarry, located about 50 km west of Toronto, supplies about 40 000 t/d of crushed limestone to the greater Toronto area market.

USE

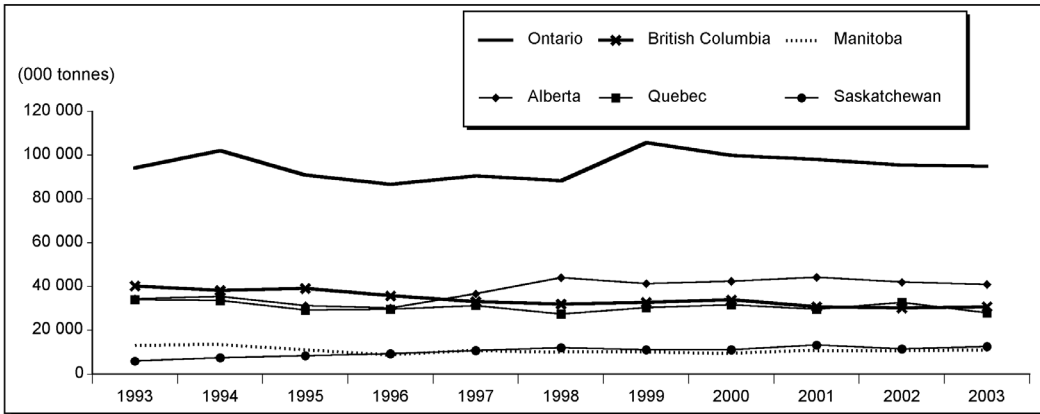
High-quality aggregates, including sand, gravel and crushed stone, are key ingredients in ready-mix concrete, pre-cast concrete products, asphalt pavements and sub-surface fill. A breakdown of sand and gravel use by region can be found in Table 3. In a typical concrete mixture, 1 m³ of concrete contains 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 (source: Aggregate Producers Association of Ontario).

TRADE

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. Aggregate exports and imports for the period 1992-2003 are shown in Figures 3 and 4, respectively. Imports of sand and gravel have been consistent over the last number of years at around 2.5 Mt/y. Limestone imports have been variable over the period. Annual gravel exports, primarily to the United States and the Caribbean, have increased 56% since 2000, while imports have decreased by 16%.

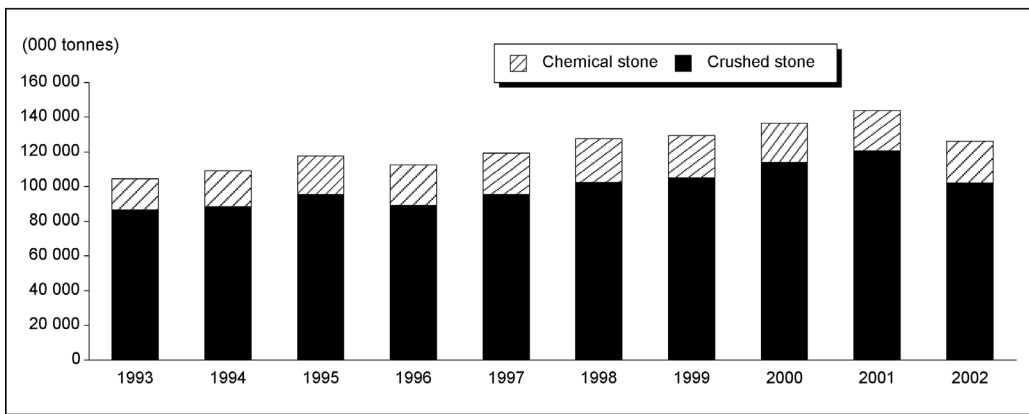
Crushed limestone continues to be exported from quarries in Newfoundland and Labrador, Nova Scotia and British Columbia, mainly to markets in New England, Florida, the Pacific northwest and California. In British Columbia,

Figure 1
Canadian Sand and Gravel Production, 1993-2003



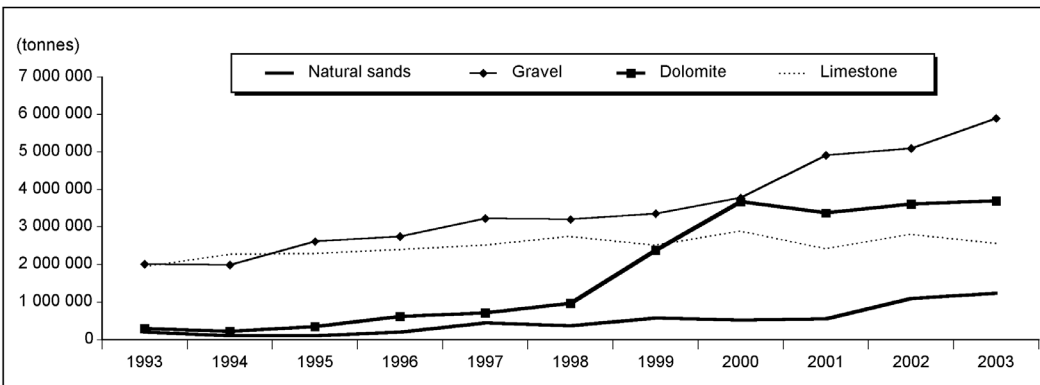
Source: Natural Resources Canada.

Figure 2
Canadian Crushed Stone Production, 1993-2002



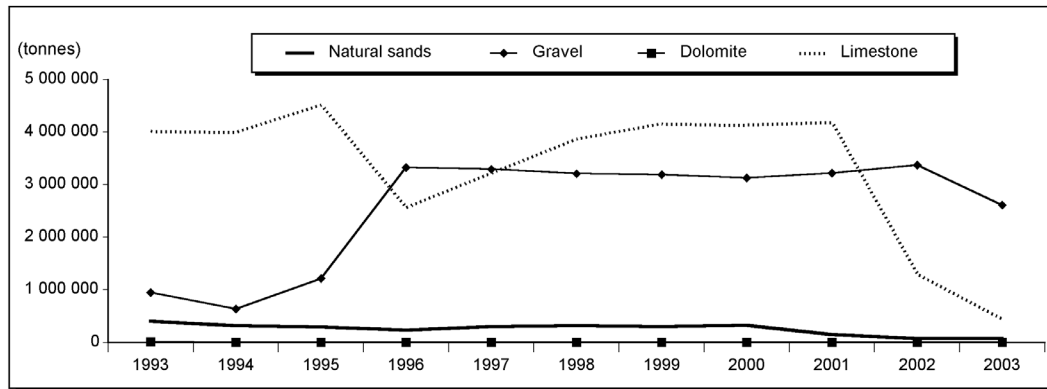
Source: Natural Resources Canada.

Figure 3
Canadian Aggregate Exports, 1993-2003



Source: Natural Resources Canada.

Figure 4
Canadian Aggregate Imports, 1993-2003



Source: Natural Resources Canada.

Texada Quarrying Ltd. and Ash Grove Cement Corporation shipped about 6 Mt of aggregate from operations at Gilles Bay and Blubber Bay. Martin Marietta Materials operates a 2-Mt/y quarry at Porcupine Mountain, Nova Scotia.

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, which 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. A list of lightweight aggregate producers is given in Table 5 and information on the production, use and trade of lightweight aggregates can be found in Tables 6-11.

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. In Canada, pumice is produced by Great Pacific Pumice Inc. from Mt. Meager in British Columbia. 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 870°C, 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. Horticultural applications include use as an additive in soilless growing mixes and as a chemical carrier. Industrial uses include abrasives, fillers and refractory brick manufacture. Perlite is imported to Canada primarily from Greece and 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 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 Co. in Enoree, South Carolina, and Virginia Vermiculite Ltd. in Woodruff, South Carolina, and Louisa County, Virginia, and from the Palabora region of South Africa (Table 6). 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. Shale is mined, crushed and screened, and then heated. Expanded slate mined in North Carolina, for example, was used in high-performance concrete in the construction of the Hibernia oil production platform in Newfoundland and Labrador. Approximately 50% of the aggregate for the platform was lightweight expanded slate. It can also produce more durable, non-polishing asphalt pavement than standard coarse aggregate.

Trade data for lightweight aggregates are found in Table 6. From these trade figures, it should be noted that Canada is a net importer of lightweight aggregates, mainly perlite and vermiculite, which are processed at expansion plants in Canada.

PRICES

Prices for sand and gravel and crushed stone aggregates are set by producers and customers, and vary depending on the region and distance to markets. For example, crushed stone in the greater Toronto area has an average value of \$10-\$15/t f.o.b. quarry, while larger shipments by bulk carrier to markets in the United States may average \$5-\$7/t f.o.b. quarry. Vermiculite ranges in price from US\$143/t f.o.b. mine (U.S. Geological Survey) to US\$160-\$260/t f.o.b. Rotterdam for South African ore (*Industrial Minerals Magazine*). Perlite has an average selling price of US\$37/t f.o.b. mine whereas pumice sells for around US\$24/t, according to the U.S. Geological Survey.

OUTLOOK

Mineral aggregate demand in 2004 is expected to remain firm or decrease slightly, partly due to an expected decrease in the number of housing starts, as predicted by Canada Mortgage and Housing Corporation. The use of crushed limestone and granite for construction needs will continue to increase in the future as current permitted resources of natural gravels become depleted. It is becoming increasingly difficult to put new gravel resources into production due to permitting difficulties at the municipal level and the isolation of existing resources by new residential developments near the large urban centres like the greater Toronto area (GTA). Aggregate demand in the GTA has been in the 50 to 60-Mt range in recent years. If future demand is satisfied from increasingly remote quarries, prices will be forced upward due to higher transportation costs, thus increasing the cost of new infrastructure

and buildings. Potential new quarry sites, especially those on tidewater along the east and west coasts and on the Great Lakes, may be brought into production in the coming years to satisfy demand for aggregates.

As an example of new initiatives that are addressing the demand situation, the Port Administration of Saguenay, Quebec, in collaboration with Concassés de la Rive Sud Inc., has sent a 40 000-t test shipment of crushed granite to Jacksonville, Florida, from a quarry at La Baie, Quebec. The venture is trying to establish a market for 500 000 t/y of crushed stone to the United States from the Quebec quarry. Some states in the United States are now using crushed granite as a granular material in highway construction in areas where other materials such as limestone are not readily available.

The U.S. government is looking at a proposal to fund about US\$318 billion in road construction, transit and safety projects over the next six years. This funding will replace TEA-21 legislation, which expired in September 2003. New funding for highway construction in the United States may have a positive impact on Canadian exports of sand, gravel and crushed stone.

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 2004. (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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TABLE 1. CANADA, STONE PRODUCTION, 2001-03

Item No.	2001		2002		2003	
	(000 t)	(\$000)	(000 t)	(\$000)	(000 t)	(\$000)
BY PROVINCE/TERRITORY (1)						
Newfoundland and Labrador	4 390	31 522	4 936	34 585	4 983	31 254
Nova Scotia	8 749	59 028	8 407	56 740	9 316	65 820
New Brunswick	4 204	20 073	4 824	28 147	5 148	30 007
Quebec	36 436	266 536	38 122	292 743	33 531	256 445
Ontario	57 969	501 956	55 945	504 246	53 944	506 085
Manitoba	3 744	17 837	3 931	18 611	4 166	20 783
Saskatchewan	—	—	—	—	—	—
Alberta	478	5 599	335	5 542	487	6 405
British Columbia	7 212	51 412	7 324	56 585	7 520	60 693
Northwest Territories	1 577	3 085	823	6 588	262	2 057
Total	124 758	957 048	124 746	1 003 786	119 356	979 549
BY USE (2)						
Stone (Dimension)						
Dimension stone						
Rough	363	53 760	453	52 265	..	..
Monumental and ornamental stone (n.f.)	106	9 323	78	6 844	..	..
Other (flagstone, curbstone, paving blocks, etc.)	110	16 136	169	21 294	..	..
Total dimension stone	579	79 219	700	80 403	..	..
Stone (Crushed)						
Crushed stone for						
Concrete aggregate	21 502	148 723	20 519	138 836	..	..
Asphalt aggregate	12 152	79 648	12 051	77 728	..	..
Road metal	37 792	203 984	43 545	263 761	..	..
Railroad ballast (includes traprock)	1 475	12 824	1 605	13 458	..	..
Other uses	41 693	236 138	37 243	228 336	..	..
Chemical and metallurgical						
Cement plants, Canada	15 548	50 300	16 104	50 095	..	..
Cement plants, foreign	454	2 051	459	2 015	..	..
Flux in iron and steel furnaces	477	3 275	258	2 485	..	..
Flux in nonferrous smelters	145	1 969	55	869	..	..
Glass factories	44	591	46	836	..	..
Lime plants, Canada	2 970	17 279	2 742	17 147	..	..
Lime plants, foreign	1 825	13 328	2 024	15 037	..	..
Pulp and paper mills	69	642	57	574	..	..
Sugar refineries	—	—	—	—	..	..
Other chemical uses	1 767	10 657	2 207	11 853	..	..
Miscellaneous stone						
Manufacture of artificial stone	2	60	42	194	..	..
Roofing granules	854	40 426	807	36 214	..	..
Poultry grit	232	2 520	199	2 316	..	..
Stucco dash	20	4 452	17	3 799	..	..
Terrazzo chips	6	586	7	714	..	..
Rock wool	30	430	34	435	..	..
Rubble and riprap	867	3 650	873	4 799	..	..
Other uses	1 591	10 313	895	7 268	..	..
Pulverized stone						
Whiting	37	3 258	46	3 963	..	..
Asphalt filler	126	125	144	257	..	..
Dusting coal mines	1	89	..	..	..	..
Agricultural purposes and fertilizer plants	847	13 170	807	13 719	..	..
Other uses	1 259	88 782	1 387	98 137	..	..
Total crushed stone	143 783	949 271	144 173	994 845	..	..
Total all stone	144 362	1 028 490	144 873	1 075 248	..	..

Source: Natural Resources Canada.

— Nil; .. Not available; n.f. Not finished or dressed.

(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) BY PROVINCE AND TERRITORY, 2000-2003

	2000		2001		2002		2003 (p)	
	(000 t)	(\$000)	(000 t)	(\$000)	(000 t)	(\$000)	(000 t)	(\$000)
Newfoundland and Labrador	2 911	12 371	2 594	10 249	2 805	8 892	2 873	9 217
Prince Edward Island	258	1 260	167	781	x	x	x	x
Nova Scotia	2 547	11 591	2 959	14 096	x	x	x	x
New Brunswick	3 356	10 716	2 529	9 748	2 550	10 187	3 028	11 939
Quebec	31 569	84 438	29 487	85 553	32 600	103 503	27 853	88 298
Ontario	99 848	395 832	97 878	433 403	95 464	405 317	94 829	410 436
Manitoba	9 571	26 968	10 952	32 982	10 642	33 990	10 983	35 203
Saskatchewan	11 064	39 151	13 195	48 106	11 448	42 063	12 489	38 892
Alberta	42 372	208 591	44 214	255 313	41 894	242 702	40 942	234 949
British Columbia	33 872	174 742	30 687	165 213	30 102	173 956	30 714	177 511
Yukon	1 087	2 966	1 226	3 646	5 475	10 628	5 475	10 627
Northwest Territories	446	2 535	598	3 143	247	1 121	456	3 471
Total	238 901	971 159	236 486	1 062 234	238 120	1 053 677	235 574	1 046 907

Source: Natural Resources Canada.

(p) Preliminary; x Confidential.

(1) Production represents shipments of natural gravel, sand and crushed gravel. It does not include shipments to Canadian cement plants.

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

TABLE 3. AVAILABLE DATA ON USE OF SAND AND GRAVEL, BY REGION, 2001 AND 2002

	Year	Atlantic	Quebec	Ontario	Western	Canada
		Provinces			Provinces (1)	
(000 tonnes)						
Road bed, surface	2001	3 326	18 892	30 076	47 157	99 451
	2002	4 500	19 057	31 789	47 709	103 055
Roads, ice control	2001	497	706	1 802	2 578	5 583
	2002	598	1063	1 920	3 077	6 657
Concrete aggregate	2001	1 625	3 300	17 107	20 172	42 355
	2002	1 776	4 323	12 769	19 782	38 500
Asphalt aggregate	2001	756	2 551	10 099	11 258	24 663
	2002	811	3 337	8 774	9 278	22 201
Railroad ballast	2001	6	193	1	148	348
	2002	–	19	1	132	152
Mortar sand	2001	60	400	1 253	148	1 861
	2002	41	453	2 000	124	2 617
Backfill for mines	2001	450	136	1 318	125	2 029
	2002	1043	124	1 530	40	2 737
Fill	2001	752	1 984	7 126	5 469	15 332
	2002	547	2 207	7 299	5 571	15 624
Other purposes	2001	803	1 325	29 362	13 853	45 342
	2002	1252	2 017	29 711	14 138	47 116
Total	2001	8 425	29 487	98 143	100 909	236 964
	2002	10 414	32 600	95 795	99 848	238 657

Source: Natural Resources Canada.

– Nil.

(1) The western provinces include the Yukon and Northwest Territories.

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

TABLE 4. CANADA, SAND AND GRAVEL AND CRUSHED STONE TRADE, 2001-03

Item No.	2001		2002		2003	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS						
2505.90	Natural sands n.e.s., excluding metal-bearing sands					
	512 754	4 266	1 017 546	9 156	1 232 557	8 864
	United States					
	St. Pierre and Miquelon	–	36	7	414	31
	Chile	231	39	14	50	11
	France	–	10	4	20	9
	Cayman Islands	37 307	–	–	–	–
	Mexico	2	–	–	–	–
	Trinidad and Tobago	99	–	–	–	–
	Bahamas	–	67 829	1 923	–	–
	Bermuda	–	11 571	232	–	–
	Germany	–	1	–	–	–
	Total	550 393	1 097 032	11 336	1 233 041	8 915
2517.10	Pebbles, gravel, broken or crushed stone used for aggregates, etc.					
	4 884 125	48 362	5 078 843	62 467	5 669 294	57 982
	United States					
	Trinidad and Tobago	–	–	–	164 959	2 981
	Bahamas	–	–	–	25 962	503
	Barbados	27 644	757	10 126	21 413	292
	Turks and Caicos Islands	–	–	–	13 451	288
	France	–	11	–	4 000	32
	Hong Kong	–	6 320	49	14	18
	Other countries	13	4 505	111	383	2
	Total	4 911 787	5 099 794	62 766	5 899 476	62 098
2517.41	Marble granules, chippings and powder of 25.15 or 25.16, heat-treated or not					
	49 078	8 983	32 365	6 864	45 972	7 196
	United States					
2517.49	Granules, chippings and powder, n.e.s., of 25.15 or 25.16, heat-treated or not					
	9 347	612	4 692	434	22 499	285
	United States					
	Other countries	26 173	30	12	570	46
	Total	35 520	4 722	446	23 069	331
2518.10	Dolomite, not calcined					
	2 872 450	30 076	3 095 736	34 002	3 197 514	28 888
	United States					
	Venezuela	318 247	297 485	2 997	324 609	3 482
	Mexico	142 974	134 722	1 258	70 046	560
	Trinidad and Tobago	38 738	84 517	995	58 471	518
	Brazil	–	–	–	46 667	333
	Romania	91	–	–	–	–
	Total	3 372 500	3 612 460	39 252	3 697 307	33 781
2518.20	Calcined dolomite					
	11 134	4 648	9 785	1 214	9 913	1 151
	United States					
2521.00	Limestone flux; limestone and other calcareous stone used for lime or cement					
	2 360 689	15 517	2 713 242	18 191	2 568 400	17 746
	United States					
	China	–	10 671	430	7 243	128
	France	–	–	–	70	–
	Cuba	237	–	–	–	–
	India	4 694	–	–	–	–
	Mexico	61 543	91 616	989	–	–
	Sweden	–	509	2	–	–
	Total	2 427 163	2 816 038	19 612	2 575 713	17 874
Total exports	11 357 575	120 840	12 672 196	141 490	13 484 491	131 346

TABLE 4 (cont'd)

Item No.	2001		2002		2003		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS							
2505.90	Natural sands n.e.s., excluding metal-bearing sands						
	United States	131 662	7 285	65 655	6 883	69 176	7 707
	China	1 286	311	1 136	393	1 562	413
	Australia	1 349	80	434	113	1 134	122
	Philippines	216	44	55	23	340	95
	Norway	—	—	1	—	500	77
	United Kingdom	144	25	146	30	193	36
	South Africa	15 820	1 836	2 308	338	105	19
	Other countries	336	60	159	25	230	20
	Total	150 828	9 641	69 904	7 805	73 240	8 489
2517.10	Pebbles, gravel, broken or crushed stone used for aggregates, etc.						
	United States	3 106 549	16 493	3 311 222	19 283	2 531 794	15 050
	Israel	50 045	216	48 830	338	42 291	432
	China	16 939	227	6 400	128	21 605	259
	United Kingdom	2 600	52	26	1	12 362	151
	Bulgaria	—	—	—	—	381	37
	Phillippines	1 237	13	3 271	32	649	34
	Brazil	261	26	192	27	278	32
	Indonesia	13	1	615	6	70	29
	France	5 683	35	1 717	17	1 914	21
	Other countries	36 349	241	1 327	84	2 804	64
	Total	3 219 677	17 304	3 373 624	19 916	2 614 148	16 109
2517.20	Macadam of slag, dross or similar industrial waste, etc.						
	United States	7 628	56	2 613	17	542	3
	Other countries	99	1	614	2	9	—
	Total	7 727	57	3 227	19	551	3
2517.30	Tarred macadam						
	United States	539	22	259	12	201	8
2517.41	Marble granules, chippings and powder of 25.15 or 25.16, heat-treated or not						
	United States	73 320	15 546	82 761	16 946	80 668	15 242
	Austria	12	2	4	1	488	49
	Italy	75	12	104	16	157	25
	Other countries	10	2	12	1	40	10
	Total	73 417	15 562	82 881	16 964	81 353	15 326
2517.49	Granules, chippings and powder, n.e.s., of 25.15 or 25.16, heat-treated or not						
	United States	25 437	1 519	25 650	2 198	19 547	1 664
	China	367	35	273	16	734	68
	France	1 027	80	315	36	345	32
	Australia	—	—	2	—	319	31
	Brazil	420	29	328	29	116	15
	Belgium	—	—	—	—	135	11
	Spain	—	—	223	29	102	10
	India	122	8	67	5	65	9
	Other countries	486	20	483	29	427	28
	Total	27 859	1 691	27 357	2 342	21 790	1 868

TABLE 4 (cont'd)

Item No.	2001		2002		2003		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS (cont'd)							
2518.10	Dolomite, not calcined						
	United States	3 579	698	2 566	534	2 711	512
	Other countries	17	3	103	24	153	20
	Total	3 596	701	2 669	558	2 867	532
2518.20	Calcined dolomite						
	United States	19 436	2 683	46 590	6 938	48 774	6 462
	Other countries	–	–	25	18	–	–
	Total	19 436	2 683	46 615	6 956	48 774	6 462
2518.30	Agglomerated dolomite (including tarred dolomite)						
	United States	556	187	857	307	1 223	438
	Other countries	70	25	174	65	135	59
	Total	626	212	1 031	372	1 358	497
2521.00	Limestone flux; limestone and other calcareous stone used for lime or cement						
	United States	4 163 352	19 771	1 290 531	20 817	442 902	15 683
	Portugal	–	–	–	–	539	105
	France	4 947	24	3 161	7	23	31
	Israel	906	7	111	22	530	29
	Other countries	11 025	33	4 260	63	277	55
	Total	4 180 230	19 835	1 298 063	20 909	444 271	15 903
	Total imports	7 683 935	67 708	4 905 630	75 853	3 288 553	65 197

Sources: Natural Resources Canada; Statistics Canada.

– Nil; n.e.s. Not elsewhere specified.

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

TABLE 5. LIGHTWEIGHT AGGREGATE PRODUCERS IN CANADA, 2002

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.	Lameque, N.B.	Perlite, 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			
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.	Saskatoon, 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 in horticulture.
	Edmonton, Alta.	Vermiculite, perlite	Vermiculite processed for use in horticulture and in friction material and loose insulation.
Inland Cement Limited	Calgary, Alta.	Expanded shale	Plant closed in 2002.
	Edmonton, Alta.	Expanded clay	Processed for concrete products industry, 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 Limited	Vancouver	Pumice	Purchased for concrete products industry.
Canada Pumice Corporation	Quesnel	Pumice, shale	A range of pumice and shale products for construction and landscaping material.
Great Pacific Pumice Inc.	Mt. Meager	Pumice	Used in horticulture, concrete products industry and as loose insulation.

Source: Natural Resources Canada, reported from NRCan 2002 annual survey questionnaire "Production of Lightweight Aggregates in Canada."

TABLE 6. CANADA, EXPORTS AND IMPORTS OF VERMICULITE, PERLITE AND PUMICE, 2001-03

Item No.		2001		2002		2003	
		(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS							
2513.11	Pumice stone, crude or in irregular pieces, including crushed pumice						
	Finland	-	-	-	-	20	12
	Cambodia	-	-	-	-	3	4
	Colombia	-	-	1	1	-	-
	United States	-	-	27	10	-	-
	Total	-	-	28	11	23	16
2513.19	Pumice stone, other						
	United States	-	5	-	-	13	52
2530.10	Vermiculite, perlite and chlorites, unexpanded						
	United States	-	-	47	49	1 116	167
	Chile	24	13	4	3	8	3
	Saint Vincent and the Grenadines	-	-	1	-	2	1
	Dominican Republic	5	10	-	-	-	-
	South Korea	-	-	28	20	-	-
	Total	29	23	80	72	1 126	171
6806.20	Exfoliated vermiculite, expanded clays, foamed slag and similar expanded mineral materials (including intermixtures thereof)						
	United States	2 248	1 699	1 682	1 361	998	859
	Other countries	1	3	-	-	32	81
	Total	2 249	1 702	1 682	1 361	1 030	940
	Total exports	2 278	1 730	1 790	1 444	2 192	1 179
IMPORTS							
2513.11	Pumice stone, crude or in irregular pieces, including crushed pumice						
	United States	5 841	742	5 277	695	5 824	717
	Turkey	3 423	344	3 881	393	2 306	204
	Other countries	81	18	24	8	442	118
	Total	9 345	1 104	9 182	1 096	8 572	1 039
2513.19	Pumice stone, other						
	United States	3 302	643	5 236	921	3 598	914
	Taiwan	37	11	378	106	1 342	311
	Turkey	-	-	122	6	352	66
	South Korea	545	71	246	55	213	43
	China	227	65	151	42	165	40
	Other countries	347	61	1 318	164	549	89
	Total	4 458	851	7 451	1 294	6 219	1 463
2530.10.00.10	Vermiculite, unexpanded						
	South Africa	22 090	5 631	15 713	4 266	12 119	2 954
	United States	14 742	2 967	14 593	3 037	12 318	2 339
	Uganda	-	-	168	59	1 513	379
	China	1	-	-	-	2 710	360
	Zimbabwe	-	-	4 630	947	134	27
	France	140	38	-	-	-	-
	Greece	1 066	152	173	22	-	-
	United Kingdom	7	2	-	-	-	-
	India	-	-	24	3	-	-
	Total	38 046	8 790	35 301	8 334	28 794	6 059
2530.10.00.20	Perlite, unexpanded						
	United States	29 754	5 876	28 343	5 207	27 735	4 324
	Greece	37 589	3 859	44 495	4 002	37 869	3 459
	South Africa	-	-	-	-	123	40
	China	-	-	1	-	-	-
	Total	67 343	9 735	72 734	9 209	65 727	7 823

TABLE 6 (cont'd)

Item No.	2001		2002		2003	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
IMPORTS (cont'd)						
3802.90.00.20	Activated perlite, excluding expanded perlite ground to be employed in					
	United States					
	638	365	268	145	186	101
	Germany					
	-	-	-	-	1	-
	Total					
	638	365	268	145	187	101
6806.20.00.10	Exfoliated (expanded) vermiculite					
	United States					
	388	1 385	696	2 161	856	2 758
	Other countries					
	17	42	10	37	46	123
	Total					
	405	1 427	706	2 198	902	2 881
6806.20.00.20	Expanded perlite					
	United States					
	10 076	7 428	10 228	7 799	13 777	9 141
	Other countries					
	25	41	54	51	89	92
	Total					
	10 101	7 469	10 282	7 850	13 866	9 233
	Total imports					
	130 336	29 741	135 924	30 126	124 267	28 599

Sources: Natural Resources Canada; Statistics Canada.

- Nil.

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

TABLE 7. CANADA, LIGHTWEIGHT AGGREGATES PRODUCED, SOLD AND USED, 2001 AND 2002

	2001				2002 (p)			
	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)	352 079	9 869 742	374 407	11 176 563	537 553	13 321 262	482 513	1 211 107
FROM IMPORTED CRUDE MATERIALS								
Expanded perlite and exfoliated vermiculite (1)	714 635	52 088 769	750 585	54 811 035	731 958	52 512 353	772 104	55 379 080
Total	1 066 714	61 958 511	1 124 992	65 987 598	1 269 511	65 833 615	1 254 617	67 490 197

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

(p) Preliminary.

(1) Combined to avoid disclosing confidential company data.

TABLE 8. CANADA, SALES OF EXPANDED SLAG, PERCENTAGE BY END USE, 2000-2002 (p)

Use	2000	2001	2002 (p)
	(%)		
Concrete block manufacture	80.0	80.0	70.0
Ready-mix concrete	10.0	10.0	5.0
Miscellaneous uses	10.0	10.0	25.0

Source: Natural Resources Canada, reported from NRCan survey questionnaire "Production of Lightweight Aggregates in Canada."
(p) Preliminary.

Notes: See Table 5 for list of establishments surveyed. Sales also imply quantities consumed for own use.

TABLE 9. CANADA, SALES OF EXPANDED CLAY AND SHALE, PERCENTAGE BY END USE, 2000-2002 (p)

Use	2000	2001	2002 (p)
	(%)		
Concrete block manufacture	50.1	54.1	64.3
Loose insulation	43.2	42.7	23.3
Pre-cast concrete manufacture	2.0	1.7	0.8
Ready-mix concrete	0.7	1.2	6.7
Horticulture and miscellaneous uses	4.0	0.3	4.9

Source: Natural Resources Canada, reported from NRCan survey questionnaire "Production of Lightweight Aggregates in Canada."
(p) Preliminary.

Notes: See Table 5 for list of establishments surveyed. Sales also imply quantities consumed for own use.

TABLE 10. CANADA, SALES OF EXPANDED PERLITE, PERCENTAGE BY END USE, 2000-2002 (p)

Use	2000	2001	2002 (p)
	(%)		
Horticulture and agriculture	94.0	94.4	95.0
Loose insulation and miscellaneous uses	5.5	4.9	3.8
Insulation			
in gypsum products	0.5	0.6	0.6
in other construction materials	–	–	0.6

Source: Natural Resources Canada, reported from NRCan survey questionnaire "Production of Lightweight Aggregates in Canada."
– Nil; (p) Preliminary.

Notes: See Table 5 for list of establishments surveyed. Sales also imply quantities consumed for own use.

TABLE 11. CANADA, SALES OF EXPANDED VERMICULITE, PERCENTAGE BY END USE, 2000-2002 (p)

Use	2000	2001	2002 (p)
	(%)		
Horticulture	84.8	83.4	75.3
Loose insulation	3.0	4.3	5.8
Miscellaneous uses	12.2	12.2	18.8

Source: Natural Resources Canada, reported from NRCan survey questionnaire "Production of Lightweight Aggregates in Canada."
(p) Preliminary.

Notes: See Table 5 for list of establishments surveyed. Sales also imply quantities consumed for own use.