



2005 Minerals Yearbook

PUMICE AND PUMICITE

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In 2005, U.S. pumice and pumicite production was 1.27 million metric tons (Mt). This was a decrease of 15% compared with 2004, which had been a record high year for U.S. pumice production. The decrease in production tonnage was offset by a 57% increase in the overall value of production to \$39 million in 2005 from \$25 million in 2004. This rise in value was attributed to a large increase in the average unit value of pumice building blocks, which account for 70% of domestic consumption of pumice and pumicite. The apparent consumption of pumice and pumicite in the United States in 2005 was 1.49 Mt, a decrease of 20% compared with that of 2004. Imports decreased by 40% to 240,000 metric tons (t). Exports of 21,000 t represented a decrease of about 22% compared with exports of 27,000 t in 2004 (table 1).

The main use for pumice continued to be as an aggregate in lightweight building blocks and assorted building products. Other major applications for pumice and pumicite included abrasives, absorbents, concrete aggregate and admixture, filter aids, horticulture (including landscaping), stonewashing of denim, and as a traction enhancer for tires. Imports were used primarily as a lightweight aggregate, but a small percentage of pumice imports was used in abrasive applications.

Domestic Data Coverage

Domestic production data for pumice and pumicite were developed by the U.S. Geological Survey (USGS) from an annual voluntary survey of U.S. pumice- and pumicite-producing sites and company operations. The canvass for 2005 covered 16 companies with 16 active operations that produced and sold or used all the domestic pumice and pumicite in the United States. The eight companies that responded represented about 76% of the 1.27 Mt produced. Sold and used data for seven of the eight companies that did not respond to the 2005 survey were estimated; the remaining nonrespondent had abandoned its operation. Data are rounded to no more than three significant digits. All percentages in this report were computed based on unrounded data.

Description and Terminology

Pumice is a low density, porous, vesicular, glassy volcanic rock that forms during explosive eruptions. It resembles a sponge because it consists of a network of gas bubbles frozen amidst fragile volcanic glass and minerals. Pumicite is a term for material made entirely of pumice, but the term is commercially used for material of smaller particle size (typically less than 4 millimeters). All types of magma, including andesite, basalt, dacite, and rhyolite, will form pumice. Scoria is another term used for vesicular glassy lava rock, though it usually refers to

dark rock of basaltic to andesitic composition and commercial practice is to use the term scoria for larger fragments (greater than 2.5 centimeters) (Presley, 2006, p. 743). Rocks called scoria are typically dark gray to black in color and denser than those termed pumice, and the term scoria has been used for dark pumice from basaltic rocks. In the past (and still locally) the terms pumice, pumicite, scoria, volcanic ash, and volcanic cinder, are used interchangeably. Pumice is the preferred term. Pumice and pumicite production in this report includes all material reported and sold as pumice or pumicite and may include some volcanic ash. Scoria used as aggregate is reported in the crushed stone reports and has not been included here.

Production

U.S. pumice and pumicite production of 1.27 Mt was valued at \$39 million. In 2005, 28% of domestic pumice and pumicite production came from Arizona followed closely by Oregon with 27%. Other States that produced pumice and pumicite, in descending order of production, were Idaho, New Mexico, California, and Kansas.

Pumice is usually extracted by simple open pit methods using rippers, bulldozers, and front-end loaders. Processing is usually just drying, crushing, and screening, though some abrasive grades may require fine grinding and classification and blocks may be sawn into shapes and sizes.

Consumption

In 2005, more than 1 Mt of the pumice and pumicite produced in the United States went into the building and decorative blocks use category (table 2). This was a 12% decrease from 2004; this, however, was still the leading end-use category, consuming 82% of production, up from 79% in 2004. Pumice used for horticultural and landscaping purposes decreased by 39% to 143,000 t in 2005 from a total of 236,000 t in 2004 and accounted for 11% of consumption. Pumice use as an abrasive was up slightly to 41,000 t in 2005 from 40,000 t in 2004 and accounted for 3% of consumption. Pumice and pumicite used for concrete admixture and aggregate also rose slightly in 2005 to 30,000 t from 29,000 t in 2004 and accounted for 2% of consumption. There are many substitutes for pumice as a concrete additive or aggregate. The amount of the pumice reported sold or used by several low-volume markets or for unreported uses grouped in the "other" category rose in 2005 to 15,000 t from 6,000 t in 2004 and accounted for about 1% of consumption. This may have been owing to producers being less precise in categorizing sales on the survey forms rather than to a real increase in consumption for "other" uses. "Other" uses accounted for 1% of consumption and included absorbent

(including pet litter), diluent, engineered fill, filter aids, in geotechnical uses, in laundries (stone-washing), in pottery clays, and for other unspecified uses.

Prices

The average prices reported for pumice and pumicite varied greatly by use compared with the average price for all uses in 2005. The overall average prices reported of all pumice and pumicite products increased dramatically to \$31.00 per metric ton in 2005 compared with \$16.80 per ton in 2004, an increase of 85%. The price change was the result of increases in the unit values of pumice building blocks and pumice as a soil additive for horticultural and landscaping, the two leading uses of pumice in the United States. The value of blocks manufactured from pumice caused the unit value of the building block and decorative use category to increase by 162% to \$25.52 per ton in 2005 from \$9.75 per ton in 2004. The average price for pumice and pumicite used for horticultural and landscaping increased by 15% to \$16.30 per ton in 2005 from \$14.23 per ton in 2004. The average price in 2005 for pumice and pumicite used for abrasives was \$228.42 per ton; for concrete admixture and aggregates, \$21.42 per ton; and for other uses, \$32.04 per ton (table 2). The increase in pumice product prices reflected the price increase in most construction materials in 2005 owing to increased demand.

Foreign Trade

Exports of pumice decreased to about 21,000 t in 2005 with a value of \$7.5 million. Countries that imported from the United States in descending order of tonnage shipped, were Canada (34%), Mexico (9%), Hong Kong (8%), Germany (8%), China (7%), the United Kingdom (6%), Brazil (4%), India (4%), Japan (4%), Malaysia (3%), Suriname (3%), Taiwan (2%), Thailand (2%), and Singapore (2%). The remaining 4% of exports went to 22 other countries in Asia, Central America, Europe, the Middle East, Oceania, and South America.

Imports in 2005 decreased by 40% to 240,000 t compared with 402,000 t in 2004. By volume, most imports of pumice and pumicite were for lightweight aggregate in construction-related uses with smaller amounts used in a range of abrasives and for the stonewashing of denim. Ninety-seven percent of imported pumice was from Greece and Italy (table 3). All imports from Greece and the majority of imports from Italy were thought to have been shipped to the United States by a single company. Greece supplied 188,000 t, accounting for 78% of pumice imports in 2005 and remained the leading source of pumice imports even though Greek sources supplied 24% less than in 2004. Imports from Italy accounted for 45,000 t (19%) of total imports, down from 147,000 t in 2004. Most of the remaining 3% of pumice imports was supplied by Turkey, although 16 other countries also exported small amounts of pumice and pumicite to the United States in 2005.

World Review

The USGS estimated world pozzolan and pumice (and related materials) production to be 17.5 Mt in 2005, slightly less than in 2004 (table 4). Most of the data published were provided by official government agencies in each country. Significant revisions

of data are sometimes reported by these agencies, usually without supporting explanations. Italy remained the leading producer of pumice and pozzolan with production estimated to be 4.6 Mt. Strictly defined, pozzolans are volcanic tuffs of the type found near Pozzuoli in southern Italy. However, internationally, the term pozzolan is commonly applied to any of the many silicious materials, such as diatomaceous earth, fly ash, opaline shale, pumicite, tuff, and volcanic ash, which when added to the cement in concrete improve the strength or other properties of the concrete. Greece was the second ranked producer in 2005 with production estimated to be 2.25 Mt. Chile was third with 1.55 Mt, and the United States, with 1.27 Mt, was the fourth ranked producer in 2005. Other countries with production of 1.0 Mt or more of pozzolan, pumice, and related materials were Iran and Turkey. In addition, 29 other countries were known to have produced pumice.

Pumice is used more extensively as a building material outside the United States, which helps to explain the large global production and sales of pumice. In Europe, for example, basic home construction uses significantly less gypsum sheetrock because stone and concrete are the preferred building materials. Prefabricated lightweight concrete walls often are produced and shipped to construction locations. Because of their lightweight, strength, and cementitious properties, pumice and pumicite perform very well in European-style construction.

Outlook

U.S. consumption of pumice and pumicite in 2006 is expected to rise slightly along with the popularity and use of artificial blocks made with pumice for construction and decoration. Imports and exports are also expected to rise slightly in 2006. Worldwide consumption of pumice is expected to be about the same as in 2005.

Reference Cited

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TABLE 1
SALIENT PUMICE AND PUMICITE STATISTICS¹

(Thousand metric tons and thousand dollars unless otherwise specified)

	2001	2002	2003	2004	2005
United States:					
Sold and used by producers:					
Quantity	919	956	870	1,490	1,270
Value ²	19,700	19,800	21,900	25,000	39,300
Average value dollars per metric ton	21.41	20.69	25.20	16.80	30.99
Exports ³	27	30	26	27	21
Imports for consumption ³	379	360	367	402	240
Apparent consumption ⁴	1,270	1,290	1,210	1,870	1,490
World, production, pumice and related volcanic materials					
	15,600 ^r	16,200 ^r	16,600 ^r	17,700 ^r	17,500 ^e

^eEstimated. ^rRevised.

¹Data are rounded to no more than three significant digits, except average value.

²Free on board mine and/or mill.

³Source: U.S. Census Bureau.

⁴Production plus imports minus exports plus adjustments for Government and industry stock changes.

TABLE 2
PUMICE AND PUMICITE SOLD AND USED BY PRODUCERS IN THE UNITED STATES, BY USE¹

Use	2004			2005		
	Quantity (thousand metric tons)	Value (thousands)	Average unit value	Quantity (thousand metric tons)	Value (thousands)	Average unit value
Abrasives ²	40	\$8,590	\$216.83	41	\$9,340	\$228.42
Building block, includes decorative block	1,180	11,500	9.75	1,040	26,500	25.52
Concrete admixture and aggregate	29	1,240	43.05	30	648	21.42
Horticulture and landscaping	236	3,360	14.23	143	2,340	16.30
Other ³	6	338	53.32	15	486	32.04
Total or average	1,490	25,000	16.80	1,270	39,300	31.00

¹Data are rounded to no more than three significant digits, except average unit value; may not add to totals shown.

²Includes cleaning and scouring compounds.

³Includes absorbent, diluents, fill, filter aids, laundries, pottery, and other unspecified uses.

TABLE 3
U.S. IMPORTS FOR CONSUMPTION OF PUMICE,
BY CLASS AND COUNTRY¹

Country	Crude or unmanufactured		Wholly or partly manufactured	
	Quantity	Value	Quantity	Value
2004:				
Greece ²	247	7,530	(3)	617
Italy ²	147	22,000	(3)	39
Turkey	7	1,510	--	--
Other ⁴	(3)	355	(3)	3,000
Total	401	31,400	1	3,660
2005:				
Greece ²	188	11,500	(3)	3,400
Italy ²	45	17,200	(3)	507
Turkey ²	4	1,020 ⁵	--	--
Other ⁶	2	2,080	(3)	1,850
Total	239	31,800 ⁵	1	5,750

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Quantity of crude or unmanufactured pumice derived from the Journal of Commerce Port Import/Export Reporting Service data.

³Less than ½ unit.

⁴Includes Argentina, Austria, China, Ecuador, Germany, Hong Kong, Indonesia, Japan, the Republic of Korea, Mexico, Malaysia, Poland, Russia, Taiwan, and the United Kingdom.

⁵Corrections posted June 22, 2006.

⁶Includes Austria, China, France, Germany, Hong Kong, India, Indonesia, Japan, the Republic of Korea, Malaysia, Mexico, Poland, Taiwan, Thailand, and the United Kingdom.

Source: U.S. Census Bureau.

TABLE 4
PUMICE AND RELATED MATERIALS: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country ³	2001	2002	2003	2004	2005 ^c
Algeria, pozzolan ^c	421,238 ⁴	451,000	500,000	508,000 ^r	494,000 ⁴
Argentina, pumice	2,097	3,070	3,531	9,188 ^r	9,000
Austria, trass ^c	5,000	5,000	5,000	5,000	5,000
Burkina Faso ^c	10,000	10,000	10,000	10,000	10,000
Cameroon, pozzolan ^c	600,000	620,000	600,000	600,000	600,000
Cape Verde, pozzolan	-- ^r	-- ^r	-- ^r	-- ^r	--
Chile:					
Pozzolan	785,000	826,000	825,000	750,000 ^r	750,000
Pumice	--	354	417,023	785,033 ^r	800,000
Costa Rica ^c	8,000	8,000	8,000	8,000	8,000
Croatia, volcanic tuff ^c	42,000	41,000	29,000	30,000	30,000
Dominica, pumice and volcanic ash ^c	100,000	100,000	100,000	100,000	100,000
Ecuador:					
Pozzolan	373,023 ^r	519,090	190,747 ^r	190,000 ^{r,c}	190,000
Pumice	373,023	130,000	271,000 ^r	298,000 ^r	300,000

See footnotes at end of table.

TABLE 4—Continued
PUMICE AND RELATED MATERIALS: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country ³	2001	2002	2003	2004	2005 ^c
El Salvador, pozzolan	265,458	279,389	294,871	222,826	220,000
Eritrea, pumice	195	212	50 ^r	439 ^r	440
Ethiopia ⁵	180,000 ^{r,c}	210,000 ^{r,c}	218,676 ^r	270,994 ^r	350,000
France, pozzolan and lapilli ^c	450,000	450,000	450,000	450,000	450,000
Germany, pumice, marketable ^c	124,000 ^r	43,000 ^r	-- ^r	-- ^r	--
Greece:					
Pozzolan	1,308,131 ^r	1,291,198 ^r	1,383,546 ^r	1,400,000 ^{r,c}	1,400,000
Pumice ^c	850,000	850,000	850,000	850,000	850,000
Guadeloupe, pumice ^c	210,000	210,000	210,000	210,000	210,000
Guatemala, pumice	264,322	377,403	273,933	226,459 ^r	230,000
Honduras, pozzolan ^c	189,999 ⁴	190,000	190,000	190,000	190,000
Iceland:					
Pumice	70,751 ^r	56,478 ^r	50,193 ^r	50,000 ^c	50,000
Scoria ^c	1,000 ^r	1,000 ^r	1,000 ^r	1,000	1,000
Iran	843,912	1,181,543	1,200,000 ^c	1,200,000 ^c	1,200,000
Italy: ^c					
Pozzolan	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000
Pumice and pumiceous lapilli	600,000	600,000	600,000	600,000	600,000
Macedonia, volcanic tuff ^c	50,000	50,000	50,000	50,000	50,000
Martinique, pumice ^c	130,000	130,000	130,000	130,000	130,000
New Zealand ^c	68,000	203,700 ⁴	204,000	200,000	200,000
Saudi Arabia, pozzolan ^c	150,000	150,000	160,000	160,000	160,000
Serbia and Montenegro, volcanic tuff ^c	100,000	100,000	100,000	100,000	100,000
Slovenia, volcanic tuff ^c	40,000	40,000	40,000	40,000	40,000
Spain, including Canary Islands ^c	600,000	600,000	600,000	600,000	600,000
Syria, volcanic tuff ^c	650,000 ^r	650,000 ^r	650,000 ^r	650,000 ^r	650,000
Tanzania, pozzolanic materials	41,468	52,000	105,910 ^r	152,679 ^r	160,000
Turkey	754,052	820,347	895,616	1,035,975 ^r	1,000,000
Uganda, pozzolanic materials	22,782	12,388	65,587	134,644 ^r	140,000
United States, pumice, sold and used by producers	919,000	956,000	870,000	1,490,000	1,270,000 ⁴
Grand total	15,600,000 ^r	16,200,000 ^r	16,600,000 ^r	17,700,000 ^r	17,500,000
Of which:					
Pumice	2,940,000 ^r	2,760,000 ^r	3,080,000 ^r	4,050,000 ^r	3,850,000
Pozzolan	8,160,000 ^r	8,390,000 ^r	8,320,000 ^r	8,310,000 ^r	8,300,000
Trass and scoria	6,000 ^r	6,000 ^r	6,000 ^r	6,000	6,000
Volcanic tuff	882,000 ^r	881,000 ^r	869,000 ^r	870,000 ^r	870,000
Unspecified	3,610,000 ^r	4,180,000 ^r	4,290,000 ^r	4,470,000 ^r	4,520,000

^cEstimated. ^rRevised. -- Zero.

¹World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Table includes data available through April 24, 2006.

³Pumice and related materials also are produced in a number of other countries, including China, Japan, Mexico, and the Commonwealth of Independent States, but available information is inadequate for the formulation of reliable estimates of output levels.

⁴Reported figure.

⁵Data are for year ending July 7 of that stated.