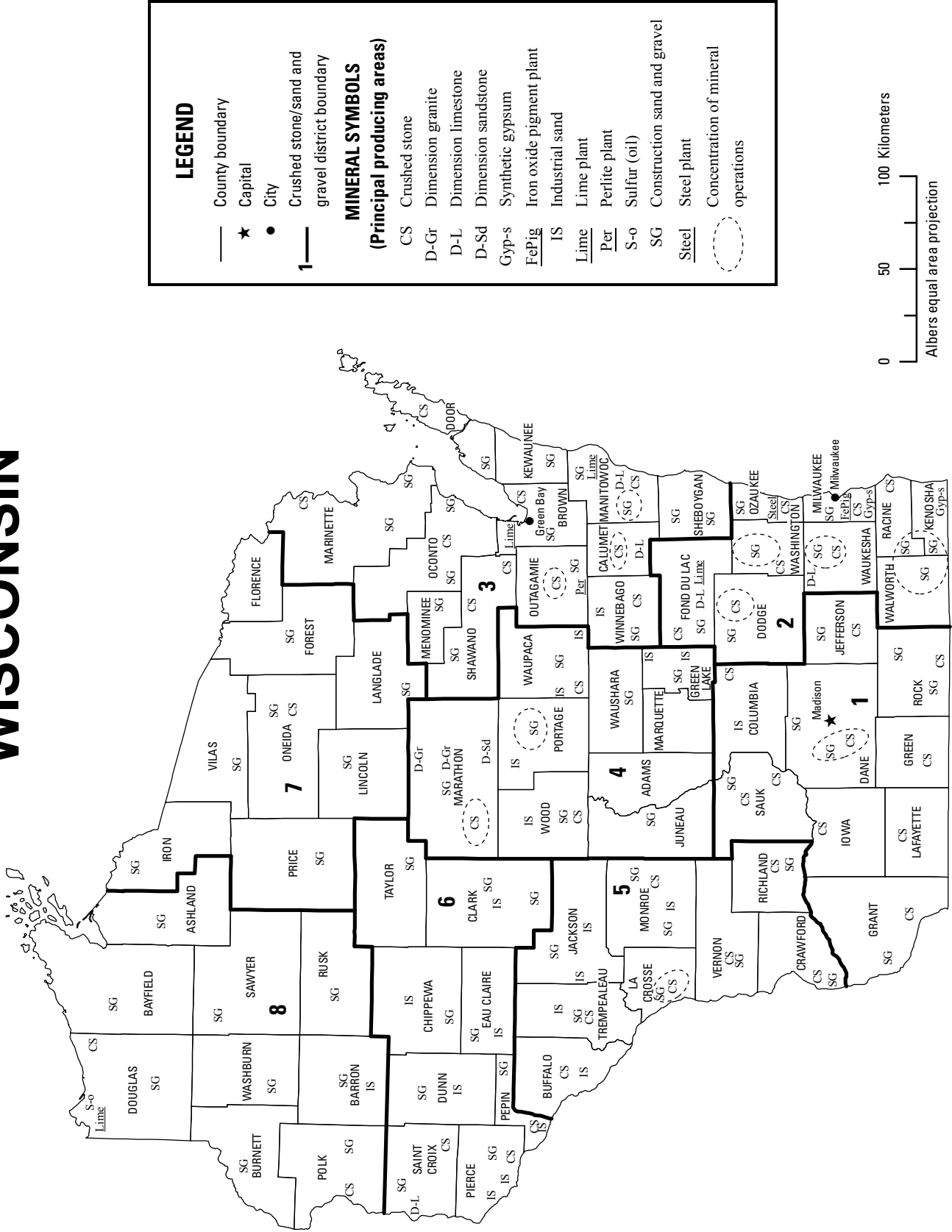




2012–2013 Minerals Yearbook

WISCONSIN

WISCONSIN



THE MINERAL INDUSTRY OF WISCONSIN

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Wisconsin Geological and Natural History Survey for collecting information on all nonfuel minerals.

In 2013, the value of the nonfuel mineral production¹ in the State of Wisconsin increased to \$1.53 billion,² 2.0% of the total U.S. nonfuel mineral production, ranking it 13th in the Nation. In 2012, the corresponding value was \$1.02 billion, 1.4% of the U.S. total nonfuel mineral production, ranking it 21st among the 50 States. In 2013, on a per capita basis, nonfuel mineral production in Wisconsin had a value of \$267 compared with the national average of \$238. In 2012, the per capita value was \$179 compared with the national average of \$241.

The value of nonfuel mineral production in Wisconsin for the years 2006 through 2013 was as follows (in millions of dollars): \$594² (2006), \$585 (2007), \$652 (2008), \$535 (2009), \$529 (2010), \$688 (2011), \$1,020 (2012), and \$1,530² (2013).

In 2013, there were 2,670 employees in nonfuel mineral mines in Wisconsin and 655 in mills and preparation plants. In 2012, the corresponding numbers were 2,389 in nonfuel mineral mines and 678 in mills and preparation plants (U.S. Mine Safety and Health Administration, 2013, p. 17; 2014, p. 17). In 2013, the average annual wage in Wisconsin for all mining was \$60,533 compared with \$42,572 for all industries. In 2012, the corresponding figures were \$60,314 and \$41,764, respectively (National Mining Association, unpub. data, February 4, 2016).

In 2012–13, industrial sand and gravel was Wisconsin's leading nonfuel mineral commodity on the basis of value, followed by construction sand and gravel and crushed stone (table 1). The State ranked first in industrial sand production in both production quantity and value out of 32 producing States in 2012, and out of 33 in 2013, and the value of industrial sand production surpassed a billion dollars in 2013. Success in the application of hydraulic fracturing in the development of low-permeability oil and gas reservoirs in the United States and Canada led to high demand. Wisconsin's industrial sand is widely regarded as ideal for use in hydraulic fracturing because the State has several formations containing sand that has a high silica content, high crush resistance, and ideal sphericity, including the St. Peter Sandstone on which industry standards are based (Benson and Wilson, 2015). Much of Wisconsin's sand was readily accessible for surface mining, with relatively little overburden, though some underground mining did take place (Wisconsin Department of Natural Resources, 2012). Access to rail transportation was also an important factor,

¹The terms “nonfuel mineral production” and related “values” encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All USGS mineral production data published in this chapter are those available as of February 2016. Data in this report are rounded to three significant digits and percentages are calculated from unrounded data. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at <http://minerals.usgs.gov/minerals>.

²Partial total; excludes values that must be withheld to avoid disclosing company proprietary data.

as sand could only be transported relatively short distances before becoming uneconomical. Premium proppant sand was shipped by truck as far as 100 kilometers (60 miles) to rail or barge facilities; the cost advantage in having rail access led to additional rail investment in Wisconsin (Sobczak, 2013). Between July 2011 and July 2013, the number of permitted industrial sand mines increased from 28 to 105 (Maglio and Portle, 2013, p. 7).

Wisconsin remained one of the leading sources of dimension stone in the country. It produced a variety of types, including dolomite and limestone, primarily from Calumet, Fond Du Lac, and Manitowoc Counties, and granite from Marathon County. One of the leading five U.S. dimension limestone producers was based in Wisconsin (Dolley, 2015, p. 72.1).

Most crushed stone consisted of limestone and dolomite, with 187 quarries in 2013 compared with 8 granite quarries (table 2). One specific use (table 3) for crushed limestone was to provide raw material for four lime plants producing high-calcium quicklime and high-calcium hydrated lime in Brown and Douglas Counties, and dolomitic quicklime and dolomitic hydrate in Fond du Lac and Manitowoc Counties.

Some mineral commodities were produced from raw materials that were not mined in the State. These included synthetic gypsum as a byproduct of flue gas desulfurization, sulfur as a byproduct of petroleum refining, finished iron oxide pigments, expanded perlite, and steel produced mainly from scrap.

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TABLE 1
NONFUEL MINERAL PRODUCTION IN WISCONSIN^{1,2}

(Thousand metric tons and thousand dollars)

Mineral	2011		2012		2013	
	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	7	NA	7	NA	7
Lime	939	95,900	924	102,000	W	W
Peat	W	(3)	W	(3)	--	--
Sand and gravel:						
Construction	27,900 ^r	147,000 ^r	27,500	138,000	29,700	157,000
Industrial	5,510	280,000	10,700	611,000	19,800	1,210,000
Stone:						
Crushed	24,100 ^r	127,000 ^r	22,300	135,000	20,000	129,000
Dimension	170	38,600	158	37,900	156	37,200
Total	XX	688,000 ^r	XX	1,020,000	XX	1,530,000

^rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable. -- Zero.

¹Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

²Data are rounded to no more than three significant digits; may not add to totals shown.

³Withheld to avoid disclosing company proprietary data; included in "Total."

TABLE 2
WISCONSIN: CRUSHED STONE SOLD OR USED IN THE UNITED STATES, BY TYPE¹

Type	2012				2013			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone ²	185	18,700	\$114,000	\$6.10	187	16,700	\$108,000	\$6.46
Dolomite	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Marble	1	68	412	6.08	1	52	338	6.55
Granite	8	2,250	13,300	5.93	8	2,210	14,000	6.33
Traprock	3	1,170	6,990	5.97	3	918	6,060	6.61
Sandstone and quartzite ⁴	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Miscellaneous stone	2	139	825	5.92	2	127	775	6.10
Total or average	XX	22,300	135,000	6.07	XX	20,000	129,000	6.45

XX Not applicable.

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

²Includes limestone-dolomite reported with no distinction between the two kinds of stone.

³Withheld to avoid disclosing company proprietary data; included with "Limestone."

⁴Includes sandstone-quartzite reported with no distinction between the two kinds of stone.

⁵Withheld to avoid disclosing company proprietary data; included with "Miscellaneous stone."

TABLE 3
WISCONSIN: CRUSHED STONE SOLD OR USED BY PRODUCERS, BY USE¹

Use	2012			2013		
	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:						
Coarse aggregate (+1½ inch):						
Riprap and jetty stone	41	\$349	\$8.52	20	\$238	\$11.89
Filter stone	82	702	8.56	31	304	9.87
Unspecified coarse aggregate	125	861	6.89	11	170	15.06
Coarse aggregate, graded:						
Concrete aggregate, coarse	161	1,420	8.80	262	2,230	8.48
Bituminous aggregate, coarse	19	110	5.81	22	155	7.14
Bituminous surface-treatment aggregate	36	270	7.51	30	223	7.42
Railroad ballast	1	4	3.82	--	--	--
Unspecified graded coarse aggregate	702	5,290	7.54	176	1,500	8.49
Fine aggregate (-¾ inch):						
Stone sand, concrete	15	84	5.60	--	--	--
Stone sand, bituminous mix or seal	5	30	6.00	2	9	6.07
Screening, undesignated	173	511	2.96	56	334	5.94
Unspecified fine aggregate	155	852	5.50	133	1,210	9.12
Coarse and fine aggregates:						
Graded road base or subbase	2,390	13,300	5.56	2,630	14,900	5.65
Unpaved road surface	30	193	6.43	94	294	3.12
Crusher run or fill or waste	333	1,040	3.11	82	463	5.62
Unspecified coarse and fine aggregates	1,530	7,380	4.81	1,410	7,970	5.65
Unspecified and other construction materials	3	26	8.69	25	195	7.72
Agricultural:						
Agricultural Limestone	433	5,420	12.52	386	5,170	13.40
Unspecified and other agricultural uses	W	W	W	48	268	5.63
Chemical and metallurgical:						
Lime manufacture	W	W	W	W	W	W
Other miscellaneous uses and specified uses not listed						
Unspecified:²						
Reported	793	4,770	6.01	718	4,700	6.55
Estimated	15,200	92,100	6.08	13,600	87,000	6.40
Total or average	22,300	135,000	6.07	20,000	129,000	6.45

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

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

²Reported and estimated production without a breakdown by end use.

TABLE 4
WISCONSIN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2012, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) ²	W	W	95	588	W	W
Coarse aggregate, graded ³	W	W	W	W	W	W
Fine aggregate (-¾ inch) ⁴	28	141	W	W	W	W
Coarse and fine aggregates ⁵	1,940	10,500	1,400	6,200	W	W
Other construction materials	W	W	--	--	--	--
Agricultural ⁶	192	1,420	W	W	18	234
Chemical and metallurgical	--	--	W	W	--	--
Special	--	--	--	--	--	--
Other miscellaneous uses and specified uses not listed	--	--	--	--	--	--
Unspecified:⁷						
Reported	--	--	--	--	--	--
Estimated	2,600	15,800	3,250	19,700	3,920	23,900
Total	4,850	28,400	5,910	36,400	4,500	27,600
Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) ²	--	--	79	673	2	18
Coarse aggregate, graded ³	--	--	1	7	--	--
Fine aggregate (-¾ inch) ⁴	--	--	15	57	--	--
Coarse and fine aggregates ⁵	W	W	305	1,880	81	508
Other construction materials	--	--	--	--	--	--
Agricultural ⁶	--	--	41	443	--	--
Chemical and metallurgical	--	--	--	--	--	--
Special	--	--	--	--	--	--
Other miscellaneous uses and specified uses not listed	--	--	--	--	--	--
Unspecified:⁷						
Reported	744	4,400	--	--	50	368
Estimated	1,460	8,890	2,100	12,800	614	3,720
Total	2,350	13,900	2,540	15,800	746	4,610
Use	District 7		District 8		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) ²	--	--	W	W	--	--
Coarse aggregate, graded ³	--	--	W	W	--	--
Fine aggregate (-¾ inch) ⁴	--	--	W	W	--	--
Coarse and fine aggregates ⁵	--	--	W	W	--	--
Other construction materials	--	--	--	--	--	--
Agricultural ⁶	--	--	W	W	--	--
Chemical and metallurgical	--	--	--	--	--	--
Special	--	--	--	--	--	--
Other miscellaneous uses and specified uses not listed	--	--	--	--	--	--
Unspecified:⁷						
Reported	--	--	--	--	--	--
Estimated	101	616	600	3,650	508	3,090
Total	101	616	779	4,850	508	3,090

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

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

²Includes riprap and jetty stone, filter stone, and unspecified coarse aggregate.

³Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and unspecified graded coarse aggregate.

⁴Includes stone sand (concrete), stone sand (bituminous mix or seal), screening (undesignated), and unspecified fine aggregate.

⁵Includes graded road base or subbase, unpaved road surface, crusher run, and unspecified coarse and fine aggregates.

⁶Includes agricultural limestone and other agricultural uses.

⁷Reported and estimated production without a breakdown by end use.

TABLE 5
WISCONSIN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2013, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) ²	17	156	W	W	W	W
Coarse aggregate, graded ³	155	1,260	W	W	90	647
Fine aggregate (-¾ inch) ⁴	83	547	W	W	W	W
Coarse and fine aggregates ⁵	2,650	15,000	1,110	6,100	98	551
Other construction materials	W	W	--	--	--	--
Agricultural ⁶	197	1,590	W	W	W	W
Chemical and metallurgical	--	--	--	--	--	--
Special	--	--	--	--	--	--
Other miscellaneous uses and specified uses not listed ⁷	W	W	--	--	--	--
Unspecified:⁸						
Reported	--	--	--	--	--	--
Estimated	1,920	12,600	3,390	20,300	3,440	22,500
Total	5,030	31,100	5,010	32,600	3,920	25,800
Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) ²	--	--	W	W	1	10
Coarse aggregate, graded ³	--	--	W	W	--	--
Fine aggregate (-¾ inch) ⁴	--	--	W	W	--	--
Coarse and fine aggregates ⁵	W	W	W	W	21	174
Other construction materials	W	W	W	W	--	--
Agricultural ⁶	--	--	--	--	--	--
Chemical and metallurgical	--	--	--	--	--	--
Special	--	--	--	--	--	--
Other miscellaneous uses and specified uses not listed ⁷	W	W	--	--	--	--
Unspecified:⁸						
Reported	718	4,700	--	--	--	--
Estimated	1,290	8,450	2,400	15,700	598	3,880
Total	2,260	14,300	2,470	16,300	620	4,060
Use	District 7		District 8		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) ²	--	--	W	W	--	--
Coarse aggregate, graded ³	--	--	--	--	--	--
Fine aggregate (-¾ inch) ⁴	--	--	W	W	--	--
Coarse and fine aggregates ⁵	--	--	W	W	--	--
Other construction materials	--	--	--	--	--	--
Agricultural ⁶	--	--	W	W	--	--
Chemical and metallurgical	--	--	--	--	--	--
Special	--	--	--	--	--	--
Other miscellaneous uses and specified uses not listed ⁷	--	--	--	--	--	--
Unspecified:⁸						
Reported	--	--	--	--	--	--
Estimated	77	504	441	2,890	25	165
Total	77	504	548	3,810	25	165

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

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

²Includes riprap and jetty stone, filter stone, and unspecified coarse aggregate.

³Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and unspecified graded coarse aggregate.

⁴Includes stone sand (concrete), stone sand (bituminous mix or seal), screening (undesigned), and unspecified fine aggregate.

⁵Includes graded road base or subbase, unpaved road surface, crusher run, and unspecified coarse and fine aggregates.

⁶Includes agricultural limestone and other agricultural uses.

⁷Includes drain fields, waste material, lightweight aggregate (slate), pipe bedding, refractory stone (including ganister), and other miscellaneous uses.

⁸Reported and estimated production without a breakdown by end use.

TABLE 6
WISCONSIN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2012,
BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,900	\$14,700	\$5.07
Concrete products (blocks, bricks, pipe, decorative, and so forth) ²	3	20	6.67
Asphaltic concrete aggregates and other bituminous mixtures	1,440	9,700	6.73
Road base and coverings	3,330	15,500	4.66
Road stabilization (cement and lime)	71	393	5.54
Fill	1,310	3,720	2.84
Snow and ice control	115	847	7.37
Other miscellaneous uses ³	703	4,010	5.71
Unspecified: ⁴			
Reported	861	4,560	5.30
Estimated	16,800	84,100	5.02
Total or average	27,500	138,000	5.00

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

²Includes plaster and gunite sands.

³Includes filtration, golf course, railroad ballast, and roofing granules.

⁴Reported and estimated production without a breakdown by end use.

TABLE 7
WISCONSIN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2013,
BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	1,710	\$9,030	\$5.30
Concrete products (blocks, bricks, pipe, decorative, and so forth) ²	3	18	6.00
Asphaltic concrete aggregates and other bituminous mixtures	373	1,940	5.19
Road base and coverings	1,600	8,200	5.14
Road stabilization (lime)	194	1,490	7.66
Fill	985	3,240	3.29
Snow and ice control	176	745	4.23
Other miscellaneous uses ³	2,620	18,400	7.01
Unspecified: ⁴			
Reported	754	5,100	6.76
Estimated	21,300	109,000	5.13
Total or average	29,700	157,000	5.30

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

²Includes plaster and gunite sands.

³Includes filtration, railroad ballast, and roofing granules.

⁴Reported and estimated production without a breakdown by end use.

TABLE 8
WISCONSIN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2012,
BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	355	1,610	1,660	8,200	280	1,490
Asphaltic concrete aggregates and road base materials ³	135	737	W	W	346	1,620
Fill	137	596	184	733	182	449
Other miscellaneous uses ⁴	230	1,330	W	W	112	544
Unspecified: ⁵						
Reported	10	64	20	120	68	377
Estimated	1,710	8,550	3,410	17,100	2,230	11,200
Total	2,570	12,900	7,550	38,700	3,220	15,700
Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	W	W	W	W	W	W
Asphaltic concrete aggregates and road base materials ³	W	W	W	W	W	W
Fill	161	192	326	941	174	377
Other miscellaneous uses ⁴	241	1,300	39	392	71	403
Unspecified: ⁵						
Reported	688	3,520	--	--	48	383
Estimated	2,380	11,900	1,840	9,220	2,710	13,600
Total	3,640	17,800	2,700	13,600	3,920	20,300
Use	District 7		District 8		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	W	W	W	W	--	--
Asphaltic concrete aggregates and road base materials ³	W	W	W	W	--	--
Fill	105	234	38	199	--	--
Other miscellaneous uses ⁴	6	35	15	237	--	--
Unspecified: ⁵						
Reported	25	81	2	16	--	--
Estimated	964	4,830	754	3,780	769	3,860
Total	1,700	7,690	1,440	6,990	769	3,860

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

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

²Includes plaster and gunite sands.

³Includes road and other stabilization (cement and lime).

⁴Includes filtration, golf course, railroad ballast, roofing granules, and snow and ice control.

⁵Reported and estimated production without a breakdown by end use.

TABLE 9
WISCONSIN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2013,
BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	W	W	W	W	298	1,390
Asphaltic concrete aggregates and road base materials ³	W	W	W	W	444	2,360
Fill	102	356	128	521	72	248
Other miscellaneous uses ⁴	299	1,950	70	473	56	327
Unspecified: ⁵						
Reported	12	81	23	113	53	344
Estimated	2,090	10,300	6,840	35,200	2,640	13,700
Total	2,880	15,000	8,250	42,600	3,560	18,400
Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	W	W	W	W	W	W
Asphaltic concrete aggregates and road base materials ³	W	W	W	W	W	W
Fill	41	54	139	442	266	939
Other miscellaneous uses ⁴	--	--	2,210	15,700	66	268
Unspecified: ⁵						
Reported	628	4,280	--	--	8	118
Estimated	1,700	8,710	2,900	15,200	2,460	12,300
Total	2,560	14,100	5,400	32,300	3,060	15,600
Use	District 7		District 8		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	W	W	W	W	--	--
Asphaltic concrete aggregates and road base materials ³	W	W	W	W	--	--
Fill	117	167	119	510	--	--
Other miscellaneous uses ⁴	25	54	74	366	--	--
Unspecified: ⁵						
Reported	7	23	22	142	--	--
Estimated	1,120	5,710	1,110	5,670	425	2,190
Total	1,690	7,880	1,860	9,050	425	2,190

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

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

²Includes plaster and gunite sands.

³Includes road and other stabilization (lime).

⁴Includes filtration, railroad ballast, roofing granules, and snow and ice control.

⁵Reported and estimated production without a breakdown by end use.