



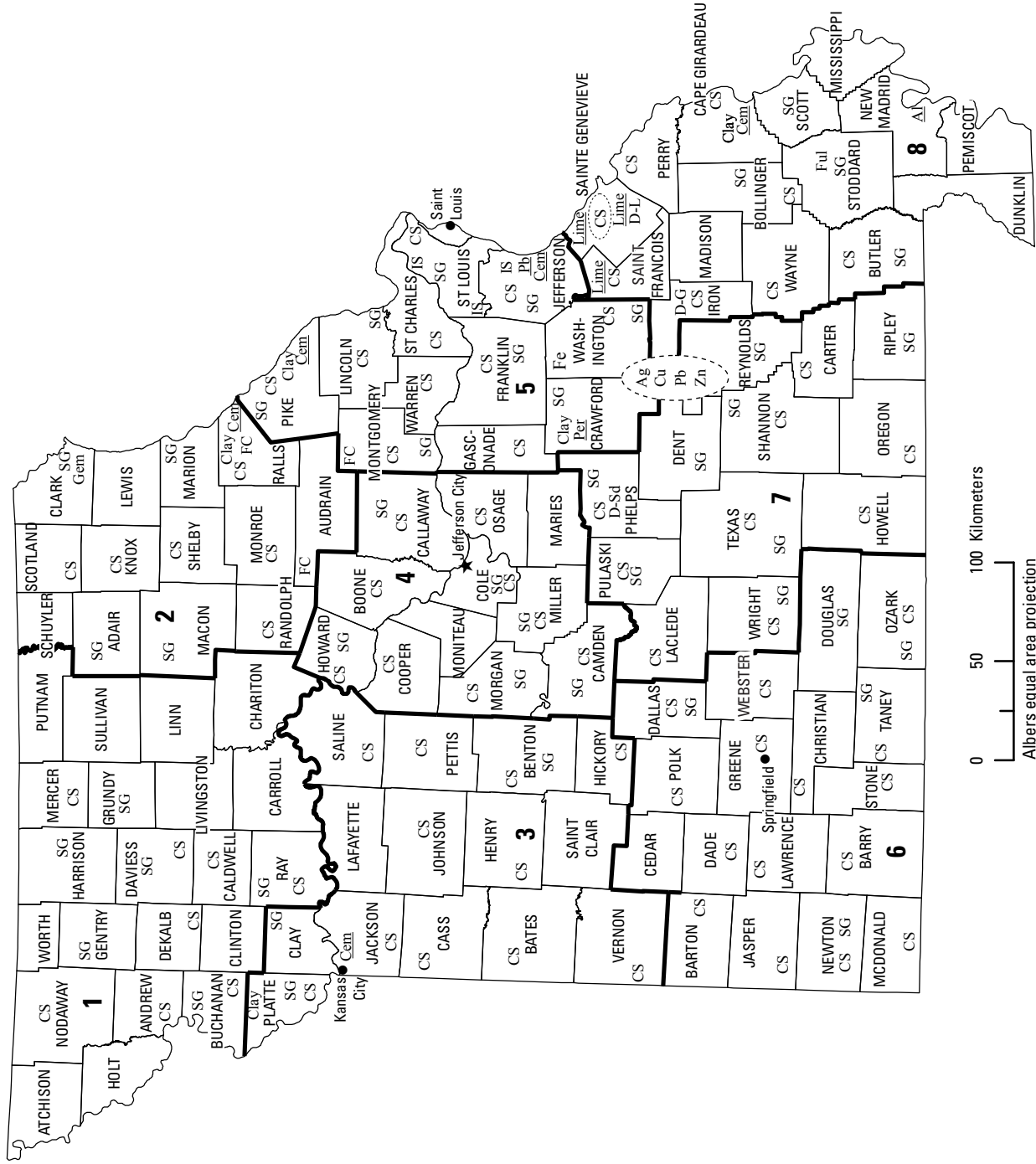
# 2009 Minerals Yearbook

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## MISSOURI

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Source: Missouri Department of Natural Resources, Division of Geology and Land Survey/U.S. Geological Survey (2009).

# THE MINERAL INDUSTRY OF MISSOURI

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Missouri Department of Natural Resources, Division of Geology and Land Survey for collecting information on all nonfuel minerals.

In 2009, Missouri's nonfuel raw mineral production<sup>1</sup> was valued at \$1.81 billion, based upon annual U.S. Geological Survey (USGS) data. This was a \$250 million, or 12%, decrease from the State's total nonfuel mineral production value of \$2.06 billion for 2008, which followed a \$220 million, or a nearly 10%, decrease from 2007 to 2008. For the third consecutive year, the State remained ninth among the 50 States in total nonfuel mineral production value and accounted for about 3% of the U.S. total of \$59 billion. The top four mineral commodities in the State were crushed stone, portland cement, lead, and lime, in descending order of production value. Crushed stone and portland cement accounted for 57% of the State's total nonfuel mineral value.

In 2009, only three mineral commodities produced in Missouri increased in production value—industrial sand and gravel, up by \$7.6 million, fuller's earth, and gemstones (actual data withheld for both—company proprietary data), in descending order of increase. All other mineral commodities decreased in production value, led by decreases in lead and copper (actual data withheld for both—company proprietary data), and portland cement, down by \$17 million.

In 2009, industrial sand and gravel increased by 115,000 metric tons (t), or 18%, in production quantity. The only other mineral commodities to increase in production quantity were fire clay and fuller's earth. There was no significant change in the quantity of dimension stone produced between 2008 and 2009. All other commodities produced in the State decreased in production quantity, including crushed stone, down by 8.7 million metric tons (Mt), or 11%; construction sand and gravel, down by 900,000 t, or 7%; and portland cement down by 233,000 t, or 5%.

Missouri continued to lead the Nation in the production of fire clay and lime, among 6 and 33 producing States, respectively. This is the 14th consecutive year Missouri has led the Nation in quantity of lime produced. The State remained 2d in fuller's earth, 3d in crushed stone, and 12th in masonry cement. The State rose to 2d from 4th in zinc, to 3d from 6th in portland cement, and to 13th from 17th in industrial sand and gravel. The State rose to 19th from 22d in gemstones (based on production value). The State ranked among the top 30 producing States for construction sand and gravel among 50 producing States. Lead was the only commodity that declined in rank, to second from

<sup>1</sup>The 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 2009 USGS mineral production data published in this chapter are those available as of September 2011. 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>.

first, among five producing States. Missouri had continuously ranked first in the production quantity of lead since 1907, except briefly when it ranked second in 1962 owing to a labor strike (Diamond and Hayes, 1963, p. 613; Thom, 1909, p. 39–47). Alaska was the top lead-producing State in 2009.

The Missouri Department of Natural Resources, Division of Geology and Land Survey<sup>2</sup> (DGLS), provided the following narrative information. Some data or information as reported by the DGLS may differ from USGS estimates and production figures. Production tonnages, as reported by mineral facilities to the Missouri Division of Labor Standards, are summarized to avoid disclosing information that may be considered proprietary by the individual companies.

## Commodity Review

### *Industrial minerals*

**Cement.**—Production of portland cement in Missouri took place at six plants. Buzzi Unicem USA Inc. (Bethlehem, PA) operated its River Cement (Selma) plant, south of Festus, Jefferson County, and its plant near Cape Girardeau, Cape Girardeau County. Continental Cement Co. LLC (Chesterfield, MO) operated the Hannibal plant, Ralls County. Holcim (US) Inc. (Waltham, MA) briefly operated its Clarksville plant, Pike County, which permanently closed in the early part of the year. In August, Holcim opened the 4-million-metric-ton-per-year Ste. Genevieve plant north of Ste. Genevieve, Ste. Genevieve County (Associated Press, 2008). Lafarge North America Inc. (Chicago, IL) operated the Sugar Creek plant, Jackson County, on the Missouri River just east of Kansas City.

**Clay and Shale.**—Twelve companies reported a total of 1.1 Mt of clay production to the State. Production included fire clay and fuller's earth. Nestle Purina Petcare Co. in Stoddard County was the leading clay producer. Four companies produced a total of 400,000 t of shale, most of which was mined and used by Continental Cement and Holcim in the production of portland cement. Buildex Inc. (Ottawa, KS) continued to produce haydite from the Weston Shale in Platte County, just northwest of Kansas City. Ceramo Co. (Jackson, MO) stopped producing shale in southeastern Missouri and Holcim stopped producing shale for its Clarksville cement plant early in the year.

**Lime.**—Lhoist North America (Fort Worth, TX; formerly Chemical Lime Co.) and Mississippi Lime Co. (St. Louis, MO) continued to produce quicklime and hydrated lime at their lime plants in Ste. Genevieve County in southeastern Missouri.

<sup>2</sup>Patrick S. Mulvany, Geologist and Chief, Industrial Minerals Unit, authored the text of the State mineral industry information provided by the Missouri Department of Natural Resources, Division of Geology and Land Survey.

**Sand and Gravel, Construction.**—Construction sand and gravel continued to be extracted from rivers, streams, and flood plains over much of the State. The material from south of the Missouri River had high chert content.

**Sand, Silica.**—Four companies produced high-quality quartz sandstone from the St. Peter Sandstone—Buzzi Unicem, in Jefferson County; Proppant Specialists LLC (Brandy, TX), in Perry County; Unimin Corp. (New Canaan, CT), in Jefferson County; and U.S. Silica Co. (Frederick, MD), in St. Louis County. The total production reported to the State was 800,000 t. Proppant Specialists produced 40–70-mesh hydraulic-fracture sand size that was used by the oil and gas well-servicing industry as a propping agent in shale formations.

**Stone, Crushed.**—SGI Granules Inc. (Hagerstown, MD; formerly ISP Minerals Inc.) and CertainTeed Corp. (Valley Forge, PA) produced crushed rhyolite roofing granules from their mines and processing facilities in Iron and Wayne Counties, respectively. Graniteville Quarry LLC (Ironton, MO) produced crushed granite in Iron County. Dillon Llewellyn LLC and Iron Mountain Trap Rock Co. (Maryland Heights, MO; a subsidiary of Fred Weber, Inc.) produced a dark-colored, crushed rhyolite in Iron and St. Francois Counties, respectively. This dark-colored rhyolite was known as “trap rock” in the industry. Crushed limestone (including dolomite) was produced at surface mines throughout most of the State. Underground mining of crushed limestone and some crushed dolomite took place in Clay, Greene, Jackson, Jasper, Platte, Stone, and Taney Counties. In addition to creating aggregate, some mines were then planned to be used as underground storage space.

**Stone, Dimension.**—Missouri Red Quarries Inc. produced granitic dimension stone in Iron County. Dimension stone from dolomite, limestone, and sandstone was produced at several locations in the State.

## Metals

**Copper, Lead, Silver, and Zinc.**—Production of copper, lead, silver, and zinc came entirely from underground mines operated by Doe Run Resources Corp. (St. Louis, MO) in the Viburnum Trend Subdistrict of the Southeast Missouri Lead District, encompassing Crawford, Dent, Iron, Reynolds, and Shannon Counties. Total combined production of copper, lead, and zinc concentrates reported to the State was about 300,000 t. Lead concentrate accounted for the majority of this total. Doe Run’s primary smelter in Herculaneum, Jefferson County, continued to operate. An unknown amount of silver was recovered as a byproduct of the smelting process. The company’s Glover smelter, in Iron County, remained on care-and-maintenance status. Doe Run’s Buick Resource Recycling Division continued to operate its lead recycling plant near the town of Boss, Dent County (Doe Run Resources Corp., 2009, p. 3–4).

**Iron Ore.**—Wings Enterprise Inc. continued to process iron ore tailings at the Pea Ridge Mine in Washington County into a small amount of magnetite-hematite concentrates. The mine was abandoned in 2000, and no announcement was made to reopen it.

## Government Programs and Activities

In July, the DGLS participated in the Missouri Minerals Education Foundation week-long teachers’ workshop that was held at William Jewell College in Liberty, Clay County. The DGLS also participated in several other educational outreach opportunities by giving talks and demonstrations to primary and secondary school students and to youth groups.

Late in the year, the DGLS finished compiling all of its previously published paper issues of “Bibliography of the Geology of Missouri” into a searchable digital database. This database can be found at <http://dnr.mo.gov/asp/dgls/bibliography/search.asp>.

The State continued to be a participant in the STATEMAP Program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. The DGLS continued to make geologic and 7.5-minute quadrangle maps in the Fulton project area, in Callaway County, as part of the STATEMAP program. The Missouri Department of Transportation provided rigs and crews that drilled holes in the project area in support of creating the surficial geologic maps.

## References Cited

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TABLE 1  
NONFUEL RAW MINERAL PRODUCTION IN MISSOURI<sup>1,2</sup>

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	5,230	515,000 <sup>e</sup>	4,650	451,000 <sup>e</sup>	4,420	434,000 <sup>e</sup>
Clays, common	426	2,880	496	3,470	421	3,020
Sand and gravel:						
Construction	14,300 <sup>r</sup>	78,500 <sup>r</sup>	12,400 <sup>r</sup>	76,200 <sup>r</sup>	11,500	71,900
Industrial	642	19,400	648	21,400	763	28,900
Stone, crushed	83,900	630,000	76,400 <sup>r</sup>	614,000 <sup>r</sup>	67,700	598,000
Combined values of cadmium (byproduct from zinc concentrates), cement (masonry), clays (fire, fuller's earth), copper, gemstones (natural), lead, lime, silver, stone (dimension, granite), zinc	XX	1,040,000	XX	892,000 <sup>r</sup>	XX	672,000
Total	XX	2,280,000	XX	2,060,000	XX	1,810,000

<sup>e</sup>Estimated. <sup>r</sup>Revised. XX not applicable.

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

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

TABLE 2  
MISSOURI: CRUSHED STONE SOLD OR USED, BY TYPE<sup>1</sup>

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone <sup>2</sup>	212 <sup>r</sup>	69,800 <sup>r</sup>	\$462,000 <sup>r</sup>	201	61,800	\$460,000
Dolomite	17	2,400	16,200	20	2,350	17,100
Granite	3	1,380	111,000	3	1,200	101,000
Traprock	2 <sup>r</sup>	2,550 <sup>r</sup>	19,900 <sup>r</sup>	2	2,160	15,800
Miscellaneous stone	5 <sup>r</sup>	294 <sup>r</sup>	4,810 <sup>r</sup>	4	259	3,830
Total	XX	76,400 <sup>r</sup>	614,000 <sup>r</sup>	XX	67,700	598,000

<sup>r</sup>Revised. XX Not applicable.

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

<sup>2</sup>Includes limestone-dolomite reported with no distinction between the two.

TABLE 3  
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS  
IN 2009, BY USE<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	194	1,570
Riprap and jetty stone	2,070	16,500
Filter stone	262	2,640
Other coarse aggregate	727	4,910
Coarse aggregate, graded:		
Concrete aggregate, coarse	1,800	15,900
Bituminous aggregate, coarse	437	3,900
Bituminous surface-treatment aggregate	36	397
Railroad ballast	450	2,970
Other graded coarse aggregate	324	2,350
Fine aggregate (-¾ inch):		
Stone sand, concrete	54	543
Stone sand, bituminous mix or seal	12	75
Screening, undesignated	265	790
Other fine aggregate	315	3,220
Coarse and fine aggregates:		
Graded road base or subbase	3,530	21,000
Unpaved road surfacing	1,620	12,900
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	445	2,560
Roofing granules	W	W
Other coarse and fine aggregates	458	2,670
Other construction materials	59	469
Agricultural, limestone	548	2,750
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Special, asphalt fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	2	13
Unspecified: <sup>2</sup>		
Reported	7,050	54,700
Estimated	41,000	319,000
Total	67,700	598,000

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

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

<sup>2</sup>Reported and estimated production without a breakdown by end use.

TABLE 4  
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch) <sup>2</sup>	W	W	W	W	W	W	W	W
Coarse aggregate, graded <sup>3</sup>	W	W	W	W	190	1,570	W	W
Fine aggregate (-¾ inch) <sup>4</sup>	W	W	W	W	W	W	W	W
Coarse and fine aggregates <sup>5</sup>	W	W	320	2,510	384	2,530	192	1,440
Other construction materials	--	--	--	--	--	--	--	--
Agricultural <sup>6</sup>	W	W	W	W	W	W	W	W
Chemical and metallurgical <sup>7</sup>	W	W	W	W	--	--	--	--
Special <sup>8</sup>	--	--	--	--	W	W	--	--
Other miscellaneous uses	--	--	--	--	--	--	--	--
Unspecified: <sup>9</sup>								
Reported	144	1,140	356	3,070	2,900	22,900	857	5,950
Estimated	2,270	18,800	1,180	9,620	5,410	37,800	4,250	33,900
Total	3,490	32,200	3,660	25,200	9,240	67,400	5,410	42,100
Use	District 5		District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch) <sup>2</sup>	499	3,566	W	W	W	W	W	W
Coarse aggregate, graded <sup>3</sup>	434	3,295	709	6,556	W	W	1,171	7,613
Fine aggregate (-¾ inch) <sup>4</sup>	133	325	W	W	W	W	W	W
Coarse and fine aggregates <sup>5</sup>	1,352	7,767	676	4,133	W	W	W	W
Other construction materials	18	85	40	385	--	--	--	--
Agricultural <sup>6</sup>	W	W	161	864	W	W	W	W
Chemical and metallurgical <sup>7</sup>	W	W	--	--	--	--	W	W
Special <sup>8</sup>	--	--	--	--	--	--	W	W
Other miscellaneous uses	2	13	--	--	--	--	--	--
Unspecified: <sup>9</sup>								
Reported	838	7,217	171	1,187	--	--	1,783	13,319
Estimated	7,865	54,397	7,343	61,861	1,613	12,841	11,121	89,982
Total	12,168	81,521	9,299	76,622	2,012	15,344	22,211	254,969
Unspecified districts								
Use	Quantity		Value		Quantity		Value	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch) <sup>2</sup>	21	219						
Coarse aggregate, graded <sup>3</sup>	98	1,310						
Fine aggregate (-¾ inch) <sup>4</sup>	9	129						
Coarse and fine aggregates <sup>5</sup>	125	1,270						
Other construction materials	--	--						
Agricultural <sup>6</sup>	--	--						
Chemical and metallurgical <sup>7</sup>	15	130						
Special <sup>8</sup>	--	--						
Other miscellaneous uses	--	--						
Unspecified: <sup>9</sup>								
Reported	--	--						
Estimated	--	--						
Total	268	3,060						

See footnotes at end of table.

TABLE 4—Continued  
 MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT<sup>1</sup>

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

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

<sup>2</sup>Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

<sup>3</sup>Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.

<sup>4</sup>Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

<sup>5</sup>Includes crusher run or fill or waste, graded road base or subbase, roofing granules, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

<sup>6</sup>Includes limestone.

<sup>7</sup>Includes cement and lime manufacture.

<sup>8</sup>Includes asphalt fillers or extenders.

<sup>9</sup>Reported and estimated production without a breakdown by end use.

TABLE 5  
 MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,  
 BY MAJOR USE CATEGORY<sup>1</sup>

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	5,260	\$32,100	\$6.10
Plaster and gunit sands	79	545	6.90
Concrete products (blocks, bricks, pipe, decorative, etc.)	290	2,130	7.36
Asphaltic concrete aggregates and other bituminous mixtures	241	1,780	7.38
Road base and coverings	35	269	7.69
Fill	154	808	5.25
Snow and ice control	7	42	6.00
Other miscellaneous uses <sup>2</sup>	17	199	11.71
Unspecified: <sup>3</sup>			
Reported	735	4,650	6.32
Estimated	4,670	29,400	6.30
Total or average	11,500	71,900	6.26

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

<sup>2</sup>Includes railroad ballast and roofing granules.

<sup>3</sup>Reported and estimated production without a breakdown by end use.



TABLE 6  
MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products <sup>2</sup>	W	W	W	W	--	--
Asphaltic concrete aggregates and road base materials	W	W	W	W	--	--
Fill	W	W	W	W	--	--
Other miscellaneous uses <sup>3</sup>	3	21	1	5	--	--
Unspecified: <sup>4</sup>						
Reported	227	1,250	3	5	(5)	2
Estimated	372	2,380	256	1,640	1,530	9,790
Total	970	5,820	327	2,140	1,530	9,790
Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products <sup>2</sup>	(6)	(6)	(6)	(6)	--	--
Asphaltic concrete aggregates and road base materials	(6)	(6)	(6)	(6)	--	--
Fill	27	90	108	631	--	--
Other miscellaneous uses <sup>3</sup>	1,270	7,750	3,870	24,400	(5)	2
Unspecified: <sup>4</sup>						
Reported	499	3,300	--	--	6	38
Estimated	118	885	1,660	10,300	41	263
Total	1,910	12,000	5,640	35,300	47	302
Use	District 7		District 8			
	Quantity	Value	Quantity	Value		
Concrete aggregate and concrete products <sup>2</sup>	W	W	W	W		
Asphaltic concrete aggregates and road base materials	W	W	W	W		
Fill	W	W	--	--		
Other miscellaneous uses <sup>3</sup>	(5)	4	--	--		
Unspecified: <sup>4</sup>						
Reported	--	--	--	--		
Estimated	417	2,660	269	1,450		
Total	445	3,140	620	3,370		

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

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

<sup>2</sup>Includes plaster and gunite sands.

<sup>3</sup>Includes railroad ballast, roofing granules, and snow and ice control.

<sup>4</sup>Reported and estimated production without a breakdown by end use.

<sup>5</sup>Less than ½ unit.

<sup>6</sup>Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."