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2008 Minerals Yearbook

MISSOURI

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U.S. Geological Survey

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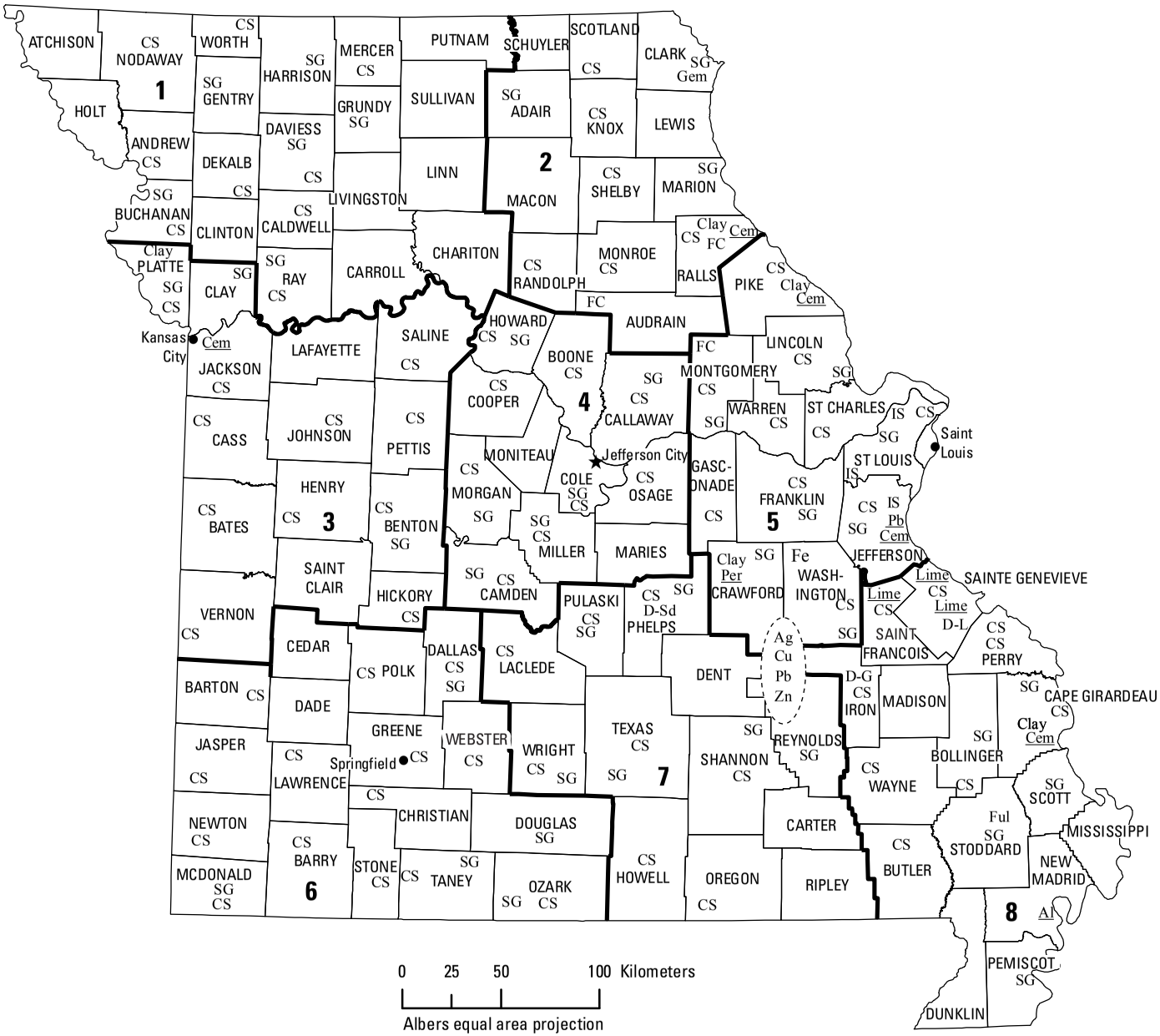
MISSOURI



LEGEND

- County boundary
- ★ Capital
- ● City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Ag	Silver
Al	Aluminum plant
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
D-G	Dimension granite
D-L	Dimension limestone
D-Sd	Dimension sandstone
FC	Fire clay
Fe	Iron
Ful	Fuller's earth
Gem	Gemstones
IS	Industrial sand
Lime	Lime plant
Pb	Lead
Pb	Lead plant
Per	Perlite
SG	Construction sand and gravel
Zn	Zinc

Concentration of mineral operations

Source: Missouri Department of Natural Resources, Division of Geology and Land Survey/U.S. Geological Survey (2008).

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 2008, Missouri's nonfuel raw mineral production[1] was valued at $2.06 billion, based upon annual U.S. Geological Survey (USGS) data. This was nearly a 10% decrease from the State's total nonfuel mineral production value of $2.28 billion for 2007, which followed a 13% ($269 million) increase from 2006 to 2007. The State remained 9th among the 50 States in total nonfuel mineral production value and accounted for 2.9% of the U.S. total.

Crushed stone remained Missouri's top-produced mineral commodity by value, and accounted for 29.2% of the State's total production value. The values of the subsequent leading mineral commodities (lead, portland cement, lime, construction sand and gravel, and zinc, listed in descending order of value), together with the value of crushed stone, made up 94% of Missouri's total mineral production value.

Despite a decreased total mineral industry value, increases in individual mineral commodity values were led by lime and copper. Lime increased by nearly $20 million and copper increased by $3.4 million. Significant increases also took place in the value of industrial sand and gravel and fire clay, increasing by slightly less than $2 million each. Other mineral commodities to gain in value were common clay and gemstones. The decline in Missouri's total mineral industry value was led by an $87.5 million decrease in the value of lead, which resulted from a nearly 12% decrease in quantity produced. Substantial decreases also took place in the values of zinc, portland cement and crushed stone, all of which are among the State's highest-produced mineral commodities. Portland cement saw a $64 million decline in its value and crushed stone decreased more than $28 million. The significant drop in zinc's value was brought about by a more than 42% decline in the commodity's unit value and a 20% decline in quantity produced. Other mineral commodities that decrease in value include cadmium byproduct of zinc concentrates, construction sand and gravel, masonry cement, and silver.

In 2008, Missouri remained first in the production of lead and lime and rose from second to first in fireclay production. The State also remained second in the production of fuller's earth, and sixth in both portland cement (of 36 producing States) and copper (of six producing States). Missouri rose in rank from fourth to third in the production of crushed stone, accounting for more than 5% of the U.S. total production quantity. Additionally, the State rose from 20th to 14th in the production of common clay. The State dropped in rank from second to fourth in the production of both zinc and cadmium in zinc, from 10th to 12th in masonry cement production, and from seventh to eighth in silver production. Missouri ranked fourth among 11 States in the production of aluminum. The State produced a significant amount of construction and industrial sand and gravel as well.

The Missouri Department of Natural Resources, Division of Geology and Land Survey[2] (DGLS), provided the following narrative information. Some data or information as reported by the DGLS may differ from USGS estimates and production figures.

Overview

In 2008, nonfuel mineral production included cement, clay and shale, construction sand and gravel, copper concentrates, crushed stone (dolomite, granite, limestone, rhyolite, and trap rock), dimension stone (dolomite, granite, limestone, and sandstone), iron ore, lead concentrates, lime, silica sand, silver contained in metal concentrates, and zinc concentrates.

Production tonnages as reported by the industry to the Missouri Division of Labor Standards are included in a general manner that avoids the risk of disclosing information that may be considered proprietary by the individual companies.

Commodity Review

Industrial Minerals

Cement.—Production of portland cement continued to be from five plants. Continental Cement Co. LLC operated the Hannibal plant; Holcim (US) Inc. operated the Clarksville plant; Buzzi Unicem USA Inc. operated the Cape Girardeau plant and the Selma plant; and Lafarge North America Inc. operated the Sugar Creek plant. The first two were along the Mississippi River north of St. Louis; the second two were along the Mississippi River south of St. Louis; and the fifth was along the Missouri River just east of Kansas City. The Cape Girardeau plant was the only one that produced masonry cement.

Holcim announced that construction on its Lee Island cement production facility was on schedule and predicted that production would begin in the second half of 2009. The plant would be located along the Mississippi River in extreme northern Ste. Genevieve County and would have a 4 million metric ton (Mt) capacity. Holcim also reported an approximate 0.6 Mt decrease in production at its Clarksville plant owing to replacement of a cooler. Holcim announced that plans were

[1]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 2008 USGS mineral production data published in this chapter are those available as of August 2010. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]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, Geologic Resources Section.

being made to close the Clarksville plant permanently in early 2009.

Clay and Shale.—There were 11 companies that reported a total of 1.0 Mt of clay production to the Missouri Division of Labor Standards. 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 0.7 Mt of shale, most of which was mined and used by Continental Cement and Holcim to make portland cement. Buildex Inc. continued to produce haydite from the Weston Shale it mined in Platte County, just northwest of Kansas City. Ceramo Co. continued to produce shale in southeastern Missouri and manufacture ceramic products.

Lime.—Chemical Lime Co. and Mississippi Lime Co. continued to produce quicklime and hydrated lime at their lime plants located in Ste. Genevieve County in southeastern Missouri.

Sand and Gravel, Construction.—Sand and gravel continued to be extracted from rivers, streams, and floodplains over much of the State. The material from the Ozarks region had high chert content.

Silica Sand.— Buzzi Unicem, Proppant Specialists LLC, Unimin Corp., and U.S. Silica Co. produced high-purity quartz sand from the St. Peter Sandstone in Jefferson, Perry, and St. Louis Counties. Total production of 0.9 Mt was reported to the Missouri Division of Labor Standards. The Perry County operation specialized in producing 40 to 70 and 70 to 140 size-grades that were used by the oil and gas well-servicing industry as a hydraulic fracture propping agent in shale formations.

Stone, Crushed.—ISP Minerals and Certainteed Corp. produced crushed rhyolite roofing granules from their mines and processing facilities in Iron and Wayne Counties. Graniteville Quarry LLC produced crushed granite in Iron County. In St. Francois County, Iron Mountain Trap Rock Co. produced crushed rhyolite that is dark in color. Nearby in Iron County, Dillon Llewellyn LLC produced similar crushed rhyolite rock. This dark-colored rhyolite was called "trap rock" by the industry.

Surface mining of crushed limestone (dolomite included) took place throughout most of the State. Underground mining of crushed limestone and some dolomite was conducted in Clay, Greene, Jackson, Jasper, Platte, Stone, and Taney Counties for the purpose of creating underground storage space.

Stone, Dimension.—Missouri Red Quarries Inc. produced granite dimension stone in Iron County. Dimension sandstone, dolomite, and limestone were produced at several locations in the State. Marble was being cut on a limited basis from old blocks at the historic Phenix quarry in northwestern Greene County.

Metals

Copper, Lead, Silver, and Zinc.—All production of these metals came from The Doe Run Company underground mines in the Viburnum Trend portion of the Southeast Missouri Lead District. Total production reported to the Missouri Division of Labor Standards was about 0.34 Mt of combined copper in concentrates, lead, and zinc. The lead portion dominated the zinc-plus-copper portion by a factor of 3.4.

Doe Run's Herculaneum smelter continued to operate. An unknown amount of silver was recovered as a byproduct from the smelting of concentrates. The Glover smelter remained on care-and-maintenance status. The Doe Run Buick Resource Recycling Division continued to operate its lead recycling plant near the town of Boss.

Iron Ore.—Wings Enterprise Inc. continued to process tailings at the Pea Ridge Mine in Washington County into a small amount of magnetite-hematite concentrates. It was not known whether the underground mine, abandoned in 2000, would be reopened anytime in the foreseeable future.

Legislation, Government Programs, and Other Activities

On May 1, the Division used the Geologic Resources Fund to create its Industrial Minerals Unit, which was staffed with one full-time geologist through the yearend. Late in the year, DGLS began compiling all of its previously published paper issues of "Bibliography of the Geology of Missouri" into a searchable digital database.

In July, DGLS participated in the Missouri Minerals Education Foundation (MMEF) weeklong teachers' workshop that was held at Mineral Area College, Park Hills, Missouri. This annual event is sponsored by Missouri's mineral industries and is held at a different location in the State each year. DGLS geologists gave presentations on the origin and uses of limestone and demonstrated a student-oriented, classroom activity called "Digging Fossils Indoors." DGLS seized on several other educational outreach opportunities during the year by giving talks and demonstrations to primary and secondary school students and to youth groups.

The DGLS has been an active 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. DGLS continued to make geologic and surficial materials 7.5-minute quadrangle maps in the Fulton project area as part of the STATEMAP program. Missouri Department of Transportation provided rigs and crews that drilled holes in surficial material, and this subsurface information added greatly to the quality of the surficial materials maps.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MISSOURI[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2006		2007		2008	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	5,240	500,000 e	5,230	515,000 e	4,650	451,000 e
Clays, common	750	4,160	426	2,880 r	496	3,470
Sand and gravel:						
Construction	17,000	92,100	14,200 r	78,400 r	12,300	75,800
Industrial	595	16,400	642	19,400	648	21,400
Stone:						
Crushed	90,500 r	576,000	83,900 r	630,000 r	75,000	602,000
Dimension	W	W	W	W	3	668
Combined values of cadmium (byproduct from zinc concentrates), cement (masonry), clays (fire, fuller's earth), copper, gemstones (natural), lead, lime, silver, zinc, and values indicated by symbol W	XX	826,000	XX	1,040,000	XX	906,000
Total	XX	2,010,000	XX	2,280,000 r	XX	2,060,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data.
XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]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[1]

Type	2007			2008		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	201 r	78,500 r	$535,000 r	208	69,500	$460,000
Dolomite	15	2,760	20,200	17	2,400	16,200
Granite	3	1,080	65,600	3	1,380	111,000
Traprock	-- r	-- r	-- r	--	--	--
Sandstone	-- r	-- r	-- r	--	--	--
Miscellaneous stone	4 r	1,520 r	9,560 r	4	1,630	15,000
Total	XX	83,900 r	630,000 r	XX	75,000	602,000

rRevised. XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2008, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	202	1,540
Riprap and jetty stone	2,170	17,400
Filter stone	274	2,300
Other coarse aggregate	1,570	9,480
Coarse aggregate, graded:		
Concrete aggregate, coarse	2,220	17,600
Bituminous aggregate, coarse	1,020	7,440
Bituminous surface-treatment aggregate	354	2,310
Railroad ballast	1,570	10,300
Other graded coarse aggregate	5,330	40,100
Fine aggregate (-⅜ inch):		
Stone sand, concrete	219	2,040
Stone sand, bituminous mix or seal	672	3,960
Screening, undesignated	825	2,200
Other fine aggregate	989	6,250
Coarse and fine aggregates:		
Graded road base or subbase	4,170	24,200
Unpaved road surfacing	469	2,920
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	2,600	11,700
Roofing granules	742	108,000
Other coarse and fine aggregates	2,530	15,200
Other construction materials	41	349
Agricultural, limestone	1,400	6,010
Chemical and metallurgical:		
Cement manufacture	5,820	27,800
Lime manufacture	W	W
Special, asphalt fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	133	3,650
Unspecified:[2]		
Reported	3,690	21,900
Estimated	34,000	250,000
Total	75,000	602,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

TABLE 4
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2008, BY USE AND DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

Use	Districts 1 and 3		Districts 2 and 5		Districts 4 and 7		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[3]	751	3,740	1,080	8,080	200	1,720	W	W
Coarse aggregate, graded[4]	2,130	16,400	2,390	18,100	1,410	10,300	1,080	9,680
Fine aggregate (-⅜ inch)[5]	W	W	1,180	6,150	29	192	W	W
Coarse and fine aggregates[6]	451	3,640	4,650	23,600	1,130	7,370	W	W
Other construction materials	--	--	--	--	15	102	26	247
Agricultural[7]	16	119	1,050	4,370	42	185	W	W
Chemical and metallurgical[8]	W	W	3,180	15,800	--	--	--	--
Special[9]	--	--	--	--	--	--	--	--
Other miscellaneous uses	--	--	133	3,650	--	--	--	--
Unspecified:[10]								
Reported	1,580	9,410	1,580	9,410	--	--	--	--
Estimated	8,200	59,000	4,100	28,000	4,200	29,000	8,200	62,000
Total	14,800	100,000	19,300	117,000	7,060	49,300	11,100	83,400

	District 8	
	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch)[3]	W	W
Coarse aggregate, graded[4]	3,480	23,200
Fine aggregate (-⅜ inch)[5]	W	W
Coarse and fine aggregates[6]	W	W
Other construction materials	--	--
Agricultural[7]	W	W
Chemical and metallurgical[8]	W	W
Special[9]	W	W
Other miscellaneous uses	--	--
Unspecified:[10]		
Reported	528	3,140
Estimated	9,700	67,000
Total	22,700	252,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Specified districts are combined to avoid disclosing company proprietary data.
[3]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.
[4]Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.
[5]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.
[6]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.
[7]Includes agricultural limestone.
[8]Includes cement and lime manufacture.
[9]Includes asphalt fillers or extenders.
[10]Reported and estimated production without a breakdown by end use.

TABLE 5
MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2008,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	4,420	$25,600	$5.79
Plaster and gunite sands	54	365	6.76
Concrete products (blocks, bricks, pipe, decorative, etc.)	161	1,210	7.50
Asphaltic concrete aggregates and other bituminous mixtures	503	3,430	6.83
Road base and coverings	221	1,630	7.37
Fill	127	453	3.57
Snow and ice control	13	73	5.62
Other miscellaneous uses[2]	94	1,340	14.29
Unspecified:[3]			
Reported	721	4,700	6.51
Estimated	6,000	37,000	6.16
Total or average	12,300	75,800	6.15

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes golf course and roofing granules.
[3]Reported and estimated production without a breakdown by end use.

TABLE 6
MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2008, BY USE AND DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

	Districts 1 and 4		Districts 2 and 5		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[3]	716	4,010	3,290	19,100	--	--
Asphaltic concrete aggregates and road base materials	W	W	W	W	--	--
Fill	19	66	99	364	--	--
Other miscellaneous uses[4]	387	3,150	366	2,760	--	--
Unspecified:[5]						
Reported	713	4,620	8	79	--	--
Estimated	522	3,220	3,600	22,200	1,710	10,500
Total	2,360	15,100	7,360	44,500	1,710	10,500

	District 6		Districts 7 and 8	
Use	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[3]	--	--	634	4,050
Asphaltic concrete aggregates and road base materials	--	--	74	552
Fill	--	--	9	23
Other miscellaneous uses[4]	--	--	1	13
Unspecified:[5]				
Reported	--	--	--	--
Estimated	71	407	114	693
Total	71	407	832	5,330

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Specified districts are combined to avoid disclosing company proprietary data.
[3]Includes plaster and gunite sands.
[4]Includes golf course, roofing granules, and snow and ice control.
[5]Reported and estimated production without a breakdown by end use.