

# 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 1999, the preliminary estimated value<sup>1</sup> of nonfuel mineral production for Missouri was \$1.38 billion, according to the U.S. Geological Survey (USGS). This was a more than 5% increase from that of 1998,<sup>2</sup> following a marginal increase in 1998 from 1997. The State rose in rank to 9th from 10th among the 50 States in total nonfuel mineral production value, of which Missouri accounted for more than 3.5% of the U.S. total.

Missouri continued to be the top lead-producing State in the Nation. The State produced more than 2.5 times and almost 11 times respectively, the amount of lead as that of the two next highest producing States in 1999. However, crushed stone, by value, has been the State's foremost nonfuel mineral commodity since 1997, having traded places with lead, which was first in 1996. Lead had been Missouri's leading nonfuel mineral since 1969, except for several years in the mid-1980's and during 1993-95. Crushed stone surpassed lead and portland cement in 1993, and ranked first through 1995. In 1999, the value of portland cement also surpassed that of lead.

In 1999, crushed stone, portland cement, lead, and lime accounted for 86% of the State's total nonfuel mineral production value. Significantly increased values for crushed stone, construction sand and gravel, and portland cement, together with smaller yet significant increases in lime, industrial sand and gravel, lead, and silver (in descending order), led to the State's overall \$70 million increase (table 1). All other changes in value in 1999 were small relative to these. In 1998, the State's increase in value mainly resulted from the increased values of lime, crushed stone, construction sand and gravel, and portland cement. Decreases in copper, zinc, and iron ore somewhat offset the year's gains.

Based upon USGS preliminary estimates of the quantities produced in the 50 States in 1999, Missouri remained first in lime, fire clays and iron oxide pigments; second in fuller's earth;

<sup>1</sup>The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending on the minerals or 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 1999 USGS mineral production data published in this chapter are preliminary estimates as of May 2000, and are expected to change. For some mineral commodities, such as, construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. A telephone listing for the specialists may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals/contacts/comdir.html>, by using MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset (request Document #1000 for a telephone listing of all mineral commodity specialists), or by calling USGS information at (703) 648-4000 for the specialist's name and number. All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>; facsimile copies may be obtained from MINES FaxBack.

<sup>2</sup>Values, percentage calculations, and rankings for 1998 may vary from the Minerals Yearbook, Area Reports: Domestic 1998, Volume II, owing to the revision of preliminary 1998 to final 1998 data. Data for 1999 are preliminary and are expected to change; related rankings may also be subject to change.

third in iron ore; fifth in portland cement; and seventh in silver and common clays (in descending order of value). The State rose to third from fourth in the production of zinc and to sixth from eighth in crushed stone. Additionally, the State was a significant producer of construction and industrial sand and gravel and masonry cement.

The Missouri Department of Natural Resources, Division of Geology and Land Survey<sup>3</sup> (DGLS), provided the following narrative information. In 1999, production of crushed stone increased more than 8%, along with a rise in unit value (table 1). The DGLS projected that the industry's current level of activity would continue into 2000. Markets in suburban areas near Kansas City and St. Louis, as well as many rural areas, were particularly active. Although consolidation of the aggregate industry slowed in Missouri as few major acquisitions were reported, many companies reported opportunities to sell to the larger interstate and multinational operators. Delta Companies (Southeast Missouri Stone Co.) purchased Williamsville Stone Co., with operations in Butler and Stoddard Counties of southeast Missouri.

Nonetheless, representatives from industry reported to the DGLS a number of growing difficulties. One problem for many producers was the shortage of skilled and willing workers. Several operators reported that they raised salaries and recruited extensively in rural areas, with limited hiring and retention success. Other producers were concerned about increasingly strict environmental regulations, increasing fuel costs, and declining support for highway construction. Several mineral producers expressed serious concerns regarding land-use planning and zoning practices. Other concerns were that too little was being done to ensure the potential availability of aggregate resources, that county officials needed to become more aware of local needs for crushed stone, and that zoning procedures could be an issue.

Production of construction sand and gravel increased by nearly one-third over that of 1998. According to the DGLS, most operators reported busy, active markets for their products; several larger operators in major markets increased sales to ready-mix concrete markets. Major problems facing sand and gravel operators were specifications of their products and environmental regulations. Several operators reported that natural sand is not being used in large amounts in "superpave" asphalt. Another serious issue facing the industry was State and Federal regulations regarding operations on wetlands and floodplains.

According to the DGLS, most of the State's cement plants ran at maximum capacity, and were unable to meet demand; most producers expected the strong demand to continue through 2000. Lafarge Corp. continued with a significant expansion of

<sup>3</sup>Ardel Rueff, Geologist, authored the text of State mineral industry information submitted by the Division of Geology and Land Survey.

its cement plant at Sugar Creek in Jackson County. As part of this modernization effort, a shaft was started to access additional limestone reserves in the Mississippian-age St. Louis Limestone. In January 1999, Holnam, Inc. announced that the company was considering building a 3-million-metric-ton-per-year cement plant along the Mississippi River in Ste. Genevieve County. According to Holnam, the plant would be the largest single-line facility in the country, and a second production line could be added if needed. In excess of 1,200 hectares are controlled by the company. Also during 1999, the German Company, Dyckerhoff AG acquired Lone Star Cement Co., which owns a plant at Cape Girardeau in Cape Girardeau County. Industry representatives expressed concern regarding excess cement capacity being planned for the Mississippi River Valley.

Structural clay and shale markets were stronger in 1999 than in 1998, and the outlook for 2000 was for this to continue. Glen Gery Corp. of Utica, Livingston County, expanded by constructing a new kiln. Also during the year, Glen Gery was acquired by CRH Holdings Inc., and is no longer a publicly traded company. Refractory clay production was slightly higher than in 1998, and 2000 is expected to be similar. In late 1998, Global Industrial Technologies, Inc., parent company of A. Harbison Walker Refractories, Inc., purchased A.P. Green Industries, Inc., and on December 31, 1999, Radex Heraklith Industriebeteiligungs AG, parent company of North American Refractories Co., acquired Global. The DGLS expects that the acquisition could result in plant closings in the Missouri clay industry. The cement industry continued to increase its use of

refractory clay containing high amounts of iron, alkali, or sand. Existing stockpiles and known resources of these former “waste” clays were being depleted rapidly and cement industry officials are concerned about maintaining a stable supply of material for the future.

The lime market improved in 1999 over 1998, and the DGLS projected that 2000 would likely be somewhat better than 1999. Some in the industry expressed concern about Title 5 and the U.S. Environmental Protection Agency’s regulation of noxious gases. Vessel Mineral Products Co. began producing dolomitic lime for the steel industry again in 1999. The plant stopped burning lime in 1997, and the kiln was down for 14 months. The kiln was modernized and production resumed in 1999, with sales increasing. Chemical Lime Co. made changes to its fuel combustion process at its plant in Ste. Genevieve County.

Cimbar Performance Minerals of Baroid Drilling Fluids, Inc. of Halliburton Co. made some major operational changes in 1999. Effective January 1, 1999, the company stopped mining barite in Missouri, but the mill continued processing barite imported from China. Part of the mill was replaced and major renovation of the remaining plant began. Excess company property was put up for sale.

Mineral representatives consistently discussed three issues with DGLS staff—the availability of the resource (societal surface development with too little regard for the need for the underlying resource), the cost of doing business (increasing labor and fuel costs), and the increase in government regulations (especially environmental).

TABLE 1  
NONFUEL RAW MINERAL PRODUCTION IN MISSOURI 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1997		1998		1999 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement: Portland	4,730	321,000 e/	4,570	323,000 e/	4,680	331,000 e/
Clays:						
Common	1,050	4,140	1,030	4,440	1,030	4,330
Fire	297	4,280	288	4,220	288	4,220
Copper 3/	8	19,300	5	9,090	6	9,750
Sand and gravel: Construction	9,530	35,600	9,470	39,300	12,100	51,200
Stone: Crushed	68,400 r/	349,000 r/	68,400	356,000	74,000	395,000
Combined values of cement (masonry), clay (fuller’s earth), gemstones, iron ore (usable), iron oxide pigments (crude), lead, lime, sand and gravel (industrial), silver, stone (dimension granite), zinc	XX	573,000	XX	575,000 r/	XX	583,000
Total	XX	1,310,000	XX	1,310,000 r/	XX	1,380,000

e/ Estimated. p/ Preliminary. r/ Revised. 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.

3/ Recoverable content of ores, etc.

TABLE 2  
MISSOURI: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1997				1998			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	176	64,600 r/	\$329,000	\$5.10	181	64,400	\$335,000	\$5.20
Dolomite	23	2,600 r/	13,100 r/	5.01	22	2,770	13,200	4.75
Granite	2	W	W	6.77	2	W	W	6.95
Sandstone	1	W	W	2.32	1	W	W	2.39
Traprock	1	W	W	4.96	2	W	W	5.37
Total or average	XX	68,400 r/	349,000 r/	5.10 r/	XX	68,400	356,000	5.21

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

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 1998, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
<b>Coarse aggregate (+1 1/2 inch):</b>			
Macadam	277	\$1,450	\$5.22
Riprap and jetty stone	2,440	11,200	4.59
Filter stone	188	884	4.70
Other coarse aggregate	752	3,830	5.10
<b>Coarse aggregate, graded:</b>			
Concrete aggregate, coarse	2,640	15,900	6.02
Bituminous aggregate, coarse	1,960	10,900	5.58
Bituminous surface-treatment aggregate	628	3,220	5.12
Railroad ballast	W	W	4.65
Other graded coarse aggregate	3,790	31,200	8.24
<b>Fine aggregate (-3/8 inch):</b>			
Stone sand, concrete	242	1,490	6.17
Stone sand, bituminous mix or seal	252	1,730	6.85
Screening, undesignated	856	3,020	3.52
Other fine aggregate	21	106	5.05
<b>Coarse and fine aggregates:</b>			
Graded road base or subbase	8,320	35,600	4.28
Unpaved road surfacing	2,190	10,100	4.62
Terrazzo and exposed aggregate	(3/)	(3/)	16.93
Crusher run or fill or waste	317	1,440	4.54
Other coarse and fine aggregates	2,560	13,700	5.37
Other construction materials	82	351	4.28
<b>Agricultural:</b>			
Agricultural limestone	1,010	4,840	4.81
Poultry grit and mineral food	(4/)	(4/)	6.47
<b>Chemical and metallurgical:</b>			
Cement manufacture	7,130	28,800	4.03
Lime manufacture	2,900	29,100	10.06
Flux stone	W	W	5.71
Chemical stone	W	W	5.26
Other chemical and metallurgical uses	195	1,030	5.27
<b>Special:</b>			
Asphalt fillers or extenders	3	15	5.00
Roofing granules	(4/)	(4/)	9.29
<b>Other miscellaneous uses:</b>			
Pipe bedding	(4/)	(4/)	5.13
Other specified uses not listed	1	3	2.68
<b>Unspecified: 5/</b>			
Actual	15,000	72,700	4.85
Estimated	14,000	68,000	4.86
Total or average	68,400	356,000	5.21

W Withheld to avoid disclosing company proprietary data; included with "Other".

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

2/ Includes dolomite, granite, limestone, limestone-dolomite, sandstone, and traprock.

3/ Included in "Other coarse and fine aggregates."

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

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

TABLE 4  
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1998,  
BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
<b>Construction aggregates:</b>								
Coarse aggregate (+1 1/2 inch) 2/	74	397	132	694	W	W	134	556
Coarse aggregate, graded 3/	135	731	W	W	1,580	18,700	755	3,860
Fine aggregate (-3/8 inch) 4/	6	38	27	97	74	254	W	W
Coarse and fine aggregate 5/	1,590	9,540	837	4,240	862	3,880	1,220	5,080
Other construction materials	--	--	--	--	--	--	--	--
Agricultural 6/	79	394	84	294	101	428	41	144
Chemical and metallurgical 7/	--	--	W	W	W	W	--	--
Special 8/	--	--	--	--	--	--	--	--
Other miscellaneous uses 9/	1	3	--	--	--	--	--	--
<b>Unspecified: 10/</b>								
Actual	2,270	10,400	W	W	4,660	23,300	W	W
Estimated	654	3,000	2,120	10,500	1,770	8,760	1,750	8,580
<b>Total</b>	<b>4,800</b>	<b>24,500</b>	<b>4,400</b>	<b>20,500</b>	<b>9,790</b>	<b>60,700</b>	<b>4,110</b>	<b>19,100</b>
	District 5		District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
<b>Construction aggregates:</b>								
Coarse aggregate (+1 1/2 inch) 2/	911	4,730	99	649	(11/)	(11/)	2,260	10,100
Coarse aggregate, graded 3/	2900	18,600	1,620	10,100	(11/)	(11/)	1,450	6,520
Fine aggregate (-3/8 inch) 4/	862	3,390	312	2,160	(11/)	(11/)	W	W
Coarse and fine aggregate 5/	3,630	17,500	1,200	6,410	(11/)	(11/)	4,340	18,000
Other construction materials	W	W	34	177	771	3,380	W	W
Agricultural 6/	131	398	267	1,700	W	W	369	1,990
Chemical and metallurgical 7/	W	W	W	W	--	--	4,610	35,100
Special 8/	--	--	W	W	--	--	3	15
Other miscellaneous uses 9/	--	--	--	--	--	--	--	--
<b>Unspecified: 10/</b>								
Actual	4,700	22,000	1,880	10,200	W	W	953	4,520
Estimated	1,970	9,620	3,130	15,300	871	4,160	1,760	8,140
<b>Total</b>	<b>18,400</b>	<b>87,300</b>	<b>9,260</b>	<b>50,800</b>	<b>1,810</b>	<b>8,290</b>	<b>15,900</b>	<b>84,900</b>

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/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

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

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

5/ Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregates, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone and poultry grit and mineral food.

7/ Includes cement manufacture, chemical stone or alkali works, flux stone, and lime manufacture.

8/ Includes asphalt fillers or extenders, and roofing granules.

9/ Includes pipe bedding.

10/ Reported and estimated production without a breakdown by end use.

11/ Withheld to avoid disclosing company proprietary data; included with "Other construction materials."

TABLE 5  
 MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1998,  
 BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate	4,840	\$19,800	\$4.09
Plaster and gunite sands	105	487	4.64
Concrete products (blocks, bricks, pipe, decorative, etc.)	205	975	4.76
Asphaltic concrete aggregates and other bituminous mixtures	280	1,230	4.38
Road base and coverings	514	2,490	4.84
Fill	227	1,060	4.65
Snow and ice control	70	307	4.39
Other miscellaneous uses 2/	89	795	8.93
Unspecified: 3/			
Actual	633	2,470	3.90
Estimated	2,500	9,670	3.87
Total or average	9,470	39,300	4.15

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

2/ Includes filtration 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 1998, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 4		District 5	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 3/	51	278	W	W	1,310	6,700	3,250	11,800
Asphaltic concrete aggregates and road base materials 4/	43	172	W	W	212	782	W	W
Other miscellaneous uses 5/	--	--	--	--	--	--	W	W
Unspecified 6/	366	1,410	62	322	823	3,040	1,170	4,860
Total	459	1,860	141	621	2,340	10,500	4,660	18,200
	District 6		District 7		District 8			
	Quantity	Value	Quantity	Value	Quantity	Value		
Concrete aggregate and concrete products 3/	W	W	243	1,040	253	1,160		
Asphaltic concrete aggregates and road base materials 4/	W	W	335	1,610	W	W		
Other miscellaneous uses 5/	W	W	--	--	W	W		
Unspecified 6/	26	235	172	515	514	1,760		
Total	79	599	751	3,160	1,030	4,260		

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

1/ Production reported in District 3 was included with District 4 to avoid disclosing company proprietary data.

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

3/ Includes plaster and gunite sands.

4/ Includes fill and snow and ice control.

5/ Includes filtration and roofing granules.

6/ Reported and estimated production without a breakdown by end use.