

THE MINERAL INDUSTRY OF MISSOURI

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

In 1997, for the fourth consecutive year, Missouri ranked 10th among the 50 States in total nonfuel mineral production value,¹ according to the U.S. Geological Survey (USGS). The estimated value for 1997 was \$1.32 billion, about a 6% increase from that of 1996. This followed a 9.6% increase from 1995 to 1996 (based on final 1996 data). The State accounted for more than 3% of the U.S. total nonfuel mineral production value.

Missouri is, by a large measure, the top lead-producing State in the Nation. The State produced more than three times the quantity of lead as that of the next highest producing State in 1997. Crushed stone replaced lead as the State's leading nonfuel mineral commodity by value. Except for several years in the mid-1980's and 1993-95, lead has been Missouri's leading nonfuel mineral since 1969. Crushed stone surpassed lead and portland cement in 1993 and ranked first through 1995.

In 1997, crushed stone, lead, portland cement, and lime combined accounted for 84% of the State's total nonfuel mineral production value. Significantly increased values for crushed stone and zinc, together with a more moderate increase for portland cement accounted for most of the State's increase in 1997 (*table 1*). Conversely, only lead showed a comparatively significant drop in value of more than \$10 million. All other changes in 1997 were relatively small. In 1996, the State's increase in value mainly resulted from a substantial increase in the value of lead with large but more moderate increases in portland cement, crushed stone, and lime.

Compared with USGS estimates of quantities produced in the other 49 States in 1997, Missouri remained first in lime and fire clays; second in iron oxide pigments; third in iron ore; third of four barite-producing States; fourth in zinc; fifth in portland cement and fuller's earth; and seventh in silver. The State rose from 4th to 3d in the production of crushed stone and 11th to 10th in common clays. Additionally, the State was a significant producer of industrial sand and gravel and masonry cement.

The following narrative information was provided by the Missouri Department of Natural Resources, Division of Geology

¹The 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 1997 USGS mineral production data published in this chapter are estimates as of January 1998. For some commodities (for example, 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. Call MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset, and request Document # 1000 for a telephone listing of all mineral commodity specialists, or call USGS information at (703) 648-4000 for the specialist's name and number. This telephone listing may also be retrieved over the Internet at <http://minerals.er.usgs.gov/minerals/contacts/comdir.html>. All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved by way of MINES FaxBack or over the Internet at <http://minerals.er.usgs.gov/minerals/>.

and Land Survey². The crushed stone industry continued at near record production levels in 1997. Commercial and private construction sales were especially strong in urban areas. Markets in rural areas, especially in northwest and northeast Missouri, were slow because of reduced demand for State work. Agricultural lime sales were also slow. Concern was expressed by the aggregate and construction industries regarding funding problems for the Missouri Department of Transportation's 15-year highway program.

Environmental and other problems facing the industrial minerals industry increased during the year. Air quality regulations, increasingly strict specifications for some aggregate products, and problems with permitting new or expanded sites were mentioned by many operators.

Consolidation occurred in the crushed stone industry as small operations were purchased by national and multinational companies. Lafarge Aggregates acquired two quarries from Howard Quarries, one quarry from Menefee Quarries, and two operations from Missouri Portable Stone, Inc. Weber Quarries acquired Iron Mountain Traprock and opened three additional sites. APAC acquired Limpus Quarries and purchased several aggregate and construction companies in central and southwest Missouri. Pace Construction acquired McClain Quarries at Danville and Capitol Quarries bought Curtman Materials at Owensville in central Missouri. Capitol Sand acquired the Lafarge Aggregates sand and gravel plant at Arlington in southcentral Missouri.

Construction sand and gravel operators reported a good-to-average year. Residential construction and readymix markets continued strong, although weakness developed in some sand markets for State work. Aggregate dredging operations complicated navigation for commercial barge operators on the Missouri River. Negotiations continue between the States, various environmental and commercial interests, along with the U.S. Corps of Engineers regarding future management practices for the river. These planned future management practices appear to include high water levels in the spring to simulate natural flooding conditions, but may interfere with and cause increased costs for river operators.

Calendar year 1997 was good for the clay industry because of low interest rates. Demand was very good for residential brick and the outlook for 1998 is promising. Construction continued through much of the winter because of mild weather. Low fuel costs were important both at the kiln and in the transportation of the finished product.

The industrial sand, lime, and cement industries all had a good year during 1997. Little change is expected for the industrial

²Ardel Rueff, Geologist, authored the text of State mineral industry information submitted by the Division of Geology and Land Survey.

sand industry in 1998. Foundry and glass bottling markets were strong. A major problem facing the industry is the proposed increased controls on the emissions of particulate matter.

Lime sales were strong, particularly in environmental markets. Some problems were reported in transportation, both with rail "bottlenecks" and competition from grain shippers for dual use cars. Vessel Mineral Products Co. bought Resco Mineral Products of Missouri's lime and stone operations at Bonne Terre,

but closed the lime plant. Mississippi Lime Co. started construction of a Maerz vertical shaft kiln at its Ste. Genevieve plant.

Several cement producers reportedly ran out of product at times during the year. The industry expects some "flattening" of demand in the next several years. Modernization and expansion plans continued at Holnam Inc. in Pike County and Lafarge Cement in Jackson County.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MISSOURI 1/ 2/
(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1995		1996		1997 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	4,360	270,000	4,530	293,000 e/	4,620	305,000 e/
Clays						
Ball	--	--	13	W	W	W
Common	972	4,810	849	3,250	984	3,370
Fire	359	5,480	223	3,220	217	3,150
Fuller's earth	283	W	283	W	283	W
Copper 3/	7	22,800	W	W	W	W
Gemstones	NA	58	NA	108	NA	650
Sand and gravel, construction	8,840	32,400	9,820	35,600	9,760	36,200
Stone, crushed	65,700 4/	305,000 4/	67,000	325,000	71,000	360,000
Combined value of barite, cement (masonry), iron ore (usable), iron oxide pigments (crude), lead, lime, sand and gravel (industrial), silver, stone [crushed granite (1995), dimension granite], zinc, and values indicated by symbol W	XX	495,000	XX	589,000	XX	610,000
Total	XX	1,140,000	XX	1,250,000	XX	1,320,000

e/ Estimated. p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

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

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Recoverable content of ores, etc.

4/ Excludes certain stones; kind and value included with "Combined value" data.

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

Kind	1995				1996			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	189 r/	62,500 r/	\$290,000 r/	\$4.64	194	63,300	\$305,000	\$4.82
Dolomite	21 r/	3,070 r/	15,200 r/	4.94 r/	24	2,590	13,000	5.02
Granite	(3/)	(3/)	(3/)	(3/)	2	W	W	7.31
Sandstone	1	200	442	2.21	1	W	W	2.26
Traprock	--	--	--	--	1	W	W	4.36
Total	XX	65,700	305,000	4.64	XX	67,000	325,000	4.85

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

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes "limestone-dolomite," reported with no distinction between the two.

3/ Excludes granite from State total to avoid disclosing company proprietary data.

TABLE 3
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 1996, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Macadam	188	\$1,250	\$6.66
Riprap and jetty stone	2,700	8,900	3.29
Filter stone	164	851	5.19
Other coarse aggregate	555	2,990	5.38
Coarse aggregate, graded:			
Concrete aggregate, coarse	3,140	18,300	5.82
Bituminous aggregate, coarse	1,730	10,000	5.82
Bituminous surface-treatment aggregate	1,120	5,860	5.25
Other graded coarse aggregate 3/	3,960	30,800	7.79
Fine aggregate (-3/8 inch):			
Stone sand, concrete	292	1,770	6.08
Stone sand, bituminous mix or seal	87	983	11.30
Screening, undesignated	1,070	3,730	3.49
Other fine aggregate	132	256	1.94
Coarse and fine aggregates:			
Graded road base or subbase	8,740	34,900	3.99
Unpaved road surfacing	2,350	10,600	4.53
Crusher run or fill or waste	245	939	3.83
Other coarse and fine aggregates	647	3,030	4.69
Other construction materials 4/	507	4,860	9.59
Agricultural limestone 5/	1,250	5,970	4.76
Chemical and metallurgical:			
Cement manufacture	8,670	28,300	3.26
Lime manufacture	1,160	4,780	4.13
Dead-burned dolomite manufacture	W	W	7.59
Flux stone	W	W	7.41
Chemical stone	W	W	4.29
Special, asphalt fillers or extenders	7	36	5.14
Unspecified: 6/			
Actual	11,600	61,300	5.28
Estimated	16,500	83,700	5.06
Total	67,000	325,000	4.85

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

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

2/ Data are rounded to three significant digits, except unit value; may not add to totals shown.

3/ Includes railroad ballast.

4/ Includes roofing granules, terrazzo and exposed aggregate, and waste material.

5/ Includes poultry grit and mineral food.

6/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.

TABLE 4
 MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1996, 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
Construction aggregates:								
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	W	W	W	W
Coarse aggregate, graded 3/	147	889	W	W	1,540	18,000	620	3,080
Fine aggregate (-3/8 inch) 4/	W	W	W	W	W	W	W	W
Coarse and fine aggregate 5/	300	1,520	269	1,260	1,060	4,770	712	3,380
Other construction materials 6/	105	561	176	902	337	2,350	295	1,040
Agricultural 7/	33	149	(8/)	(8/)	(8/)	(8/)	77	297
Chemical and metallurgical 9/	--	--	(8/)	(8/)	(8/)	(8/)	--	--
Special 10/	--	--	--	--	--	--	--	--
Unspecified: 11/								
Actual	1,180	8,770	--	--	3,210	17,500	--	--
Estimated	2,400	12,100	3,570	20,100	1,590	8,020	2,460	11,700
Total	4,170	24,000	4,970	25,600	8,590	56,100	4,160	19,500
Use	District 5		District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction aggregates:								
Coarse aggregate (+1 1/2 inch) 2/	619	3,130	W	W	W	W	W	W
Coarse aggregate, graded 3/	3,790	22,100	1,990	12,600	W	W	1,320	5,950
Fine aggregate (-3/8 inch) 4/	1,040	3,610	W	W	--	--	W	W
Coarse and fine aggregate 5/	4,310	18,200	1,740	8,680	187	808	3,800	15,300
Other construction materials 6/	--	--	468	2,950	496	2,190	2,280	6,780
Agricultural 7/	(8/)	(8/)	(8/)	(8/)	(8/)	(8/)	(8/)	(8/)
Chemical and metallurgical 9/	(8/)	(8/)	(8/)	(8/)	--	--	(8/)	(8/)
Special 10/	--	--	--	--	--	--	7	36
Unspecified: 11/								
Actual	5,640	27,600	1,200	5,710	(8/)	(8/)	(8/)	(8/)
Estimated	2,000	9,550	1,770	9,120	671	3,260	2,060	9,790
Total	22,400	96,800	8,530	46,000	1,420	6,530	12,800	50,600

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

1/ Data are rounded to 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, other coarse and fine aggregates, terrazzo and exposed aggregate, and unpaved road surfacing.

6/ Includes roofing granules and waste material.

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

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

9/ Includes cement manufacture, chemical stone for alkali works, dead-burned dolomite, flux stone, and lime manufacture.

10/ Includes asphalt fillers or extenders.

11/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.

TABLE 5
MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1996,
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Value per ton
Concrete aggregate (including concrete sand)	3,790	\$15,700	\$4.13
Plaster and gunit sands	71	338	4.76
Concrete products (blocks, bricks, pipe, decorative, etc.)	233	1,350	5.78
Asphaltic concrete aggregates and other bituminous mixtures	276	1,180	4.29
Road base and coverings 2/	200	832	4.16
Fill	109	404	3.71
Snow and ice control	88	346	3.93
Other miscellaneous uses 3/	1,160	2,740	2.36
Unspecified: 4/			
Actual	875	1,590	1.82
Estimated	3,020	11,200	3.70
Total or average	9,820	35,600	3.62

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (cement).

3/ Includes filtration and roofing granules.

4/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.

TABLE 6
MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1996, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 5	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 3/	36	194	W	W	W	W
Asphaltic concrete aggregates and road base materials 4/	34	133	W	W	W	W
Other miscellaneous uses 5/	--	--	140	586	4,720	17,400
Unspecified: 7/						
Actual	--	--	--	--	754	1,250
Estimated	340	1,280	1,150	3,690	984	4,620
Total	410	1,610	1,290	4,280	6,460	23,300
Use	District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 3/	46	343	199	735	542	2,390
Asphaltic concrete aggregates and road base materials 4/	15	88	61	219	108	516
Other miscellaneous uses 5/	27	229	--	--	(6)	1
Unspecified: 7/						
Actual	--	--	--	--	121	344
Estimated	10	39	153	438	377	1,090
Total	98	701	413	1,390	1,150	4,340

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

1/ Production reported in District 3 was included with "District 2" and production reported in District 4 was included with "District 5" to avoid disclosing company proprietary data.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Includes plaster and gunit sands.

4/ Includes fill, road and other stabilization (cement), and snow and ice control.

5/ Includes filtration and roofing granules.

6/ Less than 1/2 unit.

7/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.