



2006 Minerals Yearbook

MISSOURI

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 2006, Missouri's nonfuel raw mineral production¹ was valued at \$2.07 billion, based upon annual U.S. Geological Survey (USGS) data. This was a more than an 11% increase from the State's total nonfuel mineral production value of \$1.86 billion² for 2005, which followed a nearly 15% (\$240 million) increase from 2004 to 2005.

The State was ranked 10th (8th in 2005) among the 50 States in total nonfuel mineral production value and accounted for more than 3% of the U.S. total.

Crushed stone, cement (portland and masonry), lead, and lime, in descending order of value, accounted for nearly 84% of Missouri's total nonfuel mineral production value in 2006, down from 89% in 2005. This relative decrease resulted from an increase in the value of zinc production, the State's fifth leading nonfuel mineral commodity. The value of zinc rose substantially, owing to a significant increase in the commodity's unit value and a modest increase in production.

Missouri continued to be the top lead-producing State in the Nation, producing more than one-half of the Nation's output in 2006. However, by value, crushed stone and cement remained the State's leading nonfuel mineral commodities, having surpassed lead in 1997 and 1999, respectively. From 1969 to 1996, lead had been Missouri's leading nonfuel mineral, except for several years in the mid-1980s and 1993-95, when crushed stone was ranked first.

In 2006, in descending order of change, increases in the values of zinc, lead, portland cement, construction sand and gravel, copper, and lime led Missouri's increase in total nonfuel mineral production value for the year. The total values of lead and zinc production each rose by more than \$50 million, while those of portland cement and construction sand and gravel increased by \$36 million and nearly \$31 million, respectively. The values of copper and lime each rose by more than \$15 million, even as smaller yet significant increases also took place in the values of fuller's earth, masonry cement, and industrial sand and gravel. The unit values of each also increased, those of zinc, copper, and lead being the largest by percentage of increase (table 1). The largest decreases in production value

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 2006 USGS mineral production data published in this chapter are those available as of March 2008. 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>.

²This figure is a revision to the previously published \$1.94 billion in the The Mineral Industry of Missouri chapter in the U.S. Geological Survey Minerals Yearbook, Area Reports: Domestic 2005 Volume II; the value of crushed stone has been revised to \$647 million from \$733 million published there, resulting from a revision in the quantity produced to 87.4 million metric tons (Mt) from 99.4 Mt (table 1).

took place in crushed stone, down \$16 million, as well as a smaller decrease in silver (company proprietary data).

In 2006, Missouri continued to be first in the production of lead and lime, first of six fire clay-producing States, second in fuller's earth, and sixth in the production of portland cement. The State rose to second from third in the production of zinc, but decreased to fifth from fourth in crushed stone. Additionally, Missouri was a significant producer of construction sand and gravel, masonry cement, industrial sand and gravel, and common clays.

The Missouri Department of Natural Resources, Division of Geology and Land Survey³ (DGLS), provided the following narrative information. Some data or information as reported by the DGLS may differ from USGS estimates and production figures.

Commodity Review

Industrial Minerals

Cement.—Portland cement accounted for most of the State's cement production during the year. Five plants continued to operate with one producing some masonry cement. Total cement produced in 2006 was slightly less than that produced in 2005. Buzzi Unicem USA Inc. operated the Selma and the Cape Girardeau plants, Continental Cement Co. LLC operated the Hannibal plant, and Holcim (US) Inc. operated the Clarksville plant located along the Mississippi River. La North America Inc. operated the Sugar Creek plant along the Missouri River.

Holcim began preconstruction development of its new Lee Island cement production facility, which was to be located between Buzzi's Selma and Cape Girardeau plants in Ste. Genevieve County. Construction of the facility, with an annual production capacity of 4 million metric tons (Mt), was expected to begin in 2007.

Clay.—Common clay and fire clay production totaled about 1.1 Mt in 2006. Production of common clay was down about 9% compared with that of 2005. In addition to the common and fire clays, fuller's earth (also called absorbent clay) was produced during the year. Common clay and fire clay mineral production value accounted for about 0.6% of the total value of nonfuel mineral production in 2006.

Lime.—Quick and hydrated lime production during 2006 was equivalent to that produced in 2005. Chemical Lime Co. and Mississippi Lime Co. operated plants in Ste. Genevieve County near the Mississippi River in southeastern Missouri. Total value of the produced lime increased by about \$17 compared with

³Patrick 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.

that of 2005. Lime accounted for about 10% of the total value of nonfuel mineral production, virtually unchanged from that of 2005.

Sand and Gravel, Construction.—Construction sand and gravel production was about 17 Mt in 2006, up from about 12 Mt in 2005. Total value was about \$92 million, up from about \$62 million in 2005. Construction sand and gravel accounted for about 4.4% of the total value of nonfuel mineral production, up from about 3.3% in 2005.

Sand and Gravel, Industrial.—High-purity quartz (silica) sand production was about 0.59 Mt, slightly up from about 0.56 Mt in 2005. The sand was mined from the Ordovician St. Peter Sandstone in St. Louis and Jefferson Counties by Unimin Corp. and U.S. Silica Co. Total value of the sand was about \$16 million, up from about \$14 million in 2005. Industrial (silica) sand accounted for about 0.8% of the total value of nonfuel mineral production, unchanged from 2005.

Stone, Crushed.—Crushed stone production was about 84 Mt, down from about 87 Mt in 2005. Most (about 98%) was limestone and dolomite. The remainder consisted of granite and rhyolite (trap rock). Total value of the stone was about \$631 million, slightly down from about \$647 million in 2005.

Crushed stone accounted for 30.5% of the total value of nonfuel mineral production, down from 34.8% in 2005.

Stone, Dimension.—Dimension stone production in the form of granite, limestone and dolomite, and sandstone was about 0.003 Mt, virtually unchanged from that of 2005. Dimension stone accounted for about 0.03% of the total value of nonfuel mineral production.

Metals

Copper, Lead, Silver, and Zinc.—All production of these metals came from The Doe Run Resources Corp. underground mines in the Viburnum Trend on the west side of the St. Francois Mountains in southeastern Missouri. Total production was about 0.29 Mt, of which lead accounted for about 88%. Total value of the metals produced was about \$566 million, which accounted for about 27% of the total value of nonfuel mineral production.

Doe Run's Herculaneum smelter continued to operate, but its 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.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MISSOURI^{1,2}

(Thousand metric tons and thousand dollars)

| Mineral | 2004 | | 2005 | | 2006 | |
|--|----------|----------------------|---------------------|------------------------|----------|----------------------|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Cement, portland | 5,260 | 388,000 ^c | 5,330 | 464,000 ^c | 5,240 | 500,000 ^c |
| Clays: | | | | | | |
| Common | 911 | 3,290 | 822 | 3,400 | 750 | 4,160 |
| Fire | W | W | W | W | 359 | 7,600 |
| Sand and gravel: | | | | | | |
| Construction | 12,200 | 60,100 ^r | 12,200 | 61,600 | 17,000 | 92,100 |
| Industrial | 589 | 14,200 | 559 | 14,500 | 595 | 16,400 |
| Stone, crushed | 92,600 | 564,000 | 87,400 ^r | 647,000 ^r | 83,600 | 631,000 |
| Combined values of cadmium (byproduct of zinc concentrates), ³ cement (masonry), clays (fuller's earth), copper, gemstones (natural), lead, lime, silver, stone (dimension granite), zinc, and values indicated by symbol W | XX | 593,000 | XX | 666,000 | XX | 818,000 |
| Total | XX | 1,620,000 | XX | 1,860,000 ^r | XX | 2,070,000 |

^cEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

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.

³Data not available for 2006.

TABLE 2
MISSOURI: CRUSHED STONE SOLD OR USED, BY KIND¹

| Kind | 2005 | | | 2006 | | |
|------------------------|--------------------------|---------------------------------------|------------------------|--------------------------|---------------------------------------|----------------------|
| | Number of quarries | Quantity (thousand metric tons) | Value (thousands) | Number of quarries | Quantity (thousand metric tons) | Value (thousands) |
| Limestone ² | 164 ^r | 81,400 ^r | \$536,000 ^r | 159 | 77,200 | \$523,000 |
| Dolomite | 18 | 3,860 | 26,400 | 16 | 3,590 | 25,100 |
| Granite | 2 | W | W | 2 | W | W |
| Traprock | 1 | W | W | 1 | W | W |
| Sandstone | -- | -- | -- | 1 | 121 | 372 |
| Miscellaneous stone | -- | -- | -- | 1 | 83 | 647 |
| Total | XX | 87,400 ^r | 647,000 ^r | XX | 83,600 | 631,000 |

^rRevised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable. -- Zero.

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

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

TABLE 3
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2006, BY USE¹

(Thousand metric tons and thousand dollars)

| Use | Quantity | Value |
|---|----------|---------|
| Construction: | | |
| Coarse aggregate (+1½ inch): | | |
| Macadam | W | W |
| Riprap and jetty stone | 3,170 | 13,600 |
| Filter stone | 577 | 4,540 |
| Other coarse aggregate | 1,090 | 7,680 |
| Total | 4,840 | 25,800 |
| Coarse aggregate, graded: | | |
| Concrete aggregate, coarse | 3,230 | 25,400 |
| Bituminous aggregate, coarse | 1,540 | 10,200 |
| Bituminous surface-treatment aggregate | 128 | 845 |
| Railroad ballast | 1,450 | 7,790 |
| Other graded coarse aggregate | 3,740 | 27,900 |
| Total | 10,100 | 72,100 |
| Fine aggregate (-¾ inch): | | |
| Stone sand, concrete | 330 | 2,860 |
| Stone sand, bituminous mix or seal | 492 | 3,340 |
| Screening, undesignated | 920 | 2,840 |
| Other fine aggregate | 424 | 2,840 |
| Total | 2,170 | 11,900 |
| Coarse and fine aggregates: | | |
| Graded road base or subbase | 4,230 | 21,200 |
| Unpaved road surfacing | 1,250 | 6,580 |
| Terrazzo and exposed aggregate | (2) | (2) |
| Crusher run or fill or waste | 707 | 4,160 |
| Roofing granules | (2) | (2) |
| Other coarse and fine aggregates | 4,740 | 25,900 |
| Total | 11,400 | 127,000 |
| Other construction materials ³ | 457 | 3,940 |
| Agricultural, limestone | (4) | (4) |
| Chemical and metallurgical: | | |
| Cement manufacture | (4) | (4) |
| Lime manufacture | (4) | (4) |
| Dead-burned dolomite manufacture | (4) | (4) |
| Special, asphalt fillers or extenders | (4) | (4) |
| Unspecified: ⁵ | | |
| Reported | 9,800 | 75,700 |
| Estimated | 37,000 | 280,000 |
| Total | 46,500 | 358,000 |
| Grand total | 83,600 | 631,000 |

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

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

²Withheld to avoid disclosing company proprietary data; included in "Total."

³Includes pipe bedding.

⁴Withheld to avoid disclosing company proprietary data; included in "Grand total."

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

TABLE 4
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2006, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

| Use | Districts 1 and 3 ² | | Districts 2 and 5 ² | | Districts 4 and 7 ² | | District 6 | |
|---|--------------------------------|---------|--------------------------------|---------|--------------------------------|--------|------------|--------|
| | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value |
| Construction: | | | | | | | | |
| Coarse aggregate (+1½ inch) ³ | 91 | 484 | 1,430 | 10,100 | 203 | 1,490 | W | W |
| Coarse aggregate, graded ⁴ | 758 | 5,840 | 3,230 | 23,900 | 1,140 | 8,380 | 1,600 | 12,900 |
| Fine aggregate (-¾ inch) ⁵ | 195 | 644 | 1,290 | 6,900 | 18 | 56 | 584 | 3,840 |
| Coarse and fine aggregates ⁶ | 369 | 2,420 | 4,740 | 25,400 | 1,260 | 6,600 | 1,250 | 7,450 |
| Other construction materials ⁷ | -- | -- | 420 | 3,650 | 13 | 78 | 24 | 205 |
| Agricultural ⁸ | 52 | 341 | W | W | 54 | 219 | W | W |
| Chemical and metallurgical ⁹ | 5 | 21 | W | W | -- | -- | -- | -- |
| Special ¹⁰ | -- | -- | -- | -- | -- | -- | -- | -- |
| Unspecified: ¹¹ | | | | | | | | |
| Reported | 5,630 | 43,400 | 1,610 | 12,400 | 990 | 7,660 | 1,040 | 8,030 |
| Estimated | 7,400 | 57,000 | 7,200 | 55,000 | 2,800 | 21,000 | 6,400 | 50,000 |
| Total | 14,500 | 110,000 | 23,800 | 149,000 | 6,430 | 45,800 | 11,200 | 83,900 |
| District 8 | | | | | | | | |
| | Quantity | Value | | | | | | |
| Construction: | | | | | | | | |
| Coarse aggregate (+1½ inch) ³ | W | W | | | | | | |
| Coarse aggregate, graded ⁴ | 3,350 | 21,200 | | | | | | |
| Fine aggregate (-¾ inch) ⁵ | 76 | 448 | | | | | | |
| Coarse and fine aggregates ⁶ | 3,810 | 85,300 | | | | | | |
| Other construction materials ⁷ | -- | -- | | | | | | |
| Agricultural ⁸ | W | W | | | | | | |
| Chemical and metallurgical ⁹ | W | W | | | | | | |
| Special ¹⁰ | W | W | | | | | | |
| Unspecified: ¹¹ | | | | | | | | |
| Reported | 535 | 4,150 | | | | | | |
| Estimated | 13,000 | 100,000 | | | | | | |
| Total | 27,700 | 242,000 | | | | | | |

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.

²Districts 1 and 3, 2 and 5, 4 and 7 are combined to avoid disclosing company proprietary data.

³Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

⁴Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.

⁵Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

⁶Includes 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.

⁷Includes pipe bedding.

⁸Includes agricultural limestone.

⁹Includes cement and lime manufacture and dead-burned dolomite manufacture.

¹⁰Includes asphalt fillers or extenders.

¹¹Reported and estimated production without a breakdown by end use.

TABLE 5
 MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2006,
 BY MAJOR USE CATEGORY¹

| Use | Quantity (thousand metric tons) | Value (thousands) | Unit value |
|---|---------------------------------------|----------------------|---------------|
| Concrete aggregate (including concrete sand) | 5,460 | \$31,300 | \$5.74 |
| Concrete products (blocks, bricks, pipe, decorative, etc.) ² | 1,880 | 7,100 | 3.78 |
| Asphaltic concrete aggregates and other bituminous mixtures | 356 | 2,330 | 6.54 |
| Road base and coverings ³ | 255 | 1,290 | 5.04 |
| Fill | 296 | 2,080 | 7.04 |
| Snow and ice control | 19 | 110 | 5.79 |
| Other miscellaneous uses ⁴ | 601 | 3,620 | 6.03 |
| Unspecified: ⁵ | | | |
| Reported | 2,710 | 15,600 | 5.78 |
| Estimated | 5,410 | 28,600 | 5.29 |
| Total or average | 17,000 | 92,100 | 5.43 |

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 railroad ballast and golf course.

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

TABLE 6
MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2006, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

| Use | District 1 | | District 2 | | District 3 | |
|--|------------|--------|------------|--------|-----------------------|--------|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Concrete aggregate and concrete products ² | W | W | W | W | -- | -- |
| Asphaltic concrete aggregates and road base materials ³ | W | W | W | W | -- | -- |
| Fill | W | W | W | W | -- | -- |
| Other miscellaneous uses ⁴ | W | W | -- | -- | -- | -- |
| Unspecified: ⁵ | | | | | | |
| Reported | 1,650 | 9,110 | 44 | 269 | (6) | (6) |
| Estimated | 436 | 2,310 | 151 | 798 | 2,370 | 12,500 |
| Total | 2,920 | 16,200 | 251 | 1,330 | 2,370 | 12,500 |
| Use | District 4 | | District 5 | | District 6 | |
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Concrete aggregate and concrete products ² | 965 | 5,050 | 4,970 | 25,500 | W | W |
| Asphaltic concrete aggregates and road base materials ³ | W | W | W | W | -- | -- |
| Fill | W | W | 188 | 1,670 | -- | -- |
| Other miscellaneous uses ⁴ | W | W | 348 | 3,220 | W | W |
| Unspecified: ⁵ | | | | | | |
| Reported | 897 | 5,080 | 105 | 1,080 | 10 | 110 |
| Estimated | 67 | 352 | 2,000 | 10,600 | 150 | 794 |
| Total | 2,760 | 15,200 | 7,320 | 39,300 | 166 | 982 |
| Use | District 7 | | District 8 | | Unspecified districts | |
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Concrete aggregate and concrete products ² | 154 | 996 | W | W | 83 | 351 |
| Asphaltic concrete aggregates and road base materials ³ | 71 | 434 | W | W | -- | -- |
| Fill | 21 | 87 | -- | -- | -- | -- |
| Other miscellaneous uses ⁴ | 7 | 48 | -- | -- | -- | -- |
| Unspecified: ⁵ | | | | | | |
| Reported | -- | -- | -- | -- | -- | -- |
| Estimated | 233 | 1,230 | -- | -- | -- | -- |
| Total | 485 | 2,790 | 618 | 3,270 | 83 | 351 |

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 golf course, railroad ballast, and snow and ice control.

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

⁶Less than ½ unit.