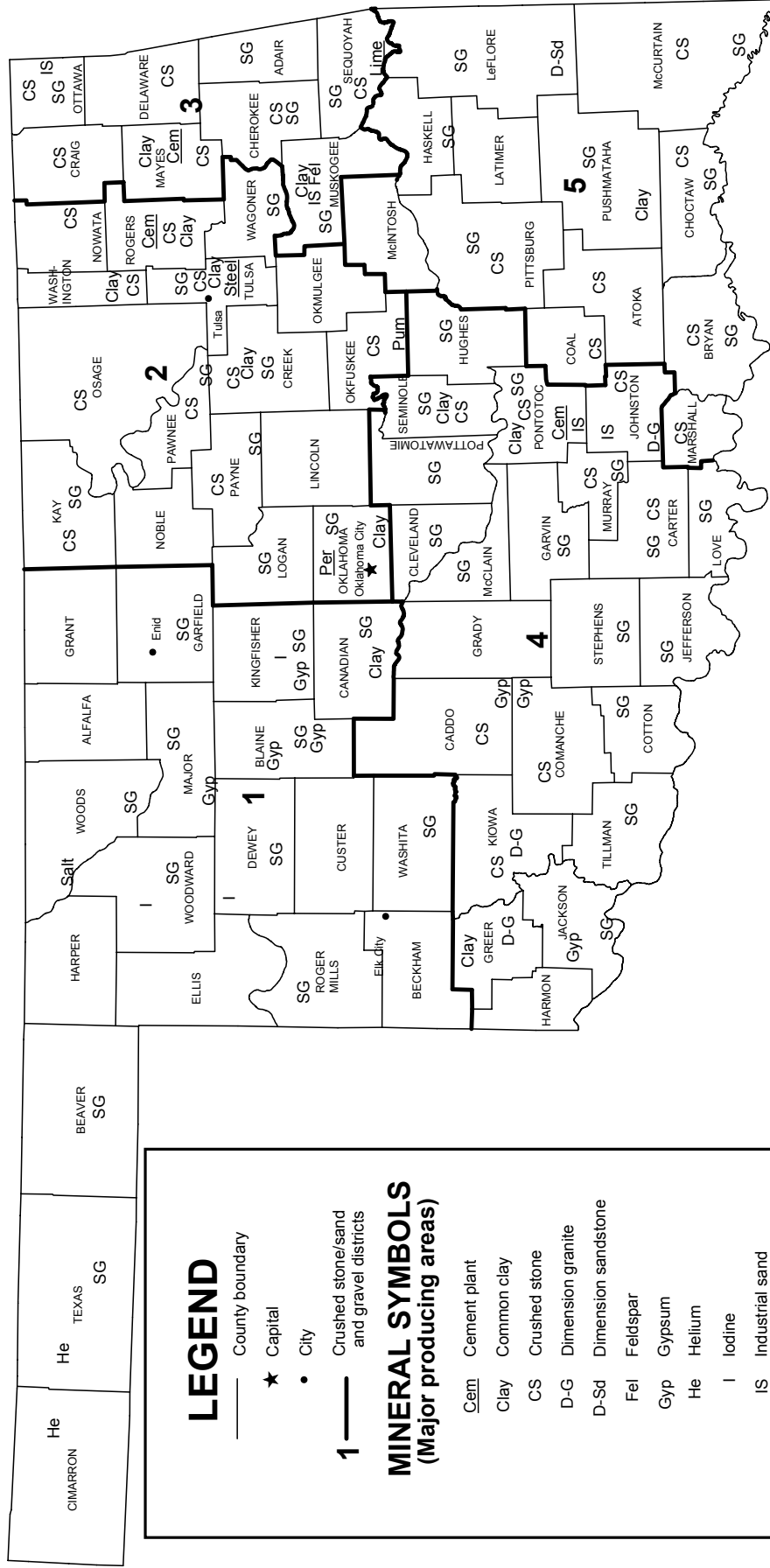


# OKLAHOMA



**LEGEND**

- County boundary
- ★ Capital
- City
- 1 — Crushed stone/sand and gravel districts

**MINERAL SYMBOLS  
(Major producing areas)**

- Cem Cement plant
- Clay Common clay
- CS Crushed stone
- D-G Dimension granite
- D-Sd Dimension sandstone
- Fel Feldspar
- Gyp Gypsum
- He Helium
- I Iodine
- IS Industrial sand
- Lime Lime plant
- Per Perlite plant
- Pum Pumice and pumicite
- Salt Salt
- SG Construction sand and gravel
- Steel Steel plant



# THE MINERAL INDUSTRY OF OKLAHOMA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Oklahoma Geological Survey for collecting information on all nonfuel minerals.

In 2003, the estimated value<sup>1</sup> of nonfuel raw mineral production for Oklahoma was \$479 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 1% increase from that of 2002<sup>2</sup> and followed a 1% decrease from 2001 to 2002. The State was 28th in rank (27th in 2002) among the 50 States in total nonfuel mineral production value, of which Oklahoma accounted for more than 1% of the U.S. total.

In 2003, crushed stone continued to be Oklahoma's leading nonfuel mineral commodity, accounting for more than two-fifths of the State's total nonfuel mineral production value. Based upon value, crushed stone was followed by cement (masonry and portland), construction sand and gravel, industrial sand and gravel, iodine, and gypsum. The combined values of three of Oklahoma's four major construction materials—crushed stone, construction sand and gravel, and gypsum (descending order of value)—accounted for about 54% of the total value. Most of the State's increase in value resulted from a rise in the values of crushed stone and masonry cement. Production data for masonry cement was withheld (company proprietary data).

In 2002, crushed stone and iodine production and values increased, their values up \$17 million and \$3.2 million, respectively. But decreases in cement, down an estimated \$18 million, and smaller decreases in gypsum, construction sand and gravel, lime, and crude helium (descending order of change) resulted in a small overall decrease in the State's nonfuel mineral value for the year (table 1). All other nonfuel minerals had changes in value of less than \$1 million (table 1).

Oklahoma's mines exclusively produced industrial minerals; no metals were mined in the State. Based upon USGS estimates of the quantities produced in the 50 States during 2003, Oklahoma remained the only State that produced iodine and continued to be first in gypsum; second of 4 States that produce

tripoli; fifth in feldspar; seventh in common clays; and eighth in industrial sand and gravel. Additionally, the State was a significant producer of crushed stone, portland and masonry and cements, dimension stone, and gemstones (descending order of value).

The narrative information that follows was provided by the Oklahoma Geological Survey<sup>3</sup> (OGS). Production data in the text that follows are those reported by the OGS based upon that agency's own surveys and estimates. Data may differ from some production figures or other data as reported to the USGS.

## Mining Employment

The Oklahoma Department of Mines (ODOM) recorded that 233 mine operators produced nonfuel minerals from 307 mines in the State of Oklahoma in 2003; however, there was a total of 480 permitted mining operations. Almost all were open pit mines, the exceptions being iodine and salt produced from brine wells, helium produced from natural gas wells, and one underground limestone mine. The mining industry in Oklahoma directly employed 26,702 persons in 2003, not including those employed by iodine and helium operators.

## Commodity Review

### Industrial Minerals

**Crushed Stone.**—Martin Marietta Materials, Inc. postponed development of the North Troy crushed stone project in Johnston County partly because of an internal corporate reorganization in 2003. The North Troy project is immediately adjacent to the Texas Industries, Inc. Mill Creek quarry and plant, which began producing aggregate in 2002.

**Dimension Stone.**—Increasing demand in Oklahoma and from other domestic markets has fostered growth in Oklahoma's dimension stone production, particularly in the State's LeFlore and Haskell Counties. Growth in residential housing markets for dimension stone products is responsible for much of this development. Products in demand include building stone, field stone, decorative stone, natural stone landscaping products, and flagstone. Granite, limestone, and sandstone are the principal kinds of stone that are mined for these purposes. In 2003, the Vermont Stone Co. purchased a limestone quarry in Johnston County. From the quarry, known for its oolitic limestone, both monument and building stone were produced from the Wapanucka Formation (Pennsylvanian). Part of the property, which had been mined out, was purchased by a private citizen for future development and recreational purposes.

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<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 2003 USGS mineral production data published in this chapter are preliminary estimates as of July 2004 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. Specialist contact information may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals/contacts/comdir.html>; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—also may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

<sup>2</sup>Values, percentage calculations, and rankings for 2002 may differ from the Minerals Yearbook, Area Reports: Domestic 2002, Volume II, owing to the revision of preliminary 2002 to final 2002 data. Data for 2003 are preliminary and are expected to change; related rankings also may change.

<sup>3</sup>Stanley T. Krukowski, Industrial Minerals Geologist with the Oklahoma Geological Survey, authored the text of the State mineral industry information provided by that agency.

**Iodine.**—Iodine is produced from oilfield brines in the northwestern quadrant of Oklahoma from deep wells in the Anadarko basin. The Woodward trench, a south-trending paleovalley in the Morrowan (basal Pennsylvanian) sandstones, contains brines with iodine concentrations as high as 700 parts per million. Two companies operated their own production wells and plant facilities, processing subsurface brines to produce iodine—Woodward Iodine Corp. in Woodward County and Iochem Corp. in Dewey County. A third company, North American Brine Resources (NABR) in Kingfisher County, operated a miniplant that served as an oilfield-injection-disposal site. NABR collects oilfield brines from a number of producing oil and gas wells in nearby northwestern Oklahoma, then extracts iodine from the brines, and finally injects the brines into wells at the plant site for disposal. In 2003, NABR (a joint venture between Mitsui & Co. of Japan and the Beard Oil Co.) was sold to a group of private U.S. investors who operate it as a limited liability company. Also, in Woodward County in 2003, NABR began dismantling their iodine production facility there and abandoned two production and three injection wells associated with the operation.

**Lime.**—Oglebay Norton Co. sought the sale of its lime assets under the Global Stone Corp. business division in 2003 in order to address an increasing corporate debt problem. As a result, Global Stone's St. Claire lime plant in Marble City, OK, was put up for sale, but early in 2004, the company rescinded its decision to sell Global Stone. Oglebay also reported weak sales in the lime segment of its business in the midcontinent as one additional reason for the attempted sale. St. Claire produced quicklime, hydrated lime, and chemical-grade limestone (including ground calcium carbonate) at the Marble City facility.

## Legislation and Government Programs

In 2003, the Mining Lands Reclamation Act was amended by title 45, chapter 8A, section 724.K, allowing an operator to transfer mining permits to another operator. The new operator must demonstrate to the ODOM, prior to the transfer of ownership, that conditions and obligations required for the permit will be met and that the new operator must submit a performance bond or other guarantee or has obtained the bond coverage of the original permit holder.

Oklahoma instituted the Coal Combustion Byproduct (CCB) Program in 2003. The primary focus of the CCB Program is to reclaim mine sites with CCB, including ash and cement kiln dust. Sites in this program are issued mining permits by the ODOM. The reclamation of these sites involves the placement of CCBs in designated portions of the site. All mining and reclamation applications must ensure that the proposed operation complies with all applicable regulations to protect public health and the environment. Environmental background information and data are analyzed so that environmental balance protection is achieved. Prior to permitting, the operator must have all necessary permits from agencies with corresponding jurisdiction. For example, this may include dealing with the results of stormwater discharge as well as an air quality permit. More information can be found on the Internet at URL <http://www.mines.state.ok.us/>.

In 2003, ODOM was faced with a reduction of State appropriations that directly affected its annual budget; it continued to perform its statutory mandates including environmental and health and safety issues as well as permit reviews. This was accomplished with a 15% staff reduction and the consolidation of inspection responsibilities of the Minerals and Coal Divisions. Inspection protocol was reviewed and revised allowing ODOM to reallocate its resources. The revisions allowed for more efficiency; hence, ODOM was able to perform a record number of inspections and a record number of citizen investigations. In addition, despite the budgetary constraints, no agency programs were cut, nor were any services to Oklahoma citizens reduced.

The OGS continued its geologic mapping of the State in cooperation with the USGS under the STATEMAP component of the USGS National Cooperative Mapping Program. The most current status may be found on the Internet at URL <http://www.ogs.ou.edu/geomapping/statemap/index.htm>. The geologic mapping program continued on a statewide, regional basis at 1:100,000 scale, supplanting previously published 1:250,000-scale maps. The following 7.5-minute quadrangles were completed in 2003: Alva, Beaver, Boise City, Buffalo, Elk City, Fairview, Guymon, and Woodward. Additionally, the following 7.5-minute quadrangles that represent the Oklahoma City metropolitan area were completed in 2003: Harrah, Horseshoe Lake, Little Axe, Luther, Oklahoma City, and Stella. The focus of the geologic mapping project includes engineering, environmental, and natural resource issues. These maps are published as open-file reports and are available through OGS Publication Sales (see below).

Two new publications concerned with the economic geology of Oklahoma were made available from the OGS in 2003. Special Publication 2003-1 covers the historical and geologic aspects of the base metals (as well as precious metals and rare-earth elements) mined in the region (Fay, 2003). In recent years, some major mining companies have expressed interest in these old mines and prospects. A second publication, Open-File Report 18-2003, is a compendium of the history of mineral prospecting and exploration in the region from prehistoric time through the earliest 20th century (Chaplin and others, 2003). Both publications are available from OGS Publications Sales, 2020 Industrial Boulevard, Norman, OK 73069. Further ordering information for these and other OGS publications may be found on the Internet at URL <http://www.ogs.ou.edu/pubs.htm>.

The OGS Well-Log Library recently was moved into its new quarters at the Oklahoma Petroleum Information Center (OPIC). The OGS Well-Log Library is the State's official repository for 13-centimeter-scale logs from more than 367,000 wells, as well as completion cards and 1002A forms, making it an important component of the OPIC. The library also houses aerial photos, known as the Melton Collection, which is cataloged by county, range, and township. OPIC is one of the largest facilities of its kind in the world and is home to more than 250,000 boxes of drill core as well as 150,000 sample boxes of drill cuttings from the OGS sample collections. Further information regarding the OPIC may be found on the Internet at URL <http://www.ogs.ou.edu/opic.htm>.

## References Cited

Chaplin, Jim, Luza, Ken, and Rodriguez, Louis, 2003, A history of midcontinent mineral discoveries: Oklahoma Geological Survey, Open-File Report 18-2003, 32 p.

Fay, R.O., 2003, Copper, lead, and zinc in the Ouachita Mountains in Oklahoma and adjacent parts of Arkansas: Oklahoma Geological Survey, Special Publication 2003-1, 38 p.

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2001		2002		2003 <sup>p</sup>	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	783	1,910	1,030	2,250	1,030	2,250
Gemstones	NA	197	NA	197	NA	197
Gypsum, crude	2,630	21,300	2,520	18,500	2,410	18,700
Iodine, crude metric tons	1,290	18,400	1,420	21,600	1,750	19,700
Sand and gravel:						
Construction	11,000	43,700	10,200	41,300	9,800	39,700
Industrial	1,360	28,200	1,320	28,400	1,320	28,400
Stone:						
Crushed	41,600	179,000	45,000	196,000	45,800	202,000
Dimension	17	2,190	17	2,100	17	2,100
Tripoli metric tons	11,700	2,100	12,700	2,290	12,700	2,290
Combined values of cement, feldspar, helium [crude (2001-02), Grade-A], lime, salt	XX	181,000	XX	160,000	XX	164,000
Total	XX	478,000	XX	473,000	XX	479,000

<sup>e</sup>Estimated. <sup>p</sup>Preliminary. NA Not available. 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  
OKLAHOMA: CRUSHED STONE SOLD OR USED, BY KIND <sup>1</sup>

Kind	2001				2002			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone <sup>2</sup>	42 <sup>r</sup>	33,700 <sup>r</sup>	\$142,000 <sup>r</sup>	\$4.22 <sup>r</sup>	41	35,500	\$151,000	\$4.26
Dolomite	1 <sup>r</sup>	W	W	5.14 <sup>r</sup>	1	W	W	5.00
Shell	1	W	W	3.64	--	--	--	--
Granite	5	4,210	15,700	3.73	5	5,500	20,700	3.76
Sandstone and quartzite	7	2,970	17,700	5.95	8	3,300	19,900	6.05
Miscellaneous stone	2	W	W	3.65	1	W	W	3.74
Total or average	XX	41,600	179,000	4.30	XX	45,000	196,000	4.34

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

<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 limestone-dolomite reported with no distinction between the two.

TABLE 3  
OKLAHOMA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2002, BY USE <sup>1</sup>

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
<b>Construction:</b>			
<b>Coarse aggregate (+1 1/2 inch):</b>			
Riprap and jetty stone	1,690	\$8,860	\$5.23
Other coarse aggregates	71	383	5.39
Total or average	1,770	9,240	5.23
<b>Coarse aggregate, graded:</b>			
Concrete aggregate, coarse	W	W	4.98
Bituminous aggregate, coarse	357	1,990	5.56
Bituminous surface-treatment aggregate	W	W	3.53
Other graded coarse aggregates	9,070	36,100	3.98
Total or average	9,430	38,100	4.04
<b>Fine aggregate (-3/8 inch):</b>			
Stone sand, concrete	W	W	3.69
Stone sand, bituminous mix or seal	W	W	4.46
Screening, undesignated	2,060	7,780	3.77
Other fine aggregates	574	2,350	4.09
Total or average	2,640	10,100	3.84
<b>Coarse and fine aggregates:</b>			
Graded road base or subbase	(2)	(2)	5.14
Crusher run or fill or waste	4,110	15,800	3.86
Other construction materials <sup>3</sup>	27	389	14.16
Agricultural limestone	(2)	(2)	4.39
<b>Chemical and metallurgical:</b>			
Cement manufacture	(4)	(4)	3.65
Lime manufacture	(4)	(4)	5.51
Total or average	2,010	7,320	3.65
Other miscellaneous uses and specified uses not listed	219	869	3.97
<b>Unspecified:<sup>5</sup></b>			
Reported	19,600	89,800	4.58
Estimated	2,800	12,000	4.35
Total or average	22,400	102,000	4.55
Grand total or average	45,000	196,000	4.34

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

<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>Withheld to avoid disclosing company proprietary data; included in "Grand."

<sup>3</sup>Includes building products.

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

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

TABLE 4  
 OKLAHOMA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2002, BY USE AND DISTRICT <sup>1,2</sup>

(Thousand metric tons and thousand dollars)

Use	District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) <sup>3</sup>	W	W	W	W	W	W
Coarse aggregate, graded <sup>4</sup>	W	W	--	--	W	W
Fine aggregate (-3/8 inch) <sup>5</sup>	W	W	--	--	W	W
Coarse and fine aggregate <sup>6</sup>	W	W	W	W	W	W
Other construction materials <sup>7</sup>	--	--	--	--	--	--
Agricultural <sup>8</sup>	W	W	W	W	--	--
Chemical and metallurgical <sup>9</sup>	W	W	--	--	W	W
Other miscellaneous uses and specified uses not listed	--	--	--	--	--	--
Unspecified: <sup>10</sup>						
Reported	3,050	17,800	2,560	11,300	10,300	40,000
Estimated	750	3,800	850	3,200	90	320
Total	10,000	53,100	3,800	16,200	21,900	82,300
	District 5					
	Quantity	Value				
Construction:						
Coarse aggregate (+1 1/2 inch) <sup>3</sup>	83	367				
Coarse aggregate, graded <sup>4</sup>	W	W				
Fine aggregate (-3/8 inch) <sup>5</sup>	W	W				
Coarse and fine aggregate <sup>6</sup>	998	3,860				
Other construction materials <sup>7</sup>	W	W				
Agricultural <sup>8</sup>	--	--				
Chemical and metallurgical <sup>9</sup>	--	--				
Other miscellaneous uses and specified uses not listed	219	869				
Unspecified: <sup>10</sup>						
Reported	3,640	20,700				
Estimated	1,100	4,900				
Total	9,380	44,000				

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

<sup>1</sup>No production for District 1.

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

<sup>3</sup>Includes filter stone, riprap and jetty stone, and other coarse aggregates.

<sup>4</sup>Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and other graded coarse aggregates.

<sup>5</sup>Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregates.

<sup>6</sup>Includes crusher run (select material or fill) and graded road base or subbase.

<sup>7</sup>Includes building products.

<sup>8</sup>Includes agricultural limestone.

<sup>9</sup>Includes cement and lime manufacture.

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

TABLE 5  
OKLAHOMA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2002,  
BY MAJOR USE CATEGORY <sup>1</sup>

Use	Quantity		Unit value
	(thousand metric tons)	Value (thousands)	
Concrete aggregate (including concrete sand)	4,790	\$20,300	\$4.23
Plaster and gunite sands	61	355	5.82
Concrete products (blocks, bricks, pipe, decorative, etc.)	33	204	6.18
Asphaltic concrete aggregates and other bituminous mixtures	466	1,990	4.28
Road base and coverings	224	649	2.90
Fill	1,210	3,010	2.49
Other miscellaneous uses <sup>2</sup>	77	420	5.45
Unspecified: <sup>3</sup>			
Reported	1,460	6,230	4.26
Estimated	1,900	8,200	4.31
Total or average	10,200	41,300	4.04

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

<sup>2</sup>Includes snow and ice control.

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

TABLE 6  
OKLAHOMA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2002,  
BY USE AND DISTRICT <sup>1,2</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2 and 3		District 4 and 5	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products <sup>3</sup>	678	2,220	2,030	7,720	2,180	10,900
Asphaltic concrete aggregates and road base materials	191	547	440	1,920	59	173
Fill	175	310	626	2,200	409	502
Other miscellaneous uses <sup>4</sup>	3	27	--	--	74	393
Unspecified: <sup>5</sup>						
Reported	9	100	408	1,270	1,040	4,860
Estimated	340	1,400	910	3,600	670	3,100
Total	1,390	4,640	4,410	16,700	4,430	19,900

-- Zero.

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

<sup>2</sup>Districts 2 and 3, 4 and 5 are combined to avoid disclosing company proprietary data.

<sup>3</sup>Includes plaster and gunite sands.

<sup>4</sup>Includes snow and ice control.

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