

# ARKANSAS

## LEGEND

County boundary

★ Capital

• City

1 — Crushed stone/sand and gravel districts

## MINERAL SYMBOLS (Major producing areas)

Abr Abrasives

Abt Abrasives plant

Br Bromine plant

Cem Cement plant

Clay Common clay

CS Crushed stone

Diam Diamond

DS Dimension stone

D-L Dimension limestone

D-Sd Dimension sandstone

Gem Gemstones

Gyp Gypsum

Gyp Gypsum plant

ISG Industrial sand and gravel

Ka Kaolin

Lime Lime plant

Per Perlite

S-ng Sulfur (natural gas)

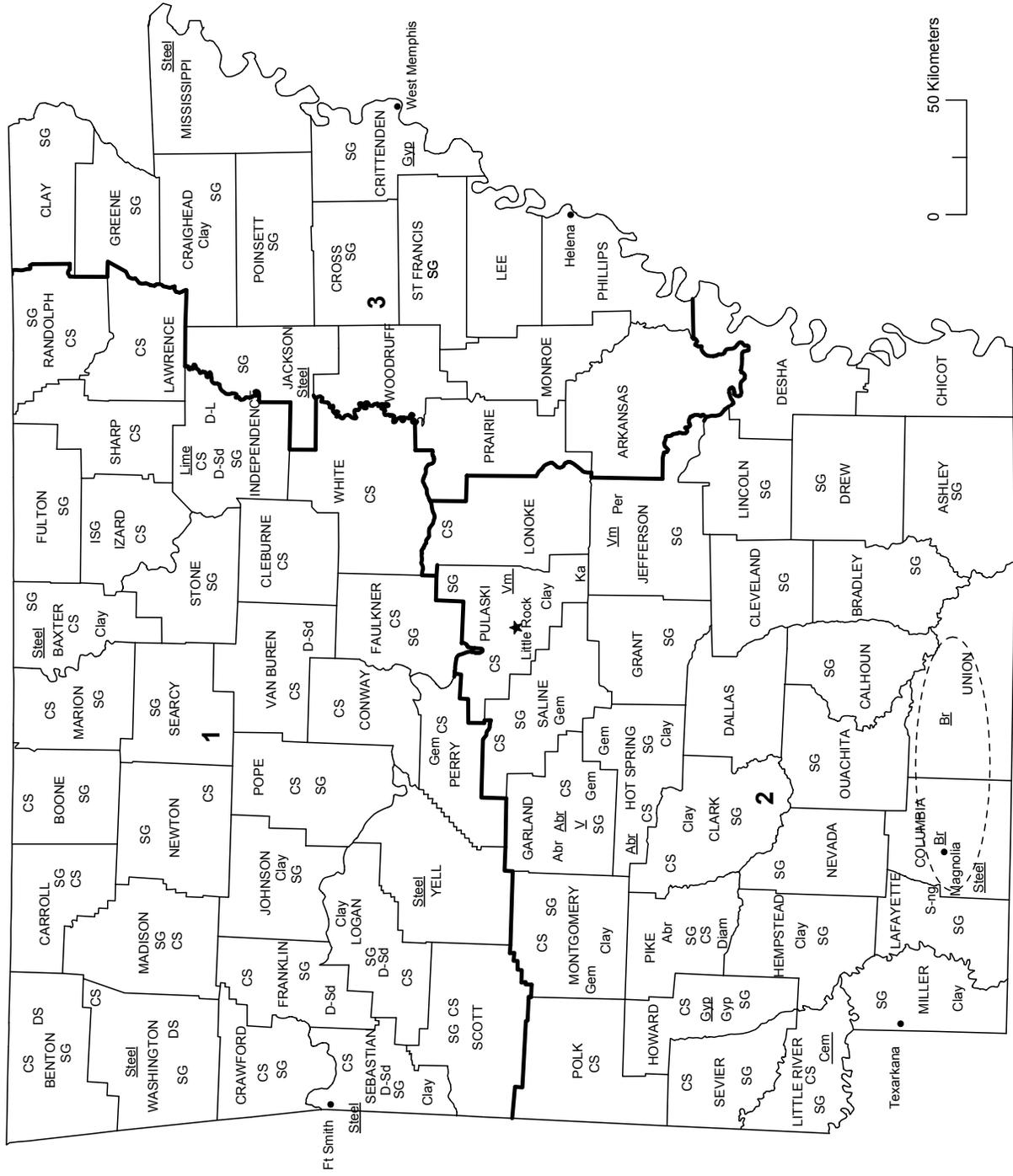
SG Construction sand and gravel

Steel Steel plant

V Vanadium plant

Vm Vermiculite plant

○ Concentration of mineral operations



Source: Arkansas Geological Commission/U.S. Geological Survey (2003)

# THE MINERAL INDUSTRY OF ARKANSAS

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

In 2003, the estimated value<sup>1</sup> of nonfuel mineral production for Arkansas was \$445 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 3% decrease from that of 2002<sup>2</sup> and followed a 4.4% decrease from 2001 to 2002. The State remained 30th in rank among the 50 States in total nonfuel mineral production value. Arkansas accounted for more than 1% of the U.S. total.

In 2003, crushed stone, followed by bromine, cement (portland and masonry), and construction sand and gravel, were Arkansas' leading nonfuel minerals by value, altogether accounting for about 92% of the State's total nonfuel mineral value. From 1969 to 1996, bromine had been the State's leading nonfuel mineral; in 1998 and 2001, it traded places back and forth with crushed stone. Bromine and cement data must be concealed to protect proprietary company data.

Arkansas' decrease in value in 2003 resulted mostly from decreases in the production and values of bromine and crushed stone, down an estimated \$11 million and \$6 million, respectively, while dimension stone was down also, by about \$1 million. Lime and construction sand and gravel increased nearly \$2 million each; portland cement was up by an estimated \$1 million (table 1).

During 2002, bromine production and value rose, up \$7 million; the production and values of common clays and lime also increased, up nearly \$1 million each. Construction sand and gravel decreased \$12 million; crushed stone, \$10 million; and cement and gypsum, about \$3 million each, resulting in the State's net decrease for the year. The values of industrial sand and gravel, silica stone, tripoli, and gemstones also were down slightly (descending order of change) (table 1).

Based upon USGS estimates of quantities produced in the 50 States during 2003, Arkansas continued to be the leading bromine-producing State, accounting for most U.S. production. Michigan was the only other State that produced bromine. Mining operations in both States extracted subsurface, bromine-rich natural brines by submersible pump for subsequent processing. Arkansas continued to be the only State that produced silica stone; it was third of four tripoli-producing States and fifth in gemstones. Even though gypsum production was up by about 13%, the State decreased in rank to ninth from eighth. Additionally, significant quantities of crushed stone, industrial sand and gravel, and common clays (11th in rank) were produced in the State. The State's metal production, mostly that of raw steel, resulted from materials received from other domestic and foreign sources.

The Arkansas Geological Commission<sup>3</sup> (AGC) provided the following narrative information.

## Commodity Review

### *Industrial Minerals*

**Crushed Stone.**—Arkholo Sand and Gravel Co. continued exploration for additional quarry sites in the western portion of the Arkansas River Valley. Arkholo produced both road aggregates and asphalt mix at the Preston Quarry near Van Buren in Crawford County. Arkholo continues to work a Hartshorne Sandstone quarry near Jenny Lind in Sebastian County. Bobby Plant Asphalt Co., based in Murfreesboro, Pike County, produced crushed stone from its quarry in the Jackfork Sandstone (Lower Pennsylvanian) south of Kirby in central Pike County.

Duffield Stone and Gravel Co. operated two sandstone aggregate quarries (Pennsylvanian) in Pope County; one in the Hartshorne Sandstone at Russellville and the other, the Gumlog Quarry, in the upper Atoka Formation. The company continued exploration in the Arkansas River Valley. Pyramid Co. produced aggregate from the middle Atoka Formation (Pennsylvanian) north of Greenbrier in Faulkner County. McClinton-Anchor, Inc. continued exploring for new aggregate quarry sites in the limestone-bearing region of northwest Arkansas.

Rogers Group, Inc. continued sandstone aggregate operations at its Greenbriar Quarry in the middle Atoka Formation in Faulkner County, its Conway County Quarry in upper Atoka Formation south of Solgohacia, and at its Lowell Quarry in the limestone of the

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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 Mineral Industry Surveys—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>J. Michael Howard, Geology Supervisor/Mineralogist, authored the text of the State mineral industry information provided by the Arkansas Geological Commission.

Boone Formation (Mississippian) in southern Benton County. Schwartz Stone Co. quarried sandstone from the Hartshorne Sandstone for aggregate and dimension stone north of Midway in Logan County. The Souter Construction Co. produced riprap from the Hollywood Quarry property in Clark County. Texas Industries Group continued evaluation of tuff deposits on leases in southern Polk County. McGeorge Sand and Gravel Co. continued riprap barge operations along the Arkansas River from its River Mountain Quarry in the Hartshorne Sandstone north of New Blaine in eastern Logan County. Chrisman Co. mined sandstone aggregate in the Hartshorne Sandstone near Hunt in Johnson County and from the Savanna Formation near Ratcliffe in Franklin County.

Vulcan Materials Co., based in Birmingham, AL, produced aggregate from its late Morrowan age sandstone operations at Judsonia and middle Atokan age sandstones at Floyd, both sites in White County. It also produced dolomitic limestone from Lower Ordovician units near Black Rock in Lawrence County. Vulcan also continued aggregate exploration, focusing on Morrowan and Atokan age sandstones in White and Cleburne Counties. Webco Mining produced crushed stone from its quarry in the middle Atoka Formation near El Paso in White County.

**Gypsum.**—In 2003, BPB Gypsum production plant and mines, near Nashville in Howard County, continued as the world's largest wallboard manufacturing plant, with an annual capacity of 130 million square meters. The plant and mine employs about 200 people. Principal markets for wallboard were in the eastern United States. Product was shipped by rail and truck. Properties of the C.W. Harrison Gypsum Co. of Oklahoma near Highland in Pike County were inactive in 2003, but the company continued reclamation efforts begun in 1999.

**Nepheline Syenite.**—Granite Mountain Quarries, Inc. (GMQ) produced aggregate from nepheline syenite at two quarries in Pulaski County and from the Granite Mountain No. 3 quarry near Bryant in Saline County. GMQ abandoned a new quarry operation northwest of DeQueen, Sevier County, in the Jackfork Sandstone (Pennsylvanian) and tested another site in the general region. It continued evaluating two other sites—one in the lower Atoka Formation west of Boles in southern Scott County and another in the Hartshorne Sandstone west of Greenwood in Sebastian County. Martin Marietta Co. actively quarried the Hatton Tuff lentil of the Stanley Group (Mississippian) at the Hatton Quarry in southern Polk County. It acquired new leases near the Cossatot River and was installing a third crusher and processing unit at this site. It continued operations at the 270 Quarry near Magnet Cove in Hot Spring County, producing from the hornfels and quartzite alteration zone in the Stanley Group adjacent to the Cretaceous igneous intrusion. At this site, the company operates an asphalt plant, which was built in 2000.

Minnesota Mining and Manufacturing Co. mined nepheline syenite from its Big Rock Arch Street Quarry to supply its roofing granule plant in Sweet Home, Pulaski County. Martin Marietta Co. continued concurrent mining of syenite dike rock for aggregate in this quarry.

**Sand and Gravel.**—There were 109 active sand and gravel operations in Arkansas in 2002, the greatest number of these being in the southeastern part of the State (the Gulf Coastal Plain). During 2003, there were 100 active sand and gravel operations in Arkansas. There were three new sand and gravel operations permitted by the Surface Mining and Reclamation Division (SMRD) of the Arkansas Department of Environmental Quality (ADEQ). These permits were issued to two individuals of Izard County, Cannon Contracting of Jefferson County, and the Madison County Road Department. For 2003, there were 27 Quarry Notifications of Intent on file. During 2003, ADEQ issued 2 Authorizations to Quarry pursuant to the Arkansas Quarry Operation, Reclamation and Safe Closure Act. These Authorizations to Quarry were issued to Martin Marietta in Polk County and Northwest Arkansas Quarries, LLC in Washington County.

**Other Industrial Minerals.**—The Butterfield Quarry in Hot Spring County, managed and operated by Mark Wallis Whetstones, produced high-silica novaculite. Shipments in 2002 continued to be sporadic. The company also continued sporadic operation of a whetstone-grade mine south of Lonsdale near the Saline-Hot Spring County line. Martin Marietta Co. began production at a deposit of high-silica novaculite for both aggregate and high-silica end usage near Glen Rose in Hot Spring County. Smith Whetstone, Inc. of Hot Springs in Garland County manufactured a variety of grades of oilstones (whetstones) from its Arkansas Novaculite (Mississippian-Devonian) quarry operations. Malvern Minerals Co. of Hot Springs, Garland County, produced tripoli from its mine in the Bigfork Chert (Upper and Middle Ordovician).

Oran McBride Stone Co. of Batesville in Independence County continued production of interior and exterior structural and architectural stone at its plant at Bethesda. Polished, cut, and rough surface marble, limestone, and sandstone were quarried from Ordovician-age formations and processed. Bennett Brothers Stone Co., Inc. obtained building stone materials from deposits in Franklin, Logan, Garland, and other counties.

Ash Grove Cement Co., sole producer of cement in the State, operated the Foreman plant in Little River County, using chalk from the Annona Formation and silica from the Marlbrook Formation (both Cretaceous). Acme Brick Co., purchased recently by Berkshire-Hathaway, is located near Malvern in Hot Spring County. Acme continued operation of its Wilcox Group (Eocene) clay mines for brick production at Perla. Strategic Minerals Corp. continued operation of the mill facility at Potash Sulphur Springs in Garland County; the mill extracts vanadium pentoxide from recycled out-of-State vanadium-bearing feed.

## **Environmental Issues and Mine Reclamation**

In 2003, Albemarle introduced a new fire retardant product, SAYTEX® RX 8500 to replace phased-out Penta BDE. Great Lakes Chemical Co. introduced its new fire-retardant product, Firemaster 550, as a result of the same phaseout. Additionally, Great Lakes

received a Supplier Award of Excellence from Wal-Mart for pool and spa products. Both Albemarle and Great Lakes Chemical Co. continued operations at bromine extraction and product production plants in Columbia and Union Counties, respectively.

Alcoa Inc. is approximately two-thirds finished with a 20-year land reclamation project of former bauxite properties adjacent to the community of Bauxite in Saline County. Alcoa's reclamation project includes a large acreage of pre-land-reclamation-law land. Umetco, Inc. initiated reclamation of the Wilson Springs vanadium mines area in Garland County in 1997 and continues this effort. In 2002, Star Resources Corp. of Houston, TX, began reclamation of a bulk testing site on the Black Lick diamond property, northeast of the Crater of Diamonds State Park near Murfreesboro in Pike County, which continued through 2003. Star Resources sold its pilot diamond processing plant, which was disassembled and shipped to Canada.

### **Government Programs**

During 2003, there were 159 active, permitted, or authorized noncoal mine sites in Arkansas. Total noncoal area permitted was 4,790 hectares. There were no amendments or changes to State laws and/or regulations concerning mining and/or mine reclamation in Arkansas during 2003.

Operators of 27 quartz contracts with the U.S. Department of Agriculture's Forest Service on the Ouachita National Forest in Arkansas generated about \$13,500 in revenue and approximately \$5,000 more on 3 producing leases. In 2003, 641 diamonds with an average weight of 0.20 carat were recovered at the Crater of Diamonds State Park. Of these, 18 diamonds weighed more than 1 carat each. More than 22,000 diamonds have been recovered since this property became a State park in 1972. Plans for the Park include a new museum and updated facilities.

The AGC Web site, URL <http://www.state.ar.us/agc/agc.htm>, hosted nearly 79,000 visitors in 2003, its 5th year of online operation, representing a 17% increase relative to 2002. Information posted on the Web site includes State resource data, USGS annual nonfuel mineral production data, publications and map ordering information, State stratigraphic and geologic data, Arkansas Board of Registration for Professional Geologists, agency services, and news items. Links are provided to State Geological Surveys, Federal agencies, geology Web sites, organizations, and universities.

Also, initiated by AGC staff in 2001 is a spreadsheet database designed to contain all identified sites of mineral extraction in the State, excluding petroleum and natural gas. By the close of 2003, more than 7,200 entries had been made. Sites are located by both latitude and longitude and general land office survey techniques. In 2003, four digitized 7.5-minute USGS topographic geologic maps were completed under the STATEMAP cooperative agreement, and three additional maps were started. Staff cartographers completed the digitization of six USGS 7.5-minute topographic geologic maps in Pulaski County. These maps have passed final review. In 2003, staff completed digitization of 19 additional USGS 7.5-minute topographic geologic maps, primarily in the Ouachita Mountains Region, sans legends.

TABLE 1  
NONFUEL RAW MINERAL PRODUCTION IN ARKANSAS<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	989	1,440	922	2,280	922	2,280
Gemstones	NA	686	NA	637	NA	616
Sand and gravel, construction	11,600	57,600	8,810	45,600	9,100	47,300
Silica stone <sup>3</sup> metric tons	393	4,040	386	3,740	386	3,740
Stone, crushed	33,700	169,000	30,800	159,000	29,500	153,000
Combined values of bromine, cement, clays (kaolin), gypsum (crude), lime, sand and gravel (industrial), silica stone <sup>3</sup> (2000), stone [dimension limestone marble, sandstone (2000-01), dimension limestone and sandstone (2002)], tripoli and item indicated by symbol W	XX	246,000	XX	247,000	XX	238,000
Total	XX	479,000	XX	458,000	XX	445,000

<sup>P</sup>Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. 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.

<sup>3</sup>Grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles.

TABLE 2  
ARKANSAS: 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	25 <sup>r</sup>	9,840 <sup>r</sup>	\$49,700 <sup>r</sup>	\$5.05 <sup>r</sup>	27	8,060	\$42,200	\$5.23
Dolomite	2	W	W	5.41	2	W	W	5.35
Granite	6	9,530	50,200	5.27	6	9,400	51,500	5.48
Sandstone	17 <sup>r</sup>	8,640 <sup>r</sup>	41,600 <sup>r</sup>	4.82 <sup>r</sup>	17	9,250	44,800	4.84
Quartzite and quartz	1	W	W	4.74	1	W	W	4.74
Slate	1	W	W	4.41	1	W	W	4.52
Miscellaneous stone	4 <sup>r</sup>	W	W	4.59	3	W	W	4.63
Total or average	XX	33,700	169,000	5.02	XX	30,800	159,000	5.16

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

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

TABLE 3  
ARKANSAS: 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	164	\$976	\$5.95
Filter stone	W	W	5.00
Other coarse aggregates	153	1,030	6.73
Total or average	317	2,010	6.33
<b>Coarse aggregate, graded:</b>			
Concrete aggregate, coarse	471	2,980	6.33
Bituminous aggregate, coarse	W	W	4.73
Bituminous surface-treatment aggregate	W	W	8.02
Railroad ballast	W	W	3.80
Other graded coarse aggregates	2,860	17,600	6.13
Total or average	3,330	20,500	6.16
<b>Fine aggregate (-3/8 inch):</b>			
Screening, undesignated	W	W	4.33
Other fine aggregates	575	3,200	5.56
Total or average	575	3,200	5.56
<b>Coarse and fine aggregates:</b>			
Graded road base or subbase	2,170	11,700	5.40
Unpaved road surfacing	W	W	5.94
Crusher run (select material or fill)	W	W	3.80
Roofing granules	W	W	10.34
Other coarse and fine aggregates	1,140	6,220	5.47
Total or average	3,310	17,900	5.42
Other construction materials	129	535	4.15
<b>Agricultural:</b>			
Limestone	86	440	5.12
Poultry grit and mineral food	(2)	(2)	12.87
Other agricultural uses	10	38	3.80
Chemical and metallurgical, lime manufacture	(2)	(2)	4.19
<b>Special:</b>			
Asphalt fillers or extenders	(2)	(2)	5.51
Other fillers or extenders	(2)	(2)	11.51
Other miscellaneous uses and specified uses not listed <sup>3</sup>	4	17	4.25
<b>Unspecified:<sup>4</sup></b>			
Reported	13,000	61,100	4.69
Estimated	8,300	37,000	4.49
Total or average	21,400	98,400	4.61
Grand total or average	30,800	159,000	5.16

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 total."

<sup>3</sup>Includes abrasives.

<sup>4</sup>Reported and estimated production without a breakdown by end use.

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

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) <sup>2</sup>	239	1,490	W	W	W	W
Coarse aggregate, graded <sup>3</sup>	W	W	W	W	W	W
Fine aggregate (-3/8 inch) <sup>4</sup>	W	W	W	W	W	W
Coarse and fine aggregate <sup>5</sup>	2,740	14,000	W	W	W	W
Other construction materials	122	509	7	27	--	--
Agricultural <sup>6</sup>	W	W	--	--	--	--
Chemical and metallurgical <sup>7</sup>	W	W	--	--	--	--
Special <sup>8</sup>	W	W	W	W	--	--
Other miscellaneous uses <sup>9</sup>	--	--	4	17	--	--
Unspecified: <sup>10</sup>						
Reported	8,010	39,300	5,030	21,800	--	--
Estimated	3,500	15,000	4,800	22,000	--	--
Total	17,200	87,300	13,300	68,900	207	2,670

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

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

<sup>2</sup>Includes filter stone, riprap and jetty stone, and other coarse aggregates.

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

<sup>4</sup>Includes screening (undesigned) and other fine aggregates.

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

<sup>6</sup>Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

<sup>7</sup>Includes lime manufacture.

<sup>8</sup>Includes asphalt fillers or extenders and other fillers and extenders.

<sup>9</sup>Includes abrasives.

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

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

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products <sup>2</sup>	1,350	\$8,040	\$5.98
Asphaltic concrete aggregates and other bituminous mixtures	346	2,770	8.00
Road base and coverings	503	2,100	4.18
Fill	42	142	3.38
Other miscellaneous uses	59	923	15.64
Unspecified: <sup>3</sup>			
Reported	5,180	24,800	4.79
Estimated	1,300	6,700	5.15
Total	8,810	45,600	5.17

<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 plaster and gunite sands.

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

TABLE 6

ARKANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2002, BY USE AND DISTRICT<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products <sup>2</sup>	199	1,320	W	W	W	W
Asphaltic concrete aggregates and road base materials	150	758	399	2,450	300	1,660
Fill	12	86	W	W	W	W
Other miscellaneous uses	39	231	151	1,330	1,050	6,140
Unspecified: <sup>3</sup>						
Reported	1,010	3,970	2,930	14,700	1,240	6,130
Estimated	400	2,100	780	3,900	150	760
Total	1,820	8,430	4,250	22,400	2,740	14,700

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

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.<sup>2</sup>Includes plaster and gunite sands.<sup>3</sup>Reported and estimated production without a breakdown by end use.