



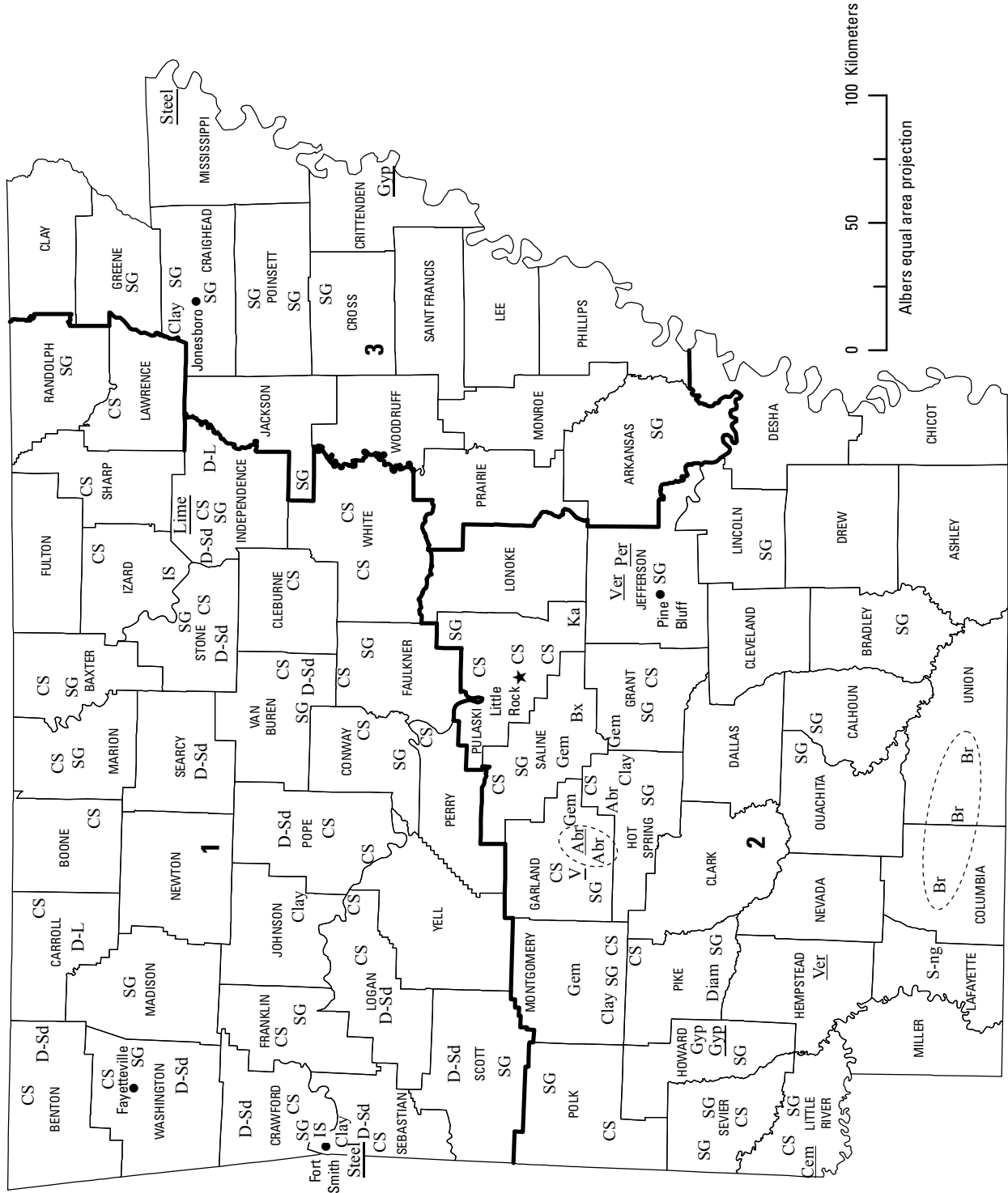
# 2008 Minerals Yearbook

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## ARKANSAS

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Source: Arkansas Geological Survey/U.S. Geological Survey (2008).

# 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 Survey for collecting information on all nonfuel minerals.

In 2008, Arkansas nonfuel raw mineral production<sup>1</sup> was valued at \$704 million, based upon annual U.S. Geological Survey (USGS) data. This was a 9% decrease from the State's total value of \$774 million in 2007, which followed a \$25 million, or 3.1%, decrease from 2006 to 2007. The State ranked 30th, a decrease from 29th, among the 50 States in total nonfuel mineral production value in 2008 and accounted for less than 1% of the U.S. total. Yet, per capita, the State remained 15th in rank in the Nation for its total nonfuel mineral production value; with a population of slightly more than 2.8 million, the per capita production value was \$246 in 2008.

The leading nonfuel minerals in 2008, by descending production value, were crushed stone, bromine, portland cement, construction sand and gravel, and lime. These commodities together accounted for nearly 94% of the State's total nonfuel mineral production value. For nearly four decades, bromine and crushed stone have been the State's two leading nonfuel minerals, by value, bromine leading in value from 1969 up to 1996 when crushed stone went from second to first. Since then, the two have exchanged rank several times; crushed stone was first in 1996–98, 2001–03, 2005, and 2008, with bromine ranking first in all other years. For more than a decade, cement has ranked third and construction sand and gravel has ranked fourth. Actual production data for bromine and portland cement have been withheld (company proprietary data).

In 2008, the largest increase in production value took place in common clays. Production was down almost 29%, or 321,000 metric tons (t), but the production value more than doubled, with an increase of more than \$6 million, or 136%. This was caused by one company placing a higher value on its clay products in 2008. The production value of lime (value withheld—company proprietary data) was up significantly and crushed stone was up by more than \$2 million. However, decreases (in descending order) in the values of bromine, crude gypsum, construction sand and gravel (down \$1.25 million), and portland cement (data withheld for all except construction sand and gravel—company proprietary data), resulted in an overall decrease in total nonfuel mineral production value for the State (table 1).

In 2008, Arkansas was the Nation's only State to produce bromine; bromine production in Michigan, the only other State with recent production, ended in 2007. Arkansas continued to be the only State that produced silica stone and it remained third in the quantities of tripoli produced among the four producing

States. The State remained fourth in the quantity of kaolin clays produced and sixth in common clays. Arkansas decreased in rank from fifth to sixth in crude gypsum, and from fifth to seventh in gemstones (gemstones based upon production value). Metals that were produced in the State—for the most part raw steel—were processed from materials acquired from other domestic and foreign sources. The principal steel mills in the State were Quanex Corp. in Sebastian County; Nucor-Yamato Steel Co. and Nucor Corp. near Hickman, Mississippi County; and Arkansas Steel Associates in Jackson County. In addition, Strategic Minerals Corp., or Stratcor, continued operation of the mill facility near Hot Springs in Garland County; the mill extracts vanadium pentoxide from recycled out-of-State vanadium-bearing feed.

The following narrative information was provided by the Arkansas Geological Survey<sup>2</sup> (AGS).

## Exploration and Development

Numerous companies continued to be engaged in nonfuel minerals exploration, mine expansion, and facility construction activities in 2008. In particular, several companies continued exploration efforts from the previous year: Arkhola Sand and Gravel Co. and Duffield Stone and Gravel Co. explored for additional quarry sites in the western portion of the Arkansas River Valley; McClinton-Anchor, Inc. explored for new aggregate quarry sites in the limestone-bearing region of northwest Arkansas; and Vulcan Materials Co., based in Birmingham, AL, continued aggregate exploration in White and Cleburne Counties. In addition to the above-listed companies, which had all performed exploration activities in 2007, Pine Bluff Sand and Gravel began evaluating various sites across the State for aggregate materials. Martin Marietta Co. began production of crushed novaculite on leases acquired in 2007 on its Hatton Quarry site in southern Polk County.

## Commodity Review

### *Industrial Minerals*

During 2008, 238 noncoal mine sites were permitted or authorized in Arkansas. The total area of noncoal sites under permit was just over 6,900 hectares (ha) (more than 17,000 acres) and more than 4,600 ha (more than 11,400 acres) were under bond.

**Abrasives, Natural.**—Seven companies continued to mine and to process novaculite to make whetstones in the Hot Springs, Garland County, including B & C Abrasives, Inc., Blue Mountain Whetstone, Co., Dan's Whetstone Co., Eagle

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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 2008 USGS mineral production data published in this chapter are those available as of July 2010. 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>.

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<sup>2</sup>J. Michael Howard, Geology Supervisor/Mineralogist, authored the text of the State mineral industry information provided by the Arkansas Geological Survey.

Mountain Whetstones Co., Halls Arkansas Oilstones, Inc., Saint Gobain Abrasives, Inc. (Norton Stones Co.), and Smiths Abrasives, Inc. Parker Quarries of Malvern, Hot Spring County, remained active. In addition to construction aggregates, Martin Marietta also continued to produce high-silica novaculite from a quarry near Glen Rose in Hot Spring County. Malvern Minerals Co. continued to mine tripoli from the Bigfork Chert (Ordovician) at its mine in Saline County for processing at its plant in Hot Springs, Garland County.

**Bromine.**—Albermarle Corp. and Chemtura Corp. continued operations at the companies' bromine extraction and production plants in Columbia and Union Counties, respectively.

**Cement.**—Ash Grove Cement Co. in Little River County continued the renovation work on its \$350 million plant in Foreman. The installation of the new dry kiln technology—anticipated to be completed in July 2009—would bring total cement production capacity to more than 1.5 million metric tons per year.

**Gemstones.**—There are currently 19 quartz contracts, 4 quartz leases, 2 wavellite leases, and 1 novaculite contract on the Ouachita National Forest under the U.S. Forest Service in Arkansas.

In 2008, almost 950 diamonds were recovered at the Crater of Diamonds State Park, Pike County. The total weight of the stones was almost 193 carats, with an average weight of 0.25 carats. Of these diamonds, 27 weighed more than 1 carat. Diamonds recovered included 622 white, 139 brown, and 145 yellow. The largest stone recovered in 2008 was a white diamond that weighed 4.68 carats. Almost 28,000 diamonds have been recovered since this property became a State park in 1972. Work began late in the year on the renovation of the Park Museum with an anticipated opening date set between late 2010 and early 2011.

**Gypsum.**—Saint Gobain Corp.'s gypsum mine and wallboard plant operation near Nashville, Howard County, continued to be the world's leading wallboard manufacturing plant.

**Nepheline Syenite.**—The Big Rock Arch Street Quarry, owned by Minnesota Mining and Manufacturing Co. (a 3M company), Maplewood, MN, continued to produce nepheline syenite to supply material for the company's roofing granule plant in Sweet Home, Pulaski County. (More information can be found in the crushed stone narrative that follows regarding an additional active producer of nepheline syenite.)

**Sand and Gravel, Construction.**—As of yearend, there were 123 permitted sites that produced sand and gravel. There were 51 quarries operating under authorizations issued by the Mining Division of the Arkansas Department of Environmental Quality (ADEQ). Ten additional gravel and stone operations were leased in the Ouachita National Forest under the jurisdiction of the U.S. Forest Service, bringing the total number of operations to 40 and generating more than \$20,000 in revenue.

**Sand and Gravel, Industrial.**—Industrial sand was produced by Unimin Corp. from its mine and processing facility at Guion, IZard County. The sand was sourced from the Ordovician St. Peter Sandstone Formation, found prevalent throughout the midwestern United States. Arkhola Sand and Gravel Co.

of Sebastian County produced industrial sand, as well as construction sand, from its dredging operations on the Arkansas River. Both companies have local markets for their industrial sand as frac sand during the continuing development of the Fayetteville Shale gas play within the Arkansas Valley region of the State.

**Stone, Crushed.**—Arkhola Sand and Gravel Co. produced road aggregates and asphalt mix at the Preston Quarry near Van Buren, Crawford County. Arkhola continued work with the Jenny Lind quarry, Sebastian County, in the Hartshorne Formation (Pennsylvanian Period). R.D. Plant Construction Co., Inc. operated the R.D. Plant quarry, south of Kirby in central Pike County, in the Jackfork Formation (Pennsylvanian Period).

Duffield Stone and Gravel Co. operated two sandstone aggregate quarries (Pennsylvanian Period) in Pope County—one in the Hartshorne Sandstone at Russellville, and the other, the Gumlog Quarry, in the upper Atoka Formation. Pyramid Co. produced aggregate from the middle Atoka Formation (Pennsylvanian Period) north of Greenbriar, Faulkner County.

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, Saline County. GMQ also operated a sandstone quarry near Y-City, Scott County, in the Atoka Formation (Pennsylvanian Period). Martin Marietta Co. actively quarried the Hatton Tuff lentil of the Stanley Group (Mississippian Period) at its Hatton Quarry in southern Polk County, and continued operations at the company's Jones Mill Quarry near Magnet Cove, Hot Spring County, producing from both the hornfels and quartzite alteration zone in the Stanley Group adjacent to the Cretaceous-age igneous intrusion and the intrusive rock. Martin Marietta also operated an asphalt plant at this site.

Rogers Group, Inc. continued sandstone aggregate operations at the company's Greenbriar Quarry and its Jefferson Island Quarry, both in the middle Atoka Formation in Faulkner County, at its Conway County Quarry in upper Atoka Formation south of Solgohachia, and at its Lowell Quarry in the limestone of the Boone Formation (Mississippian Period) in southern Benton County. Schwartz Stone Co. quarried sandstone from the Hartshorne Sandstone quarry for aggregate and dimension stone north of Midway in Logan County. McGeorge Sand and Gravel Co. continued riprap barge operations along the Arkansas River from its River Mountain Quarry in the Hartshorne Sandstone area north of New Blaine in eastern Logan County. Chrisman Co. mined sandstone aggregate in the Hartshorne Sandstone area near Hunt in Johnson County and from the Savanna Formation near Ratcliffe, Franklin County.

Vulcan Materials Co. produced aggregate from its upper Morrowan age sandstone operations at Judsonia and middle Atokan age sandstones at Floyd; both sites are in White County. Vulcan also produced dolomitic limestone from lower Ordovician units near Black Rock, Lawrence County. Webco Mining Co. produced crushed stone from its quarry in the middle Atoka Formation near El Paso, White County. Quality Stone Co. produced sandstone aggregate from the Atoka Formation (Pennsylvanian Period) at its Lonestar quarry in south Cleburne County, north of the Rosebud community. Midwest Lime Co. produced aggregate from middle and upper

Ordovician-age limestones near Batesville, Independence County. Limestone Specialties, Inc. produced aggregate that was shipped by rail from upper Ordovician units in Independence County.

**Stone, Dimension.**—Oran McBride Stone Co. of Batesville, Independence County, continued production of interior and exterior structural and architectural stone at its plant in Bethesda. Marble, limestone, and sandstone were quarried from Ordovician and Mississippian-age formations and processed as polished, cut, and rough surface product. Schwartz Stone Co. also quarried sandstone from the Hartshorne Sandstone quarry north of Midway in Logan County. Broken dimension stone (Cotter Formation) in a variety of shades was produced by Johnson Landscaping from their Ozark Southern Stone quarry, north of Eureka Springs in Carroll County. Eureka Stone Co.'s saw shop is located near this quarry, and produces a variety of sawn and turned architectural pieces. Bennett Brothers Stone Co., Inc. obtained building stone materials from deposits in Franklin, Garland, Logan, and other counties, principally from Pennsylvanian-age formations.

### **Environmental Issues and Mine Reclamation**

The Mining Division of the Arkansas Department of Environmental Quality (ADEQ) reported that there were almost 82 ha (almost 202 acres) of reclaimed land released from 10 permitted/authorized noncoal-producing sites during 2008.

Umetco, Inc. continued reclamation (that began in 1997) of the LeCroy area at the Wilson Springs vanadium mines in Garland County. Reclamation activities included the extension of a sulfate-reducing barrier (SRB) to enhance groundwater remediation (Drown, 2008). The Black Lick diamond property, which was reclaimed in 2004 by Star Resources Corp. of Houston, TX, is northeast of the Crater of Diamonds State Park in Pike County; during 2008, Star continued to await the release of its bond money.

### **Legislation and Government Programs and Activities**

There was no activity, either legislatively or regulatory, during 2008 concerning noncoal mineral operations in the State of Arkansas.

The passage of the Arkansas Act 129 of 2007 officially changed the name of the Arkansas Geological Commission to the Arkansas Geological Survey (AGS) to more properly reflect the activities of the agency to the public. The AGS Web site at URL <http://www.geology.arkansas.gov/home/index.htm> celebrated 10 years

online in 2008. Information posted on the Web site included State resource data; USGS annual nonfuel mineral production data; publications and map ordering information; State stratigraphic, geologic, and geohazard data; online geologic maps; agency services; and news items. The site has links to State agency services, Federal agencies, geology Web sites, organizations, and universities.

The AGS continued preparation of a spreadsheet database that contains all identified sites of mineral extraction in the State, excluding petroleum and natural gas. By the close of 2008, more than 7,500 records had been entered and field checking for 40 of 75 counties completed. Site locations were entered by latitude and longitude and by general land office survey techniques.

The AGS has been an active participant in the STATEMAP program since 1995. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. During 2008, the Marshall, Harriet, and Landis 7.5-minute USGS topographic geologic maps and the Dequeen 1:100,000 map were completed under the STATEMAP cooperative agreement. Five additional 7.5-minute geologic maps were started midyear—the Cannan, Leslie, Oxley, Pea Ridge, and Garfield quadrangles (Arkansas Geological Survey, 2010). Additional information about the STATEMAP geologic mapping program in Arkansas can be found on the AGS Web site.

Staff cartographers completed the digitization of an additional 10 USGS 7.5-minute topographic-based geologic maps across Arkansas, with legends. Digitized 7.5-minute geologic maps are freely available for download from the AGS Web site.

### **References Cited**

- Arkansas Geological Survey, 2010, Arkansas Statemap Factsheet: Little Rock, AR, 2 p. (Accessed June 2, 2011, at <http://www.geology.arkansas.gov/pdf/Arkansas%20Statemap%20Factsheet.pdf>.)
- Drown, S.L., 2008, Re: State Construction Permit Number AR0048950C – AFIN 26-00277: Little Rock, AR, ADEQ Correspondence, 6 p. (Accessed June 2, 2011, at [http://www.adeg.state.ar.us/ftproot/Pub/WebDatabases/PermitsOnline/NPDES/PN/AR0048950C\\_Construction\\_20081215.pdf](http://www.adeg.state.ar.us/ftproot/Pub/WebDatabases/PermitsOnline/NPDES/PN/AR0048950C_Construction_20081215.pdf).)

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2006		2007		2008	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	1,140	2,550	1,120	4,520 <sup>r</sup>	796	10,700
Gemstones, natural	NA	439	NA	601	NA	607
Sand and gravel, construction	11,100	73,600	9,080	66,300	8,800	65,100
Silica stone <sup>3</sup> metric tons	227	992	231	1,020	W	W
Stone:						
Crushed	36,800	250,000	33,000 <sup>r</sup>	237,000 <sup>r</sup>	32,200	239,000
Dimension	W	W	W	W	21	2,740
Combined values of bromine, cement, clays (kaolin), gypsum (crude), lime, sand and gravel (industrial), tripoli, and values indicated by symbol W	XX	471,000	XX	464,000	XX	386,000
Total	XX	799,000	XX	774,000 <sup>r</sup>	XX	704,000

<sup>r</sup>Revised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "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 TYPE<sup>1</sup>

Type	2007			2008		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	42 <sup>r</sup>	13,700 <sup>r</sup>	\$95,600 <sup>r</sup>	42	11,400	\$80,700
Granite	4	5,340	39,600	4	6,370	48,600
Sandstone and quartzite	23	11,100	81,800 <sup>r</sup>	23	12,000	91,600
Miscellaneous stone	19 <sup>r</sup>	2,880 <sup>r</sup>	19,600 <sup>r</sup>	21	2,480	17,700
Total	XX	33,000 <sup>r</sup>	237,000 <sup>r</sup>	XX	32,200	239,000

<sup>r</sup>Revised. XX Not applicable.

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

TABLE 3  
 ARKANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS  
 IN 2008, BY USE<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
<b>Construction:</b>		
<b>Coarse aggregate (+1½ inch):</b>		
Riprap and jetty stone	808	9,310
Filter stone	135	762
Other coarse aggregate	176	1,300
<b>Coarse aggregate, graded:</b>		
Concrete aggregate, coarse	305	2,410
Bituminous aggregate, coarse	261	2,300
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	432	4,080
<b>Fine aggregate (-¾ inch):</b>		
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	234	545
Other fine aggregate	628	4,060
<b>Coarse and fine aggregates:</b>		
Graded road base or subbase	1,780	12,700
Unpaved road surfacing	471	2,910
Crusher run or fill or waste	83	274
Roofing granules	W	W
Other coarse and fine aggregates	2,130	17,300
Other construction materials	645	1,010
<b>Agricultural:</b>		
Limestone	151	1,440
Other agricultural uses	W	W
<b>Chemical and metallurgical:</b>		
Cement manufacture	W	W
Lime manufacture	W	W
<b>Special:</b>		
Asphalt fillers or extenders	W	W
Other fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	7	30
<b>Unspecified:<sup>2</sup></b>		
Reported	11,400	92,100
Estimated	9,600	72,000
<b>Total</b>	<b>32,200</b>	<b>239,000</b>

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

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

<sup>2</sup>Reported and estimated production without a breakdown by end use.

TABLE 4  
 ARKANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2008,  
 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 (+1½ inch) <sup>2</sup>	1,040	10,800	W	W	W	W
Coarse aggregate, graded <sup>3</sup>	1,170	10,000	W	W	W	W
Fine aggregate (-¾ inch) <sup>4</sup>	802	4,070	W	W	--	--
Coarse and fine aggregates <sup>5</sup>	3,990	29,000	W	W	W	W
Other construction materials	640	988	5	21	--	--
Agricultural <sup>6</sup>	W	W	--	--	--	--
Chemical and metallurgical <sup>7</sup>	W	W	W	W	--	--
Special <sup>8</sup>	W	W	W	W	--	--
Other miscellaneous uses	--	--	7	30	--	--
Unspecified: <sup>9</sup>						
Reported	4,360	35,600	7,080	56,500	--	--
Estimated	5,400	40,000	4,300	32,000	--	--
Total	18,500	139,000	13,600	98,700	46	804

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 aggregate.

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

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

<sup>5</sup>Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, roofing granules, and other coarse and fine aggregates.

<sup>6</sup>Includes agricultural limestone and other agricultural uses.

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

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

<sup>9</sup>Reported and estimated production without a breakdown by end use.

TABLE 5  
 ARKANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2008,  
 BY MAJOR USE CATEGORY<sup>1</sup>

Use	Quantity	Value (thousands)	Unit value
	(thousand metric tons)		
Concrete aggregate and concrete products	2,720	\$20,400	\$7.49
Concrete products (blocks, bricks, pipe, decorative, etc.)	3	22	7.33
Asphaltic concrete aggregates and other bituminous mixtures	113	1,230	10.90
Road base and coverings <sup>2</sup>	233	1,030	4.44
Fill	117	540	4.62
Other miscellaneous uses <sup>3</sup>	59	720	12.20
Unspecified: <sup>4</sup>			
Reported	2,590	19,200	7.43
Estimated	3,000	22,000	7.38
Total or average	8,800	65,100	7.39

<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 road and other stabilization (lime).

<sup>3</sup>Includes golf course, railroad ballast, and snow and ice control.

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



TABLE 6  
 ARKANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2008, 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	315	2,890	1,650	12,100	757	5,410
Asphaltic concrete aggregates and other bituminous mixtures	--	--	W	W	W	W
Road base and coverings <sup>2</sup>	W	W	117	459	W	W
Fill	55	304	59	217	4	19
Other miscellaneous uses <sup>3</sup>	70	691	180	1,150	154	1,140
Unspecified: <sup>4</sup>						
Reported	899	6,410	1,250	9,660	443	3,160
Estimated	1,000	7,600	1,700	12,000	284	2,100
Total	2,370	17,900	4,790	35,300	1,640	11,800

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

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

<sup>2</sup>Includes road and other stabilization (lime).

<sup>3</sup>Includes golf course, railroad ballast, and snow and ice control.

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