2012–2013 Minerals Yearbook

ARIZONA [ADVANCE RELEASE]

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U.S. Geological Survey

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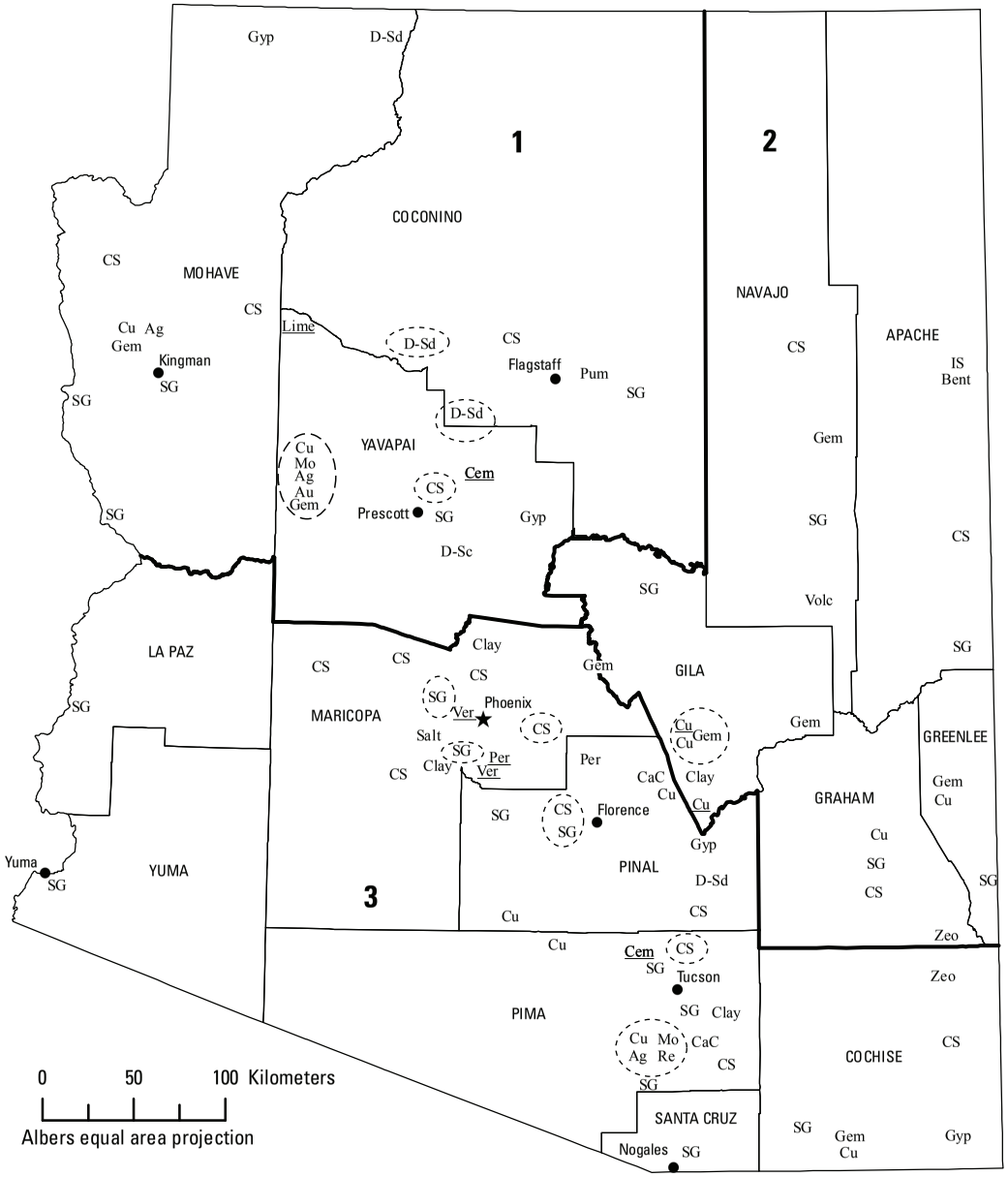
ARIZONA



LEGEND

——	County boundary
★	Capital
●	City
1——	Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Ag	Silver
Au	Gold
Bent	Bentonite
CaC	Calcium carbonate
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
Cu	Copper plant
D-Sd	Dimension sandstone
D-Sc	Dimension schist/onyx
Gem	Gemstones
Gyp	Gypsum
IS	Industrial sand
Lime	Lime plant
Mo	Molybdenum
Per	Perlite
Per	Perlite plant
Pum	Pumice and pumicite
Re	Rhenium (byproduct)
Salt	Salt
SG	Construction sand and gravel
Ver	Vermiculite plant
Volc	Volcanic cinder
Zeo	Zeolites
⬭	Concentration of mineral operations

Source: Arizona Department of Mines and Mineral Resources/U.S. Geological Survey (2012–13).

The Mineral Industry of Arizona

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

In 2013, the value of the nonfuel mineral production1[1] in the State of Arizona decreased to $7.54 billion, 10.0% of the total U. S. nonfuel mineral production, ranking it second in the Nation. In 2012, the corresponding value was $7.95 billion, 10.5% of the U.S. total nonfuel mineral production, again ranking it second among the 50 States. In 2013, on a per capita basis, nonfuel mineral production in Arizona had a value of $1,140 compared with the national average of $238. In 2012, the per capita value was $1,210 compared with the national average of $241.

The value of nonfuel mineral production in Arizona for the years 2006 through 2013 was as follows (in billions of dollars): $6.74 (2006), $7.26 (2007), $7.84 (2008), $5.18 (2009), $6.79 (2010), $8.39 (2011), $7.95 (2012), and $7.54 (2013).

In 2013, there were 6,443 employees in nonfuel mineral mines in Arizona and 4,010 in mills and preparation plants. In 2012, the corresponding numbers were 6,330 in nonfuel mineral mines and 3,694 in mills and preparation plants (U.S. Mine Safety and Health Administration, 2013, p. 7; 2014, p. 7). In 2013, the average annual wage in Arizona for all mining was $78,000 compared with $45,500 for all industries. In 2012, the corresponding figures were $79,700 and $45,200, respectively (National Mining Association, unpub. data, February 4, 2016).

In 2013, on the basis of production quantity, Arizona continued to be the leading State for the production of copper out of 7 producing States, second in molybdenum concentrates out of 7 producing States, third in crude perlite out of 6 producing States, fourth in zeolites out of 6 producing States, and fifth in silver out of 11 producing States.

In 2012, Arizona was the leading State for the production of copper and molybdenum concentrates out of 7 producing States each, third in crude perlite, pumice, and silver out of 5, 6, and 11 producing States, respectively, and fifth in zeolites out of 6 producing States.

In 2012 and 2013, the State also produced construction sand and gravel, crushed stone, dimension stone, gemstones, gold, gypsum, industrial sand and gravel, lime, masonry and portland cement, pumice, and salt (table 1).

[1]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 USGS mineral production data published in this chapter are those available as of February 2016. Data in this report are rounded to three significant digits and percentages are calculated from unrounded data. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at http://minerals.usgs.gov/minerals.

Commodity Review

The Arizona Geological Survey[2] provided several reports for the mineral industry of the State covering activities in 2012 and 2013 from which the following data have been extracted. These data may differ from U.S. Geological Survey (USGS) data, which were based on company responses to USGS surveys and estimation for nonrespondents. The USGS withheld some data to avoid disclosing company proprietary data.

The number of claims fluctuated during 2013 and 2012, but in January 2013, the number of claims in Arizona was 49,255 compared with 43,652 in January 2012.

Metals

Copper.—Mineral industry activity in 2012 and 2013 with respect to copper was as follows:

- December 2013—Grupo Mexico, S.A.B. de C.V. reported that the Mission concentrator expansion project was completed in the fourth quarter of 2013 on time and on budget, at a total cost of $60 million. The expansion was expected to increase copper production by 9,070 metric tons (t) annually starting in 2014.
- December 2013—A draft Record of Decision was issued by the U.S Forest Service, approving construction for the Rosemont Mine to begin.
- October 2013—The restart of the Pinto Valley Mine (owned by Capstone Mining Corp.) commenced in December 2012, after its purchase in October 2012.
- January 2013—Sumitomo Corp. and Sumitomo Metal Mining Co. agreed to participate in a $1.7 billion expansion at Freeport-McMoRan Copper & Gold Inc.'s Morenci Mine to increase annual copper production by 43 percent.
- September 2012—Copper Fox Metals Inc. completed the acquisition of the Sombrero Butte Copper project and the remaining Van Dyke unpatented mining claims pertaining to the Van Dyke copper deposit.
- February 2012—Stockholders approved the sale of Quadra FNX Mining Ltd. to Polish mining company KGHM Polska Miedz SA for $2.9 billion.

Gold and Silver.—Mineral industry activity with respect to gold and silver was as follows:

- Exploration for several gold and silver prospects continued throughout 2012 and 2013.
- October 2013—American Bonanza Gold Corp. placed the Copperstone Mine on care and maintenance.

[2]Nyal Niemuth, Economic Geology Chief, Arizona Geological Survey, provided the State nonfuel mineral industry information.

Industrial Minerals

Mineral industry activity with respect to industrial minerals was as follows:

- Drilling for potash, mainly in the Holbrook basin, continued throughout 2012 and 2013.
- July 2013—Russia's Uralkali dismantled the world's largest potash cartel and was expected to reduce prices by 25 percent.
- December 2012—Preferred Sands, a hydraulic fracturing sand and proppants company, purchased a sand-mining business near Sanders in 2011, and expanded its operations to mine 1.18 million metric tons (Mt) of industrial sand in 2012 and 1.63 Mt in 2013.
- August 2012—The U.S. Fish and Wildlife Service proposed to list the Gierisch mallow as endangered, and proposed critical habitat for the species under the Endangered Species Act. This was expected to affect the Black Rock West and Black Rock Mines.

References Cited

U.S. Mine Safety and Health Administration, [2013], Mine injury and worktime, quarterly, January–December 2012, Final, closeout edition, 33 p. (Accessed February 4, 2016, at http://arlweb.msha.gov/Stats/Part50/WQ/MasterFiles/MIWQ%20Master_20125.pdf.)

U.S. Mine Safety and Health Administration, [2014], Mine injury and worktime, quarterly, January–December 2013, Final, closeout edition, 34 p. (Accessed February 4, 2016, at http://arlweb.msha.gov/Stats/Part50/WQ/MasterFiles/MIWQ%20Master_20135.pdf.)

TABLE 1
NONFUEL MINERAL PRODUCTION IN ARIZONA[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2011		2012		2013	
	Quantity	Value	Quantity	Value	Quantity	Value
Copper[3]	751	6,720,000	763	6,180,000	795	5,960,000
Gemstones, natural	NA	2,500	NA	2,500	NA	2,360
Sand and gravel, construction	31,600 r	267,000 r	34,100	301,000	33,900	289,000
Stone:						
Crushed	8,260	66,400 r	6,810	60,100	8,260	73,000
Dimension, sandstone	112	13,300	46	5,570	57	6,420
Combined values of cement, clays [bentonite (2011–12), common (2011–12)], gold, gypsum (crude), lime, molybdenum concentrates, perlite (crude), salt, sand and gravel (industrial), silver, zeolites	XX	1,320,000	XX	1,400,000	XX	1,210,000
Total	XX	8,390,000	XX	7,950,000	XX	7,540,000

[r]Revised. NA Not available. XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.
[3]Recoverable content of ores, and so forth.

TABLE 2
ARIZONA: CRUSHED STONE SOLD OR USED IN THE UNITED STATES, BY TYPE[1]

Type	2012 Number of quarries	2012 Quantity (thousand metric tons)	2012 Value (thousands)	2012 Unit value	2013 Number of quarries	2013 Quantity (thousand metric tons)	2013 Value (thousands)	2013 Unit value
Limestone[2]	5	2,920	$26,000	$8.91	6	3,080	$29,100	$9.47
Granite	22	2,110	20,300	9.66	19	2,670	26,100	9.79
Traprock	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Sandstone and quartzite[4]	4	702	5,280	7.52	4	779	5,430	6.97
Volcanic cinder and scoria	6	193	1,390	7.19	5	211	2,010	9.50
Miscellaneous stone	23	888	7,110	8.01	19	1,520	10,400	6.79
Total or average	XX	6,810	60,100	8.83	XX	8,260	73,000	8.84

XX Not applicable.
[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two kinds of stone.
[3]Withheld to avoid disclosing company proprietary data; included with "Miscellaneous stone."
[4]Includes sandstone-quartzite reported with no distinction between the two kinds of stone.

TABLE 3
ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS BY USE[1]

Use	2012 Quantity (thousand metric tons)	2012 Value (thousands)	2012 Unit value	2013 Quantity (thousand metric tons)	2013 Value (thousands)	2013 Unit value
Construction:						
Coarse aggregate (+1½ inch):						
Riprap and jetty stone	W	W	W	W	W	W
Filter stone	--	--	--	W	W	W
Unspecified coarse aggregate	W	W	W	W	W	W
Coarse aggregate, graded:						
Concrete aggregate, coarse	18	$200	$11.11	--	--	--
Bituminous aggregate, coarse	5	90	18.00	--	--	--
Unspecified graded coarse aggregate	W	W	W	W	W	W
Fine aggregate (-⅜ inch):						
Stone sand, concrete	5	144	28.80	--	--	--
Unspecified fine aggregate	W	W	W	W	W	W
Coarse and fine aggregates:						
Graded road base or subbase	W	W	W	W	W	W
Unpaved road surface	41	238	5.81	--	--	--
Terrazzo and exposed aggregate	780	6,560	8.41	1,060	$8,910	$8.40
Crusher run or fill or waste	31	162	5.23	--	--	--
Unspecified coarse and fine aggregates	W	W	W	W	W	W
Unspecified and other construction materials	--	--	--	114	929	8.18
Chemical and metallurgical:						
Cement manufacture	W	W	W	W	W	W
Lime manufacture	--	--	--	W	W	W
Chemical stone	--	--	--	W	W	W
Other miscellaneous uses and specified uses not listed	12	79	6.56	158	1,080	6.81
Unspecified:[2]						
Reported	161	335	2.08	671	1,480	2.21
Estimated	3,650	30,800	8.44	3,310	31,800	9.62
Total or average	6,810	60,100	8.83	8,260	73,000	8.84

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

TABLE 4

ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2012, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	--	--	W	W
Coarse aggregate, graded[3]	W	W	23	290	W	W
Fine aggregate (-⅜ inch)[4]	W	W	27	444	W	W
Coarse and fine aggregates[5]	W	W	23	201	952	7,690
Other construction materials	--	--	--	--	--	--
Agricultural	--	--	--	--	--	--
Chemical and metallurgical[6]	W	W	--	--	W	W
Special	--	--	--	--	--	--
Other miscellaneous uses and specified uses not listed[7]	12	79	--	--	--	--
Unspecified:[8]						
Reported	8	64	8	61	--	--
Estimated	1,810	14,600	573	5,000	1,280	11,200
Total	2,590	22,100	653	6,000	3,420	31,800

Use	Unspecified districts	
	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch)[2]	--	--
Coarse aggregate, graded[3]	--	--
Fine aggregate (-⅜ inch)[4]	--	--
Coarse and fine aggregates[5]	--	--
Other construction materials	--	--
Agricultural	--	--
Chemical and metallurgical[6]	--	--
Special	--	--
Other miscellaneous uses and specified uses not listed[7]	--	--
Unspecified:[8]		
Reported	146	210
Estimated	--	--
Total	146	210

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

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

[2]Includes macadam, riprap and jetty stone, filter stone, and unspecified coarse aggregate.

[3]Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and unspecified graded coarse aggregate.

[4]Includes stone sand (concrete), stone sand (bituminous mix or seal), screening (undesignated), and unspecified fine aggregate.

[5]Includes graded road base or subbase, unpaved road surface, terrazzo and exposed aggregate, crusher run, roofing granules, and unspecified coarse and fine aggregates.

[6]Includes cement manufacture, lime manufacture, dead-burned dolomite manufacture, flux stone, chemical stone, glass manufacture, and sulfur oxide removal.

TABLE 5

ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2013, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	--	--
Coarse aggregate, graded[3]	W	W	W	W	--	--
Fine aggregate (-⅜ inch)[4]	W	W	W	W	--	--
Coarse and fine aggregates[5]	W	W	W	W	W	W
Other construction materials	114	929	--	--	--	--
Agricultural	--	--	--	--	--	--
Chemical and metallurgical[6]	W	W	--	--	W	W
Special	--	--	--	--	--	--
Other miscellaneous uses and specified uses not listed[7]	W	W	--	--	W	W
Unspecified:[8]						
Reported	62	538	6	53	--	--
Estimated	480	4,230	583	5,700	2,250	21,900
Total	2,740	24,900	704	7,590	4,210	39,600

Use	Unspecified districts	
	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch)[2]	--	--
Coarse aggregate, graded[3]	--	--
Fine aggregate (-⅜ inch)[4]	--	--
Coarse and fine aggregates[5]	--	--
Other construction materials	--	--
Agricultural	--	--
Chemical and metallurgical[6]	--	--
Special	--	--
Other miscellaneous uses and specified uses not listed[7]	--	--
Unspecified:[8]		
Reported	603	890
Estimated	--	--
Total	603	890

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

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

[2]Includes macadam, riprap and jetty stone, filter stone, and unspecified coarse aggregate.

[3]Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and unspecified graded coarse aggregate.

[4]Includes stone sand (concrete), stone sand (bituminous mix or seal), screening (undesignated), and unspecified fine aggregate.

[5]Includes graded road base or subbase, unpaved road surface, terrazzo and exposed aggregate, crusher run, roofing granules, and unspecified coarse and fine aggregates.

[6]Includes cement manufacture, lime manufacture, dead-burned dolomite manufacture, flux stone, chemical stone, glass manufacture, and sulfur oxide removal.

TABLE 6
ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2012,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,800	$34,700	$9.13
Concrete products (blocks, bricks, pipe, decorative, and so forth)[2]	113	1,350	11.95
Asphaltic concrete aggregates and other bituminous mixtures	1,700	18,000	10.59
Road base and coverings	2,610	19,300	7.39
Fill	871	5,600	6.43
Other miscellaneous uses[3]	580	6,160	10.62
Unspecified:[4]			
Reported	10,000	89,000	8.90
Estimated	14,400	127,000	8.82
Total or average	34,100	301,000	8.83

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes filtration, and snow and ice control.
[4]Reported and estimated production without a breakdown by end use.

TABLE 7
ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2013,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,830	$36,400	$9.49
Concrete products (blocks, bricks, pipe, decorative, and so forth)[2]	178	2,090	11.75
Asphaltic concrete aggregates and other bituminous mixtures	1,200	13,700	11.41
Road base and coverings[3]	2,230	12,700	5.69
Fill	908	6,910	7.61
Snow and ice control	1	12	12.00
Other miscellaneous uses[4]	1,010	7,930	7.84
Unspecified:[5]			
Reported	10,900	93,500	8.60
Estimated	13,700	116,000	8.47
Total or average	33,900	289,000	8.52

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (lime).
[4]Includes filtration, and railroad ballast.
[5]Reported and estimated production without a breakdown by end use.

TABLE 8

ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2012, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	W	W	W	W	3,440	30,600
Concrete products (blocks, bricks, pipe, decorative, and so forth)[2]	W	W	W	W	81	863
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	1,190	13,000
Road base and coverings	197	1,460	338	3,090	2,070	14,700
Fill	68	330	9	54	794	5,210
Other miscellaneous uses[3]	74	915	8	104	498	5,140
Unspecified:[4]						
Reported	2,240	19,600	242	2,170	7,460	67,000
Estimated	873	7,650	1,380	12,200	11,800	104,000
Total	3,980	35,300	2,200	20,100	27,300	241,000

Use	Unspecified districts	
	Quantity	Value
Concrete aggregate (including concrete sand)	--	--
Concrete products (blocks, bricks, pipe, decorative, and so forth)[2]	--	--
Asphaltic concrete aggregates and other bituminous mixtures	144	1,740
Road base and coverings	--	--
Fill	--	--
Other miscellaneous uses[3]	--	--
Unspecified:[4]		
Reported	100	176
Estimated	356	3,140
Total	600	5,060

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

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

[2]Includes plaster and gunite sands.

[3]Includes filtration, and snow and ice control.

[4]Reported and estimated production without a breakdown by end use.

TABLE 9

ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2013, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	W	W	W	W	3,410	30,900
Concrete products (blocks, bricks, pipe, decorative, and so forth)[2]	W	W	W	W	56	609
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	602	6,780
Road base and coverings[3]	265	1,650	80	821	1,880	10,200
Fill	29	140	2	23	877	6,740
Other miscellaneous uses[4]	(5)	6	2	21	1,000	7,800
Unspecified:[6]						
Reported	2,000	17,800	258	2,310	8,050	72,000
Estimated	799	5,660	1,400	12,300	11,500	98,000
Total	3,770	33,800	1,960	18,000	27,400	233,000

Use	Unspecified districts	
	Quantity	Value
Concrete aggregate (including concrete sand)	--	--
Concrete products (blocks, bricks, pipe, decorative, and so forth)[2]	--	--
Asphaltic concrete aggregates and other bituminous mixtures	251	2,880
Road base and coverings[3]	--	--
Fill	--	--
Other miscellaneous uses[4]	--	--
Unspecified:[6]		
Reported	563	1,420
Estimated	--	--
Total	814	4,300

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

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

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes filtration, and railroad ballast.

[5]Less than ½ unit.

[6]Reported and estimated production without a breakdown by end use.