

THE MINERAL INDUSTRY OF ARIZONA

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

In 1999, the preliminary estimated value¹ of nonfuel mineral production for Arizona was \$2.5 billion, according to the U.S. Geological Survey (USGS). This was about an 8% decrease from the \$2.74 billion of 1998,² and followed a 22.6% decrease from 1997 to 1998. The State ranked third in the Nation in total nonfuel mineral production value, of which Arizona accounted for more than 6% of the U.S. total.

Arizona continued in 1999 as the top copper-producing State, accounting for about two-thirds of total U.S. copper mine production and value. Copper was the State's leading nonfuel mineral, representing 72% of Arizona's 1999 total nonfuel mineral production value. In 1999, copper mine production was down more than 7%, and the value of production was down by about 12%. The decrease in copper's value, about \$250 million, accounted for most of the State's decrease in nonfuel mineral value. Smaller yet significant decreases occurred in gold, which was down about \$11 million, while lime decreased by about \$7 million, and silver was down approximately \$2 million. These losses were tempered somewhat by a \$35 million increase in construction sand and gravel, a \$5 million rise in portland cement, and about a \$2 million increase in crushed stone. All other changes in value were on the order of \$1 million or less. In 1998, the \$880 million decrease in the value of copper was the most significant change affecting the State's mineral economy, followed by a \$5 million decrease in the value of gold. Significant increases occurred in the values of construction sand and gravel, molybdenum, portland cement, and silver (table 1).

Based upon USGS estimates of the quantities produced in the 50 States during 1999, Arizona remained the leading State in molybdenum output, 2d in gemstones and crude perlite, 4th in silver and zeolites, 5th in construction sand and gravel and pumice and pumicite, and 11th in the production of gold. While

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or 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 1999 USGS mineral production data published in this chapter are preliminary estimates as of May 2000, 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. A telephone listing for the specialists may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals/contacts/comdir.html>, by using MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset (request Document #1000 for a telephone listing of all mineral commodity specialists), or by calling USGS information at (703) 648-4000 for the specialist's name and number. All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>; facsimile copies may be obtained from MINES FaxBack.

²Values, percentage calculations, and rankings for 1998 may vary from the Minerals Yearbook, Area Reports: Domestic 1998, Volume II, owing to the revision of preliminary 1998 to final 1998 data. Data for 1999 are preliminary and are expected to change; related rankings may also be subject to change.

the State rose to 5th from 6th in iron oxide pigments and to 6th from 7th in bentonite, it decreased from 9th to 10th in dimension stone. Additionally, Arizona was a significant producer of portland cement, lime, and gypsum.

The Arizona Department of Mines and Mineral Resources³ provided the following narrative information. More than 18,000 people were employed by 72 mining companies, operating 126 mines, and by 70 sand and gravel producers in the State.

In 1999, Arizona's copper production declined to 1.1 million metric tons (Mt). Copper output at the Ray Mine was 152,000 metric tons (t) in 1998, of which 41,000 t came from its solvent extraction electrowinning (SX-EW) operations. This 24% increase in SX-EW production from the previous year resulted from using new technology and higher concentrations of acid in the leach dumps. In July 1999, a combined 36,000-metric-ton-per-year (t/yr) reduction was announced for Ray and Mission, which was forecast to reduce ASARCO Incorporated's 1999 North American production by about 7%. At Ray, harder ore would reduce output by 11,000 t. As part of a negotiated settlement with the U.S. Environmental Protection Agency and State agencies, Asarco would extend the Mineral Creek diversion tunnel around the Ray Mine workings at a cost of \$55 million. When completed, the project will shorten hauls and increase leach and dump capacity. At the end of 1998, Ray had ore reserves of 863 Mt grading 0.6% sulfide copper and 161 Mt of leachable copper ore grading 0.45%.

Mission's copper production in 1998 was 116,000 t, up 1,800 t from 1997. The increase was attributed to new loading and hauling equipment, including a large overland conveyor system designed to move 53 million metric tons per year of waste. More importantly, it reduced waste haulage costs by 11%. Accounting for 43% of Arizona's silver production, Mission was Arizona's largest silver producer with 79 t recovered as a byproduct. The cutback announced for Mission in 1999 meant that 150 employees were laid off and that copper production was trimmed by 25,000 t/yr. Mission's reserves at the end of 1998 were about 450 Mt of ore grading 0.7% copper. The Hayden smelter, an INCO Ltd. flash furnace rated at 650,000 t/yr of charge, produced 173,000 t of copper in 1998. Modernization of the smelter's gas handling system and the process control system was completed in 1998.

In June 1999, Broken Hill Proprietary Copper Co. (BHP) announced that the San Manuel underground mine and smelter would be closed, eliminating 2,200 jobs. In October, the rod mill ceased production. Prior to these layoffs, BHP was the State's largest copper employer. The San Manuel Mine produced 123,000 t of copper in the fiscal year that ended May 1, 1999. Byproduct gold recovered was more than 715 kilograms for the same period. San Manuel's and Lower

³Nyal J. Niemuth, Mining Engineer, authored the text of State minerals information provided by the Arizona Department of Mines and Mineral Resources.

Kalamazoo's ore reserves were 205 Mt of sulfide ore at an estimated grade of 0.62% copper as of 1998.

BHP's San Manuel smelter, the largest single furnace copper smelter, which had been operating since 1988 without a rebuild, was shut down for 2 months in the spring of 1999 for a \$66 million rebuilding and modernization effort. Improvements included installing a new burner design, new draft fans, and a waste heat boiler; constructing a 36,000 t concentrate storage building; and improving the conveyor systems to reduce spillage and airborne contamination. The project was completed but the smelter did not restart because of the mine's closure.

With the shutdown of BHP's smelter, BHP's Florence's in-situ leach start up plans were postponed. The Florence Mine's oxide resources of 291 Mt averaging 0.34% copper are expected to produce 33,000 t/yr of cathode copper for 15 years.

Phelps Dodge Corp., headquartered in Phoenix, is the world's largest producer of SX-EW cathode copper. Following its merger with Cyprus Amax Minerals Co., it will produce about one-half of the United States' mined copper from its properties in Arizona and southwestern New Mexico. The Morenci Mine (Phelps Dodge, 85%, and Sumitomo Metal Mining Co., Ltd., 15%) in Greenlee County, the largest copper mine in North America, produced 474,000 t of copper in 1998 and 435,000 t in 1999.

The Morenci Mine produced 224,000 t of copper in concentrate and 250,000 t of electrolytic copper in 1998. Production dropped to 177,000 t in concentrate and rose to 258,000 t of electrolytic copper in 1999, largely due to the closing of the Metcalf concentrator in August. The closure was part of a plan to reduce costs by phasing out sulfide concentration and by converting Morenci to an all leach operation by 2002. As part of an expansion of leach output, construction began on installing mechanical stackers and agglomeration equipment. The Metcalf crushing plant will continue to be used for leach operations. The larger Morenci concentrator will be phased out during the next 2 years, but will be maintained to provide flexibility in production. Although no layoffs were expected from the Morenci concentrator closure, 250 contract employees were laid off with the Metcalf mill closure.

Morenci's milling reserves totaled more than 377 Mt grading 0.64% copper, while leaching reserves totaled more than 1.69 billion metric tons at the end of 1999. Additional resources at Morenci include: Western Copper Mine with an estimated 480 Mt of milling material at a grade of 0.55% copper and 450 Mt of leach material at a grade of 0.31% copper; Garfield, containing 950 Mt grading 0.27% copper; and American Mountain, containing 130 Mt of leach material grading 0.25% copper.

In response to low copper prices during 1998, Cyprus announced it was reducing copper production by 27,000 t from its Bagdad and Sierrita Mines. The cutbacks were made by reducing the use of its highest cost equipment. Additionally, \$10 million will be saved by deferring equipment purchases and holding other expenses to support levels.

In 1996, the Sierrita Mine started mining a 63-Mt oxide deposit that led to increased leach output. Cathode production during 1998 was a record 22,000 t, and production from concentrates was 81,000 t of copper. Cost cutting efforts resulted in a 17% reduction in cash unit costs per pound. The mine's byproduct molybdenum credit was 10,000 t in 1998, which was one-third of Cyprus' molybdenum production and

made Sierrita the largest molybdenum producer in Arizona. At the end of 1999, Phelps Dodge reported that Sierrita contained sulfide reserves of 964 Mt grading 0.27% and oxide reserves of 58 Mt grading 0.18% copper.

The Bagdad Mine in Yavapai County produced 97,500 t of copper in 1998, a 13% decline from 1997's record level. Compared to a year earlier, a 7% drop in cash costs, normalized to grade of copper mined, was achieved. This resulted from finer ore grind, improved control of the flotation circuit, and other minimal capital efforts. Phelps Dodge reported that at the end of 1999 Bagdad had a 703-Mt sulfide reserve grading 0.37% copper and 0.02% molybdenum, as well as 14.5 Mt of leach material grading 0.29% copper.

All of Miami's operations had outstanding levels of production in 1998. The mine and SX-EW plant produced a record 74,000 t of copper in 1998, a 5% improvement over the 1997 record. The smelter processed 549,000 t of copper concentrates from other Cyprus operations. The refinery produced 172,000 t of cathode, and the rod plant operated above capacity and produced 139,000 t of copper rod in 1998, both amounts were new records. At the end of 1999, Phelps Dodge reported leach reserves for Miami of 171 Mt grading 0.38%.

Although mining was suspended in July 1997 at Cyprus' Tohono test open pit, leaching of heaps continued until February 1999. Production at Tohono totaled 3,600 t of copper during 1998.

After 6 years of effort, the Carlota open pit heap leach SX-EW project is now fully permitted. Carlota Copper Co., a subsidiary of Cambior U.S.A. Inc., received a favorable ruling on litigation contesting the Forest Service's record of decision in August 1999. The property consists of four oxide ore bodies with reserves totaling 87 Mt of ore grading 0.44% copper. Production was planned at a rate of 27,000 t/yr of copper for the first 10 years via openpit mining, heap leaching, and SX-EW. Capital costs were estimated at \$100 million. Heavy debt problems related to Cambior's gold hedging activities caused the company to offer the project for sale in late 1999.

In October 1999, Equatorial Mining N.L. secured a 3-year option on the Zonia Mine, Yavapai County, from bankrupt Arimetco International, Inc. A prefeasibility study was planned to evaluate the property's 129 Mt resource grading 0.31% copper.

Nord Resources Corp. of Albuquerque, NM, acquired Johnson Camp Mine in Cochise County from Summo Minerals Corp. in the spring of 1999. The mine, currently on care and maintenance, continued to produce 450,000 t to 900,000 t of copper annually by SX-EW from existing heap leaches. With a rise in copper prices, the mine is expected to reopen and produce 8,200 t/yr of cathode copper.

During the first half of 1999, BHP sought to sell its North American copper operations. Having received no acceptable offers, BHP announced the June 1999 closure of its copper properties, excluding leach production. The San Manuel Mine, smelter, refinery, and mineral complex, along with the Pinto Valley Mine, remained closed at yearend.

In July 1999, Asarco and Cyprus announced a merger of equals' transaction. However, in August, Phelps Dodge initiated an unsolicited takeover attempt of both companies, offering a 30% premium over the companies' existing share prices. The offer was rejected and Phelps Dodge soon increased its offer. In August, Grupo Mexico, S.A. de C.V. made an initial offer to

acquire Asarco. In October, Asarco's board of directors accepted Phelps Dodge's offer of \$29.50 cash per share, and the merger was signed, contingent upon 80% of the shares being tendered by October 22 and approval by Phelps Dodge's shareholders. Grupo Mexico increased its offer the next day to \$29.75 per share, and this offer was eventually accepted. When the companies merged, all Asarco shares were acquired for \$29.75 cash for a total transaction value, including assumed debt, of \$2.25 billion. Asarco paid a \$30 million termination fee to Phelps Dodge.

Grupo Mexico, headquartered in Mexico City, is Mexico's largest mining company. With the purchase of Asarco, it became the third largest copper producer in the world. The two divisions of the company are Grupo Minero Mexico, the mining division, and Grupo Ferroviario Mexico, the railroad division. Grupo Mexico's sales in 1998 totaled \$1.4 billion. The Arizona copper operations acquired include the Mission Complex, the Silver Bell Mine, and the Ray-Hayden Complex.

In December 1999, Phelps Dodge acquired Cyprus Amax making it the world's second largest producer of copper and the world's largest molybdenum producer. The total equity value of the purchase was \$1.8 billion, based on approximately 90.7 million Cyprus Amax shares outstanding. The Arizona properties acquired were the Sierrita Mine, the Bagdad Mine, and the Miami Complex.

Low gold prices, dropping slightly to average below \$280 per ounce in 1999, continued to curb activity. Bema Gold Corp., operating in Arizona as Yarnell Mining Co., ceased funding of the Environmental Impact Statement (under the National Environmental Policy Act) for the Yarnell gold project and closed its engineering office in August. The company is delaying its open pit heap leach operation until prices improve.

Only a few gold exploration projects were active. The Moreau property in La Paz County was drilled by Nevada Pacific Gold Ltd. in late spring. Exploration of the property was continued by Echo Bay Mineral Co., who optioned the property in the fall.

Royal Oak Mines Inc.'s bankruptcy hindered efforts by subsidiary Arctic Precious Metals Inc. to continue exploration of the Copperstone gold deposit. Asia Minerals Corp., who acquired the project, reported an underground resource of about 16 t, and planned further drilling.

Sand and gravel are increasingly important as the Phoenix metropolitan area continues its rapid growth. Phoenix's construction industry was paced by the addition of more than 30,000 new homes in 1998 and 1999 and the associated commercial construction. Creating additional demand for industrial minerals is the accelerated urban freeway and rural highway building program of the Arizona Department of Transportation. The Federal Government passed the Transportation Equity Act for the 21st Century, a multiyear highway-funding law that is expected to increase highway construction spending. The rapidly growing demand for aggregates and concrete has attracted global players, including Pioneer International, Hanson Plc., Vulcan Materials Co., and Cemex S.A. de C.V. to Arizona.

Australia's Pioneer International continued its rapid pace of acquisitions of sand and gravel and concrete producers in Arizona by buying Phoenix Redimix Inc., Wickenburg Concrete and Materials, Valley Concrete and Materials (of Clarkdale),

and Yavapai Materials during 1999. The purchase of Phoenix Redimix, for approximately \$50 million, itself added more than 27 Mt of aggregate reserves with a life of 15 years at current production rates. With the latest acquisitions, Pioneer is now the second largest concrete producer and the fourth largest aggregate supplier in Arizona, operating 12 concrete batch plants and 6 quarries. Pioneer's combined annual sales are expected to be more than \$100 million from more than 760,000 cubic meters of concrete and 3.6 Mt of aggregate.

Vulcan Materials completed its acquisition of Calmat Co. in a deal that began in November 1998 and closed in January 1999. The purchase totaled \$760 million plus assumption of Calmat's debt of \$130 million. Calmat's southwest U.S. operations included Calmat of Arizona with 479 employees at 7 Phoenix area plants.

In 1999, Salt River Sand & Rock Co., located in Maricopa County, again operated the second largest sand and gravel plant in the United States. Two companies finished construction and development activities for industrial mineral commodities not produced in Arizona for decades. Applied Chemical Magnesias Corp. finished a \$2 million grinding and bagging plant at Bullhead City to process brucite from the underground White House Mine in the San Francisco District of Mohave County. AZCO Mining Inc., better known in Arizona for its previous copper activities, developed the Black Canyon (also known as Mica Mule) pegmatite, 48 kilometers (km) north of Phoenix. It will supply mica for a dry- and wet-grinding facility in Glendale.

Omya Arizona Inc. (Pluess Staufer) of Lucerne Valley, CA, broke ground in June for its \$30 million calcium carbonate (CaCO_3) processing plant at Superior in Pinal County, and is projecting a June 2000 start up. Of the 91,000 t/yr capacity, two-thirds will be for food-grade CaCO_3 additives.

In January 2000, the Federal Government created two new national monuments in areas of known mineral potential, the Agua Fria National Monument east of I-17 in southeast Yavapai County and the Shiviwits National Monument north of the Colorado River in Mohave County. Both monuments were created by Presidential order.

The Arizona State Land Department began mineral evaluation programs for copper and sand and gravel occurrences on State Trust Lands in a 48-km perimeter around the Phoenix-Casa Grande/Tucson development corridor. The study will provide the department with information that will assist it in maximizing revenue from the trust lands that may be subject to eventual preservation related to the "growing smarter initiative" and the "Arizona preserve initiative."

In collaboration with many county, State, and Federal agencies, the Arizona State Office of the Bureau of Land Management produced the *Arizona Mining Summit, Guide to Permitting Mining Operations*. This publication includes each permitting agency's authorizing statutes and estimates of the cost and time required to acquire permits and provides contact information.

A more complete discussion of Arizona's mineral industry, along with a detailed listing of the mines and operators, is available in Directory 48, Directory of Active Mines 2000 (available from the Arizona Department of Mines and Mineral Resources).

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ARIZONA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1997		1998		1999 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Copper 3/	1,250	2,940,000	1,190	2,060,000	1,100	1,810,000
Gemstones	NA	2,360	NA	2,120	NA	1,920
Gold 3/ kilograms	2,140	22,800	1,840	17,400	763	6,870
Molybdenum metric tons	14,400	W	16,600	W	16,800	W
Sand and gravel:						
Construction	39,500	187,000	47,900	229,000	54,000	264,000
Industrial	330	3,160	307	3,290	262	4,120
Silver 3/ metric tons	190	29,900	211	34,700	189	32,500
Stone: Crushed	7,490	44,000	8,080	44,800	8,200	46,700
Zeolites metric tons	(4/)	NA	(4/)	NA	NA	NA
Combined values of cement, clays (bentonite, common), gypsum, (crude), iron oxide pigments (crude), lime, perlite (crude), pumice and pumicite, salt, stone (dimension sandstone), and values indicated by symbol W	XX	312,000	XX	344,000 r/	XX	344,000
Total	XX	3,540,000	XX	2,740,000 r/	XX	2,510,000

p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. 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, etc.

4/ Withheld to avoid disclosing company proprietary data.

TABLE 2
ARIZONA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1997				1998			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	6	4,590	\$23,300	\$5.08 r/	7	4,300	\$23,900	\$5.55
Granite	12	1,590 r/	10,700	6.71 r/	14	2,200	10,900	4.98
Marble	3	W	W	11.69	2	W	W	5.36
Sandstone and quartzite	3 r/	W	W	14.61 r/	3	W	W	10.84
Volcanic cinder and scoria	4	115	135	1.17	7	333	1,600	4.83
Miscellaneous stone	3 r/	W	W	6.13 r/	15	W	W	5.51
Total or average	XX	7,490	44,000	5.86	XX	8,080	44,800	5.54

r/ Revised. W Withheld to avoid disclosing company proprietary data, included in "Total." XX Not applicable.

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

TABLE 3
ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 1998, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Macadam	516	\$1,500	\$2.91
Riprap and jetty stone	47	251	5.34
Filter stone	5	24	4.80
Total or average	568	1,770	3.12
Coarse aggregate, graded: Bituminous aggregate	W	W	4.03
Coarse and fine aggregates:			
Graded road base or subbase	46	153	3.33
Unpaved road surfacing	27	91	3.37
Terrazzo and exposed aggregate	565	4,130	7.32
Other coarse and fine aggregates	108	358	3.31
Total or average	746	4,740	6.35
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	5.58
Lime manufacture	(3/)	(3/)	5.51
Flux stone	(3/)	(3/)	13.99
Total or average	4,300	24,800	5.75
Special: Mine dusting or acid water treatment	W	W	4.14
Other miscellaneous uses: Other specified uses not listed	W	W	4.47
Unspecified: 4/			
Actual	1,020	5,600	5.48
Estimated	1,400	7,690	5.51
Total or average	2,420	13,300	5.50
Grand total or average	8,080	44,800	5.54

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

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

2/ Includes granite, limestone, marble, miscellaneous stone, quartzite, sandstone, and volcanic cinder and scoria.

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

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

TABLE 4
ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1998,
BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction aggregates:								
Coarse aggregate (+1 1/2 inch) 3/	W	W	--	--	W	W	--	--
Coarse aggregate, graded 4/	W	W	--	--	W	W	--	--
Coarse and fine aggregate 5/	219	1,680	--	--	527	3,050	--	--
Chemical and metallurgical 6/	1,880	11,400	--	--	2,420	13,400	--	--
Special 7/	--	--	--	--	W	W	--	--
Other miscellaneous uses	32	143	--	--	--	--	--	--
Unspecified: 8/								
Actual	527	2,910	12	42	91	505	--	--
Estimated	162	897	127	700	1,110	6,100	389	2,150
Total	2,830	17,100	139	742	4,720	24,800	389	2,150

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 granite, limestone, marble, miscellaneous stone, quartzite, sandstone, and volcanic cinder and scoria.

3/ Includes filter stone, macadam, and riprap and jetty stone.

4/ Includes bituminous aggregate (coarse).

5/ Includes graded road base or subbase, terrazzo and exposed aggregates, other coarse and fine aggregates, and unpaved road surfacing.

6/ Includes cement manufacture, lime manufacture, and flux stone.

7/ Includes mine dusting or acid water treatment.

8/ Reported and estimated production without a breakdown by end use.

TABLE 5
ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1998,
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate	15,300	\$73,900	\$4.82
Plaster and gunitite sands	493	3,080	6.24
Concrete products (blocks, bricks, pipe, decorative, etc.)	679	3,560	5.24
Asphaltic concrete aggregates and other bituminous mixtures	2,540	9,860	3.88
Road base and coverings 2/	10,800	41,400	3.82
Fill	918	3,900	4.24
Snow and ice control	5	45	9.00
Railroad ballast	22	195	8.86
Other miscellaneous uses 3/	415	1,210	2.91
Unspecified: 4/			
Actual	12,100	67,700	5.58
Estimated	4,540	24,400	5.37
Total or average	47,900	229,000	4.78

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

2/ Includes road and other stabilization (cement and lime).

3/ Includes roofing granules.

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

TABLE 6
ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1998,
BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products	462	2,900	317	2,040	15,200	72,500	--	--
Plaster and gunitite sands	29	278	20	186	444	2,610	--	--
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	1,520	6,830	802	1,770
Road base materials 2/	800	4,840	738	3,560	8,500	31,700	795	1,310
Fill	W	W	W	W	853	3,690	--	--
Other miscellaneous uses 3/	211	1,210	108	520	409	1,180	--	--
Unspecified: 4/								
Actual	803	5,940	92	152	11,100	61,400	109	180
Estimated	1,270	6,930	215	1,180	3,050	16,300	--	--
Total	3,580	22,100	1,490	7,640	41,100	196,000	1,710	3,260

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

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

2/ Includes road and other stabilization (cement and lime).

3/ Includes filtration, railroad ballast, and snow and ice control.

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