

THE MINERAL INDUSTRY OF ARIZONA

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

For the sixth time in the last 7 years, Arizona was first in the Nation in total U.S. nonfuel mineral value¹ in 1994, according to the U.S. Bureau of Mines. The estimated value for 1994 was \$3.3 billion, a 19.7% increase over that of 1993. This followed a 12.2% decrease in 1993 from that of 1992. The State accounted for nearly 10% of the U.S. total of mineral production. Arizona continued as the top U.S. copper producer, representing 64% of both production and value. The decrease in 1993 and increase in 1994 in the State's nonfuel mineral value were mainly the result of fluctuations in copper prices. Overall, copper represented 84.8% of Arizona's nonfuel mineral value; industrial minerals, 11%; and the remaining 4% was divided between molybdenum, gold, and silver. In mineral production, Arizona remained first in copper and molybdenum, second in silver and perlite, fourth in construction sand and gravel, and fifth in the production of pumice. Compared with 1993, the value of construction sand and gravel, portland cement, molybdenum, crushed stone, lime, salt, gypsum, masonry cement, and industrial sand and gravel increased in 1994. The value of silver, gemstones, pumice, perlite, clays, dimension stone, and iron oxide pigments decreased.

Copper companies continued to invest in their operations to expand production and lower costs. The rising prices allowed for increased company profits in

1994. The producer price for refined copper, which averaged \$0.92 per pound in 1993, averaged \$1.11 per pound in 1994, and traded in the \$1.30 range in December. A number of significant copper mine developments occurred in 1994, as reported by the Arizona Department of Mines and Mineral Resources (ADMMR). In September, ASARCO Incorporated announced plans to develop an underground mine at the Mission Complex, Pima County, to produce about 13,000 metric tons of copper per year beginning in early 1996. The Silver Bell Mine, Pinal County, received an Aquifer Protection Permit necessary to construct an 16,300-ton-annual-capacity solvent extraction-electrowinning (SX-EW) plant. The plant will be supplied with oxide ore from the new Silver Bell North deposit. AZCO Mining Inc. announced receipt of all environmental permits for its Sanchez Mine near Safford, Graham County. With financing completed in November, 1-year construction of the mine and a 22,700-ton-annual-capacity SX-EW plant was scheduled to begin in early 1995. The Tohono O'odham Nation granted Cyprus Climax Co. a permit to develop a 550-million-ton copper deposit at Casa Grande, Pinal County. Magma Copper Co. proceeded with its \$135 million development of the Kalamazoo ore body, from which an estimated 1 million tons of contained copper will add about 12 years of production to the San Manuel underground mine, Pinal

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ARIZONA¹

Mineral	1992		1993		1994 ^p	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays thousand metric tons	² 102	² \$463	³ 97	² \$451	92	\$421
Copper ³ metric tons	¹ 1,152,878	² 2,730,015	1,158,759	2,339,018	1,180,000	2,820,000
Gemstones	NA	5,416	NA	5,626	NA	3,780
Gold ³ kilograms	6,656	73,818	2,711	31,459	⁴ 2,490	⁴ 28,900
Iron oxide pigments (crude) metric tons	77	62	77	62	68	38
Sand and gravel (construction) thousand metric tons	30,701	123,517	⁵ 35,000	⁶ 138,300	45,000	185,000
Silver ³ metric tons	165	20,873	200	27,684	170	23,500
Stone (crushed) thousand metric tons	⁴ 4,990	² 26,300	6,430	36,823	⁶ 6,600	³ 38,300
Combined value of cement, clays (bentonite), gypsum (crude), lead (1992), lime, molybdenum, perlite, pumice, pyrites (1992-93), salt, sand and gravel (industrial), stone (dimension), and tin (1992)	XX	¹ 184,337	XX	196,417	XX	225,000
Total	XX	¹ 3,164,801	XX	2,775,840	XX	⁵ 3,320,000

¹Estimated. ^pPreliminary. ^rRevised. NA Not available. XX Not applicable.

²Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

³Excludes certain clays; kind and value included with "Combined value" data.

⁴Recoverable content of ores, etc.

⁵Placer canvassing discontinued beginning 1994.

⁶Data do not add to total shown because of independent rounding.

County. Production will be phased in with the depletion of the an Manuel ore body from 1997-99. A 20% expansion of capacity at the San Manuel Outokumpu flash smelter, the industry's largest single furnace smelter, was completed in March. In the summer, Phelps Dodge Corp. began a \$200 million expansion at its Morenci Mine's SX-EW facility—already the world's largest. Development of the 136-million-ton Southside deposit, adjacent to the Morenci pit, Greenlee County, was announced by the company. Carlota Copper Co.(Cambior USA) continued the permitting process for its open pit SX-EW Carlota project straddling the Gila/Pinal County line near Globe; the company projected annual production of 27,000 tons of copper per year out of 91 million tons of oxide reserves. In

December, Addwest Minerals Inc. constructed a new mine entrance and a 450-ton-per-day carbon-in-pulp mill for the reopening of the Gold Road Gold Mine, Mohave County. The Arizona legislature passed legislation funding an abandoned mines location program and creating mine reclamation requirements. ADMMR published a *Directory of Active Mines in Arizona 1995*, listing producing companies, mines, personnel, and an industry operation summary.

[†]The term value means the total monetary value as represented by either mine shipments, mineral commodity sales, or marketable production as is applicable to the individual mineral commodities.

TABLE 2
ARIZONA: CRUSHED STONE¹ SOLD OR USED BY PRODUCERS IN 1993, BY USE

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate, graded:			
Concrete aggregate, coarse	4	\$22	\$5.50
Bituminous aggregate, coarse	65	231	3.55
Fine aggregate (-3/8 inch):			
Stone sand, bituminous mix or seal	12	34	2.83
Coarse and fine aggregates:			
Graded road base or subbase	70	208	2.97
Unpaved road surfacing	96	185	1.93
Terrazzo and exposed aggregates	343	2,340	6.82
Crusher run or fill or waste	47	254	5.4
Other construction materials ²	41	343	8.37
Agricultural:			
Other agricultural uses	W	W	5.74
Chemical and metallurgical:			
Cement manufacture	W	W	6.00
Lime manufacture	W	W	4.66
Special:			
Other fillers or extenders	W	W	7.72
Other specified uses not listed	3,721	20,582	5.53
Unspecified:³			
Actual	537	3,454	6.43
Estimated	1,495	9,171	6.13
Total ⁴	6,430	36,823	5.73
Total ^{5 6}	7,088	36,823	5.20

W Withheld to avoid disclosing company proprietary data; included with "Other specified uses not listed."

¹Includes granite, limestone, marble, miscellaneous stone, traprock, and volcanic cinder.

²Includes riprap and jetty stone, and stone sand (concrete.)

³Includes production reported without a breakdown by use and estimates for nonrespondents.

⁴Data may not add to totals shown because of independent rounding.

⁵One short ton is equal to 907 kilograms or 2,000 pounds. To convert metric tons to short tons, divide metric tons by 0.907185.

⁶Total shown in thousand short tons and thousand dollars.

TABLE 3
ARIZONA: CRUSHED STONE SOLD OR USED, BY KIND

Kind	1991				1993			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	10	'3,592	'\$17,729	'\$4.94	11	4,161	\$23,183	\$5.57
Marble	3	W	W	'5.49	2	W	W	5.74
Granite	'13	'1,944	'10,184	'5.24	12	1,764	9,861	5.59
Traprock	3	'67	436	6.51	2	W	W	5.09
Quartzite	'1	W	W	'9.85	—	—	—	—
Volcanic cinder and scoria	2	24	52	2.17	3	112	405	3.62
Miscellaneous stone	'3	280	1,363	4.87	3	251	2,110	8.41
Total ¹	XX	6,405	32,842	5.13	XX	6,430	36,823	5.73
Total ^{2,3}	XX	7,060	32,842	4.65	XX	7,088	36,823	5.20

¹Revised. W Withheld to avoid disclosing company proprietary data; included with "Total." XX Not applicable.

²Data may not add to totals shown because of independent rounding.

³One short ton is equal to 907 kilograms or 2,000 pounds. To convert metric tons to short tons, divide metric tons by 0.907185.

⁴Total shown in thousand short tons and thousand dollars.

TABLE 4
ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1993, BY USE AND DISTRICT

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified within all districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction aggregates:								
Coarse aggregate (+1 1/2 inch) ¹	—	—	—	—	W	W	—	—
Coarse aggregate, graded ²	—	—	—	—	W	W	—	—
Fine aggregate (-3/8 inch) ³	—	—	—	—	W	W	—	—
Coarse and fine aggregate ⁴	(⁵)	(⁵)	(⁵)	(⁵)	430	2,631	—	—
Other construction materials	—	—	—	—	122	630	—	—
Agricultural ⁶	—	—	—	—	(⁷)	(⁷)	—	—
Chemical and metallurgical ⁸	(⁵)	(⁵)	—	—	(⁷)	(⁷)	—	—
Special ⁹	—	—	—	—	(⁷)	(⁷)	—	—
Other miscellaneous uses	20	222	—	—	1,335	7,650	—	—
Unspecified: ¹⁰								
Actual	—	—	(⁵)	(⁵)	(⁵)	(⁵)	146	642
Estimated	161	788	—	—	1,334	8,383	—	—
Total ¹¹	2,622	13,967	67	513	3,595	21,702	146	642
Total ^{12,13}	2,890	13,967	74	513	3,963	21,702	161	642

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

¹Includes riprap and jetty stone.

²Includes concrete aggregate (coarse) and bituminous aggregate (coarse).

³Includes stone sand (concrete) and stone sand (bituminous mix or seal).

⁴Includes graded road base or subbase, unpaved road surfacing, terrazzo and exposed aggregate, and crusher run (select material or fill).

⁵Withheld to avoid disclosing company proprietary data; included with "Total."

⁶Includes other agricultural uses.

⁷Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

⁸Includes cement manufacture and lime manufacture.

⁹Includes other fillers or extenders, and other specified uses not listed.

¹⁰Includes production reported without a breakdown by use and estimates for nonrespondents.

¹¹Data may not add to totals shown because of independent rounding.

¹²One short ton is equal to 907 kilograms or 2,000 pounds. To convert metric tons to short tons, divide metric tons by 0.907185.

¹³Total shown in thousand short tons and thousand dollars.