

# THE MINERAL INDUSTRY OF MONTANA

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 Montana Bureau of Mines and Geology for collecting information on all nonfuel minerals.

Montana remained 22d in the Nation in nonfuel mineral production value<sup>1</sup> in 1995, according to the U.S. Geological Survey (USGS). The estimated value for 1995 was \$581 million, a 7% increase from that of 1994. This followed a 12.2% increase from 1993 to 1994 (based on final data). The State accounted for 1.5% of the U.S. total nonfuel mineral production value.

Overall, metallic minerals accounted for 77% of the State's total nonfuel mineral value. By value, gold was Montana's leading nonfuel mineral, followed closely by copper. Portland cement, the State's third-leading nonfuel mineral commodity, was its leading industrial mineral. Portland cement accounted for nearly 43% of the State's total industrial mineral value. During the past 2 years, most of the rise in nonfuel mineral production value resulted from increases in copper, molybdenum, and portland cement. To a lesser degree, these increases were mitigated by decreases in gold in both years and a smaller drop in silver in 1994. A smaller increase in construction sand and gravel also contributed to 1995's value increase. Compared with 1994, other nonfuel minerals that increased in value were platinum, zinc, talc and pyrophyllite,

bentonite, silver, and dimension stone. Decreases occurred in palladium, lime, lead, crushed stone, gemstones, masonry cement, and barite.

Based on USGS estimates of the quantities produced in the 50 States in 1995, Montana continued as the only U.S. producer of primary platinum and palladium. The State remained first in the production of talc and pyrophyllite; second in bentonite; fourth in copper and lead; fifth in gold, molybdenum, and zinc; and sixth in silver. Because of the lack of a common physical unit to properly measure the quantity of gemstones produced, gem production is measured by value. The State dropped from sixth to seventh in gemstones. Significant quantities of construction sand and gravel and lime were produced in Montana.

The Montana Bureau of Mines and Geology<sup>2</sup> reported that the State's mineral industry continued its revival from the doldrums of 1993. Mineral commodity prices showed steady increases, and demand for most minerals was steady to strong.

In gold development, Pegasus Gold Inc.'s Beal Mountain Mine received a water discharge permit. The

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

Mineral	1993		1994		1995 <sup>p</sup>	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays thousand metric tons	W	W	<sup>3</sup> 28	W	W	W
Gemstones	NA	\$281	NA	\$3,400	NA	\$1,720
Gold <sup>4</sup> kilograms	14,300	166,000	<sup>5</sup> 12,600	<sup>5</sup> 156,000	<sup>5</sup> 12,300	<sup>5</sup> 148,000
Lead <sup>4</sup> metric tons	W	W	9,940	8,140	W	W
Palladium kilograms	6,500	25,300	6,440	29,400	6,400	29,200
Platinum do.	1,800	21,400	1,960	25,300	2,000	25,800
Sand and gravel (construction) thousand metric tons	<sup>6</sup> 10,000	<sup>6</sup> 32,000	7,360	28,800	8,500	34,400
Silver <sup>4</sup> metric tons	127	17,600	71	12,000	72	12,200
Stone (crushed) thousand metric tons	2,820	10,400	2,320	8,830	1,900	7,400
Talc and pyrophyllite metric tons	350,000	11,900	W	W	W	W
Zinc <sup>4</sup> do.	W	W	21,000	22,800	21,000	24,600
Combined value of barite, cement [masonry (1994-95), portland], clays [bentonite, common, fire (1993-94)], copper, iron ore [usable (1993)], lime, molybdenum, peat, phosphate rock (1993), sand and gravel (industrial), stone (dimension), and values indicated by symbol W	XX	199,000	XX	249,000	XX	298,000
Total	XX	484,000	XX	543,000	XX	581,000

<sup>1</sup>Estimated. <sup>2</sup>Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data, value included with "Combined value" data. XX Not applicable.

<sup>3</sup>Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

<sup>4</sup>Data are rounded to three significant digits; may not add to totals shown.

<sup>5</sup>Excludes certain clays; kind and value included with "Combined value" data.

<sup>6</sup>Recoverable content of ores, etc.

<sup>7</sup>Placer canvassing discontinued beginning 1994.

company planned to continue the project through 1996 and possibly 1997, although it had previously announced a planned closure for 1995 and had recorded that 3.8 million metric tons of reserves remained. Near Jefferson City, Pegasus Gold's Montana Tunnels Mine received a permit allowing the company to construct a 26-meter (85-foot) lift on its impoundment. Pegasus also reported increased gold recovery from its new gravity plant in the mill. At the Zortman-Landusky Mine, a silver and gold heap-leach operation, Pegasus completed mining operations at the August pit and was halfway through permitting for the Zortman expansion. A draft environmental impact statement was completed and permits were expected in 1996.

Other companies continued to develop gold deposits. Near Lincoln, the Seven-Up Pete Joint Venture of Phelps Dodge Corp. and Canyon Resources Corp. worked on its "completeness review stage" of its mining draft environmental impact statement. The proposed heap leach project will be the largest in Montana. Near Whitehall, Jefferson County, Placer Dome Inc.'s Golden Sunlight Mine did not experience any more ground stability problems. After restarting the mill and operation in February, the mine expanded its tailings facility and continued decommissioning of the old impoundment area. Near Gardiner, Park County, TVX Gold, Inc. continued developing its Crevice property and Mineral Hill Mine. TVX also expanded reserves on both properties. Near Philipsburg, Cable Mountain Mines Co. continued drilling on its Basin Gulch project. Cable also drilled several holes at the Cable Mountain Mine. Near Butte, Battle Mountain Exploration Co. drilled several holes at the Tuxedo Mine. Cominco American Resources, Inc. drilled a number of stratigraphic holes, one of which was in Soap Gulch. ASARCO Incorporated drilled and later abandoned the Highland project near the Highland Mine, leaving its joint partner, Orvana Minerals Corp., to continue with the project. Orvana also drilled its Baldy Mountain prospect northeast of Lincoln. Near Dillon, Cameco U.S., Inc. drilled into a volcanic formation in search of gold in the Grasshopper Creek drainage area. Near Virginia City, Hanover Gold Co., Inc. drilled at the Kearsarge property. Royalstar Resources, Ltd. drilled the Garrison property. Both are in upper Alder Gulch. Near Avon, Phelps Dodge drilled the Irish Hill property. Near Helena, Newmont Exploration, Ltd. drilled and abandoned the Pike's Gulch or Grady Ranch project.

The Stillwater Mining Co. continued construction of its 550-meter mine shaft. This was part of the company's expansion project at its Stillwater platinum-group metal

mine near Columbus. Stillwater also expanded its mill capacity to 1,800 metric tons per day and began construction on a base metal refinery at the smelter. All projects were scheduled for completion during 1996.

Montana Resources, Inc. enlarged the grinding circuit at its Continental Copper Mine mill near Butte. This was done to compensate for increased processing time caused by the crushing of harder ore. This resulted in lower than expected profits, despite strong copper and molybdenum prices.

In talc mining, Barretts Minerals Inc. has embarked on an aggressive development program in the southwestern corner of the State, near Dillon. Barretts spent approximately \$5 million in expanding its talc milling and packaging facility, and anticipated an equivalent amount would be spent in 1996. Luzenac America Inc. continued development of the Sappington and Three Forks talc processing facilities. Luzenac continued prestripping activities at the Yellowstone Mine, and was planning to deepen the decline at the Beaverhead Mine. Both companies, anticipating an increased demand for talc in the near future, were preparing for the market change. Prices have shown a steady increase during recent years.

Near Virginia City, Cominco American opened the first commercial garnet operation in the State. The operation is targeting garnet in the 3/16-inch to 250-mesh-size range for the abrasives industry.

Near Lewistown, Vortex Mining Co. completed the first full year of sapphire production from the company's new shaft. The stones were larger and of better quality than first expected. Canyon Resources continued reclamation on the closed C. R. Kendall heap-leach gold and silver mine near Hilger. Mining operations were completed in 1994, while leaching and reclamation will continue for two more years.

In the Butte area, Rhône-Poulenc Basic Chemicals Co. mothballed its elemental phosphorus plant, and was contracting the processing of its Idaho-sourced ore.

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<sup>1</sup>The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending on 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 1995 USGS mineral production data are estimates as of December 1995. For some commodities, especially 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. Call MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset and request Document No. 1000 for a telephone listing of all mineral commodity specialists or call USGS information at (703) 648-4000 for the specialist's name and number.

<sup>2</sup>This report includes information provided by the Montana Bureau of Mines and Geology.

TABLE 2  
**MONTANA: CRUSHED STONE<sup>1</sup> SOLD OR USED BY PRODUCERS IN 1994, BY USE<sup>2</sup>**

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch): Riprap and jetty stone	23	\$152	\$6.61
Coarse and fine aggregates: Graded road base or subbase <sup>3</sup>	144	525	3.65
Chemical and metallurgical: Cement manufacture	897	3,390	3.77
Other miscellaneous uses: <sup>4</sup>			
Unspecified: <sup>5</sup>	408	2,000	4.90
Actual	368	1,420	3.85
Estimated	482	1,350	2.81
Total	2,320	8,830	3.80

<sup>1</sup>Includes granite, limestone, miscellaneous stone, sandstone and quartzite, traprock and volcanic cinder, and scoria.

<sup>2</sup>Data are rounded to three significant digits; may not add to totals shown.

<sup>3</sup>Includes bituminous aggregate (coarse), screening (undesignated), unpaved road surfacing, and terrazzo and exposed aggregate.

<sup>4</sup>Includes chemical stone for alkali works, lime manufacture, mine dusting or acid water treatment, poultry grit and mineral food, and sulfur oxide removal.

<sup>5</sup>Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 3  
**MONTANA: CRUSHED STONE SOLD OR USED, BY KIND<sup>1</sup>**

Kind	1993				1994			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	11	1,820	\$7,070	\$3.89	9	1,410	\$6,010	\$4.26
Granite	2	W	W	2.52	2	W	W	2.55
Traprock	3	W	W	2.94	5	338	1,140	3.36
Sandstone and quartzite	4	418	1,760	4.20	2	W	W	3.84
Volcanic cinder and scoria	3	3	7	2.33	3	5	12	2.40
Miscellaneous stone	1	17	51	3.00	1	W	W	3.86
Total	XX	2,820	10,400	3.68	XX	2,320	8,830	3.80

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

<sup>1</sup>Data are rounded to three significant digits.

TABLE 4  
**MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1994, BY MAJOR USE CATEGORY<sup>1</sup>**

Use	Quantity (thousand metric tons)	Value (thousands)	Value per ton
Concrete aggregate (including concrete sand)	947	\$4,890	\$5.16
Plaster and gunitite sands	6	41	6.83
Asphaltic concrete aggregates and other bituminous mixtures	488	3,880	7.95
Road base and coverings <sup>2</sup>	2,830	10,200	3.62
Fill	366	1,180	3.23
Snow and ice control	93	263	2.83
Filtration	15	62	4.13
Other <sup>3</sup>	93	556	5.98
Unspecified: <sup>4</sup>			
Actual	341	1,030	3.03
Estimated	2,190	6,660	3.05
Total or average	7,360	28,800	3.91

<sup>1</sup>Data are rounded to three significant digits; may not add to totals shown.

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

<sup>3</sup>Includes railroad ballast.

<sup>4</sup>Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 5  
**MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1994, BY USE AND DISTRICT<sup>1</sup>**

(Thousand metric tons and thousand dollars)

Use	District 1		District 2	
	Quantity	Value	Quantity	Value
Concrete aggregates <sup>2</sup>	661	3,210	292	1,720
Asphaltic/bituminous mixtures	312	2,980	176	903
Road base and coverings <sup>3</sup>	2,010	7,430	822	2,810
Fill	269	867	97	314
Snow and ice control	89	248	4	14
Other miscellaneous uses <sup>4</sup>	27	110	80	508
Unspecified: <sup>5</sup>				
Actual	341	1,030	—	—
Estimated	987	3,730	1,200	2,930
Total	4,700	19,600	2,670	9,190

<sup>1</sup>Data are rounded to three significant digits; may not add to totals shown.

<sup>2</sup>Includes plaster and gunitite sands.

<sup>3</sup>Includes road and other stabilization (cement).

<sup>4</sup>Includes filtration and railroad ballast.

<sup>5</sup>Includes production reported without a breakdown by end use and estimates for nonrespondents.



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