



# THE MINERAL INDUSTRY OF COLORADO

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

In 2004, Colorado's nonfuel raw mineral production was valued<sup>1</sup> at \$1.01 billion, based upon annual U.S. Geological Survey (USGS) data. This was a 50% increase from that of 2003<sup>2</sup> and followed a 6.2% increase from 2002 to 2003. The State increased to 17th from 22d in rank among the 50 States in nonfuel mineral production value, of which Colorado accounted for more than 2% of the U.S. total.

The State's two leading nonfuel mineral commodities in 2004, by value, were molybdenum concentrates and construction sand and gravel, followed by portland cement, gold, and crushed stone. A large part of Colorado's substantial increase in value in 2004 was a result of the increased production and value of molybdenum concentrates, as well as those of gold (value up about \$23 million), construction sand and gravel (up \$22 million), and cement (up about \$17 million for masonry and portland combined); and a smaller yet significant increase in crushed stone (up more than \$3 million) (table 1). The only substantial decrease in value was from that of soda ash, down slightly more than \$25 million.

Nearly 52% of Colorado's nonfuel mineral production value in 2004 resulted from the production of metals—molybdenum concentrates, gold, and silver—in descending order of value; this was a significant increase from 30% in 2003 and 23% in 2002. Molybdenum concentrate production rose by more than 25% in 2004, and its total production value more than quadrupled that of 2003 as the significant growth in molybdenum concentrate prices that began in December 2002 continued on throughout 2003 and 2004. For example, the time-average price of molybdenic oxide rose from \$8.27 per kilogram in 2002 to \$11.75 per kilogram in 2003 to \$36.73 per kilogram in 2004 and reached \$68.86 in December 2004. Molybdenum concentrate prices remained high and continued to increase more gradually during the early months of 2005. (Prices were converted from those reported in Platts Metals Week in dollars per pound of contained molybdenum).

In 2003, Colorado's rise in mineral production value was led by increases in the production and related value of gold, molybdenum concentrates, and portland cement, up about \$32 million, \$22 million, and \$21 million, respectively. Additionally, an increase of nearly \$4 million also took place in soda ash. The most significant decreases in production and values took place in crushed stone and construction sand and gravel. The value of crushed stone was down \$32 million (down 33%) with a dropoff in production of 30.7%, and construction sand and gravel value was down \$9 million (down 4%) with a dropoff in production of nearly 8%. Relative to these, most other nonfuel minerals showed significantly smaller changes in value, for the most part small increases, that were inconsequential to the net result for the year (table 1).

In 2004, Colorado remained second in the quantity of molybdenum concentrates produced among 6 producing States, third of 3 States that produce soda ash, and ninth in gemstones (based on value). The State rose to 4th from 5th of 10 gold-producing States and to 9th from 10th in gypsum and decreased to 10th from 8th in silver and to 10th from 9th in construction sand and gravel. Additionally, Colorado produced significant quantities of portland cement and common clays.

The following narrative information was provided by the Colorado Geological Survey<sup>3</sup> (CGS) and much of the data are based on its own surveys, estimates, and information gathered from company annual reports.

## Exploration and Development Activities

Mineral exploration and development activity increased in 2004. The number of active, unpatented mining claims on public lands in Colorado has been declining since 1994, but in 2004 there was a modest increase (Cappa and others, 2005, p. 28). Various groups conducted exploration activities for copper, gold, silver, and uranium.

The Cashin copper deposit in Montrose County is a sandstone-hosted deposit near the Colorado-Utah border that is currently being explored and developed by Constellation Copper Corp. The deposit was explored as a potential satellite operation to the Constellation's new Lisbon Valley Mine, 24 kilometers (km) to the southwest in San Juan County, UT. Pending further engineering studies, permitting, and resource definition, copper ore from Cashin will be trucked to Lisbon Valley for processing. New estimates based on revised relogging of older drill holes and new drilling indicated a resource of 9.5 million metric tons (Mt) grading 0.52% copper, which contains about 49,000 metric tons (t) of copper. Proven and probable mining reserves, calculated at the copper price of \$2.09 per kilogram, are estimated to be 4.76 Mt grading 0.52% copper with a waste-to-ore ratio of 0.74 to 1.

Calais Resources, Inc. continued exploration and resource-definition drilling in the historic Caribou District in Boulder County. The company drilled 2,700 meters (m) of core in four deep holes in 2004. Specific targets of the drilling included the northeast-striking No Name vein system and the contact zone between the Caribou monzonite stock and Proterozoic gneiss. Drill holes

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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 2004 USGS mineral production data published in this chapter are those available as of December 2005. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—also can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

<sup>2</sup>Values, percentage calculations, and rankings for 2003 may differ from the Minerals Yearbook, Area Reports: Domestic 2003, Volume II, owing to the revision of preliminary 2003 to final 2003 data. Data and rankings for 2004 are considered to be final and are not likely to change significantly.

<sup>3</sup>John W. Keller, a Geologist at the Colorado Geological Survey, authored the text of the State mineral industry information provided by that agency.

successfully intersected mineralization in the No Name vein system. The Nelson veins were also intersected, and four previously undiscovered veins were also found below the footwall of the No Name vein. One of the mineralized intercepts contained 18.5 grams per metric ton (g/t) gold over 0.6 m and was 602 m below the surface and was the deepest mineralization tested so far in the Caribou District. Several other intercepts of 10 to 31 g/t gold were encountered as well, and these ranged from 0.8 m to 1.8 m in width.

Consolidated Global Minerals Ltd. of Vancouver, British Columbia, Canada, announced in September 2004 that it had purchased an underground drill, a surface exploration drilling rig, and mining equipment needed for the exploration of the Cash Mine and other areas in the Gold Hill District in Boulder County. The project was called "The Front Range Gold JV." They announced that several drill holes had been completed and one was in progress. Assays from 11 rock chip samples from the 38 m level at the Cash Mine averaged 55 g/t gold and 272 g/t silver. Work was done to retune the circuits at the 45-metric-ton-per-day flotation mill, which was built in 1987 and operated briefly in 1988. Historic mines in the area produced gold and silver from narrow, high-grade quartz veins in Proterozoic gneiss and granitic rocks.

The Bates-Hunter Mine in Central City, Gilpin County, saw renewed activity in late 2004. In September, Wits Basin Precious Metals, Inc., a Minneapolis-based junior exploration company, secured an option to purchase the Bates-Hunter Mine and The Golden Gilpin Mill. Central City Consolidated Mining Company is the present owner of the mine and mill, which has not produced ore since 1936 according to press releases from Wits Basin. The mine produced gold from ore shoots in steeply dipping fissure veins. Wits Basin recently announced plans to dewater and rehabilitate the shaft, to conduct exploration drilling from underground stations when the workings are rehabilitated, and to refurbish the Golden Gilpin Mill.

In 2004, Minerex Corp. applied for permits from the State of Colorado and Teller County for the Little Hope Mine, a proposed small, underground gold mine near Mineral Hill just north of the town of Cripple Creek. The mine would produce gold ore that would be processed at a custom mill located elsewhere.

## Commodity Review

### *Industrial Minerals*

**Cement.**—Holcim (US) Inc. and CEMEX, Inc. produced a combined 2.6 Mt of cement in 2004. Holcim's plant near Florence, CO, employed about 180 people and operated at capacity to produce about 1.9 Mt of portland cement. The CEMEX plant near Lyons, Colorado, employed about 100 people and produced portland and masonry cement. Cement production was 460,000 t, most of which was utilized in the greater metropolitan Denver area.

**Clay and Shale.**—The majority of the clay mined in Colorado was common clay, which was used mainly to make bricks and tiles or in the manufacture of cement and lightweight aggregate. Common clay was mined primarily in eastern Colorado, especially near the Front Range in Douglas, El Paso, Elbert, Fremont, Jefferson, and Pueblo Counties. In 2004, Colorado clay mines produced 262,000 t of clay, which represents an increase of about 1% more than that of 2003. The value of this clay was estimated to be more than \$1.4 million. In eastern Colorado, clay is mined principally from the Laramie Formation (Upper Cretaceous), the Dakota Sandstone (Lower Cretaceous), and the Dawson Formation (Upper Cretaceous to Tertiary). Principal producers of clay products are located in the Front Range area and include Denver Brick Co., Robinson Brick Co., Summit Brick and Tile, Co., and TXI Operations (Texas Industries, Inc.).

**Crushed Stone and Sand and Gravel.**—The production of construction materials and many industrial minerals is largely tied to the health of the construction industry. Increased demand for aggregate was expected in 2005 as the Colorado economy strengthened and construction continued on the Interstate 25 transportation project and other major roadways in the State.

In 2004, about 70,000 t of industrial sand and gravel worth about \$3.0 million was produced in the State, which is roughly the same amount produced in 2003. Colorado's leading industrial sand company is the Ohio-based Oglebay Norton Co. that markets "Colorado Silica Sand," a specialty industrial sand used primarily as filter media for water purification plants and as a construction material, largely for stucco. Oglebay Norton quarries and receives raw material from Quaternary eolian deposits consisting mostly of well-sorted and well-rounded grains of quartz.

**Dimension Stone.**—Colorado produced 5,240 t of dimension stone in 2004 with an estimated value of \$1.5 million. This is a 13% increase compared with the 2003 production. The principal Colorado dimension stones include granite, marble, rhyolite, and sandstone. Improvements in quarry techniques and rising costs of some other construction materials has led to renewed interest in the use of stone as a building material, particularly in residential markets.

Significant dimension stone mines in Colorado include the Yule Marble quarry in Marble, which was sold by Sierra Minerals in April 2004 to Colorado Stone Quarries (CSQ) (a subsidiary of Polycor, Inc. of Quebec, Ontario, Canada). CSQ brought in an experienced operating manager and more modern quarrying equipment that, together, resulted in significantly expanded production in the latter portion of 2004 and into 2005. Downtime during the sale of the quarry, however, resulted in a net production of 1,700 t, down 11% from 2003. The Yule Marble is Colorado's official State rock.

Arkins Park Stone Corporation employed about 40 people and operates three quarries near the town of Masonville in Larimer County. The company produces buff-colored sandstone as well as "Berthoud Pink" and "Berthoud Sunset" from the Permian Lyons Sandstone. Much of the stone is used as flagstone and facing in the construction of buildings. Recently, the company also began producing riprap for commercial uses such as bridge abutments, dams, and riverbed linings.

Other important dimension and decorative producers include several quarries in Boulder and Larimer Counties that fabricate facing and decorative stone from the Permian Lyons Sandstone. The Eocene Wall Mountain Tuff is quarried near Castle Rock and is fabricated as dimension stone and riprap.

**Gypsum.**—The American Gypsum Co.'s mine and wallboard plant, located near the town of Gypsum, produced 562,000 t of gypsum in 2004. This represented a 5% production increase from 2003. Approximately 56 million square meters per year of wallboard are manufactured at the plant. About one-half of the wallboard was used by the Colorado construction industry, and the remainder was marketed throughout the United States. The gypsum was excavated from evaporite deposits in the Pennsylvanian Eagle Valley Formation using a pavement grinder. American Gypsum was developing a new mining area northeast of the current site. For a span of a few years, mining will shift to the new site as reserves are depleted in the original site. The plant and mine employed approximately 120 people.

Colorado Lien (subsidiary of Pete Lien & Sons, Inc. of South Dakota) produced gypsum from the Munroe Quarry north of Fort Collins near Livermore. Gypsum was extracted from the Permian Lykins Formation using a portable crusher. Annual production averaged about 23,000 t. The majority of the material quarried was sold within the State to the cement industry.

**Soda Ash.**—Natural Soda, Inc. produced sodium bicarbonate (baking soda) derived from nahcolite that was solution mined in the Piceance Basin in northwestern Colorado. In 2004, the plant produced 72,000 t of sodium bicarbonate, a 2.4% increase more than the 70,300 t produced in 2003. Prices for sodium bicarbonate remained stable in 2004. High-grade nahcolite (greater than 80%) is recovered from the Boise Bed of the Green River Formation. Food-grade and industrial-grade products were marketed.

American Soda (owned by Solvay Chemicals, Inc.) mothballed its large nahcolite solution mine and soda ash processing plant in northwestern Colorado in spring 2004, laying off approximately 50 people. The processing plant in Garfield County had manufactured soda ash and sodium bicarbonate from nahcolite, which was solution mined in Rio Blanco County. The plant still produced sodium bicarbonate using feedstock railed to Parachute from Solvay's trona mine in Wyoming.

## **Metals**

**Gold and Silver.**—Cripple Creek & Victor Gold Mining Co. (CC&V) (a subsidiary of South African-based AngloGold Ashanti, Ltd.) operated the Cresson Mine (Teller County), which was the leading producer of precious metals in Colorado and the 9th ranked U.S. gold mine. The mine produced 10,200 kilograms (kg) of gold in 2004, up 16% from the quantity produced in 2003. The average grade of ore mined was 0.86 g/t gold. Based on AngloGold's realized sales prices of gold produced at the CC&V Mine, the value of gold produced at the mine was \$105 million in 2004. More than 6,190 kg of silver, valued at approximately \$1.3 million, was also produced. AngloGold expects the mine to produce approximately 10,300 kg of gold in 2005. In 2004, CC&V received county and State approval for an extension of the East Cresson mining area. This extension will provide approximately 5 Mt of additional ore. The mine employs approximately 318 people and is the largest private employer in Teller County.

LKA International, Inc. owns the Golden Wonder, a small, high-grade underground gold mine near Lake City in the San Juan Mountains. Since beginning operations in 1998, the mine has produced more than 2,950 kg of gold. The 2004 production was 445 kg of gold. According to company press releases, the weighted average grade of ore mined during the past 2 years was 523 g/t gold. In January 2005, LKA announced that it is planning to permit and develop a new adit and drift below the current workings. The proposed drift will be located approximately 300 m below the deepest current workings.

**Molybdenum.**—The price of molybdenum skyrocketed from nearly \$8 per pound at the end of 2003 to more than \$30 per pound in early 2005. Because of the high price and increased production, molybdenum is now the largest segment of Colorado's nonfuel minerals industry in terms of production value (Cappa and others, 2004, p. 31). The Henderson Mine in the Front Range west of Idaho Springs added a work shift and significantly increased molybdenum production in 2004. Climax Molybdenum Company (a subsidiary of Phelps Dodge) operates the underground block-cave mine. Henderson is North America's leading primary producer of molybdenum. In 2004, the mine produced 12,500 t of molybdenum metal contained in concentrates, a 24% increase compared with the quantity produced in 2003. The estimated production value was \$348 million. Phelps Dodge reported that it received an average of \$12.65 per pound for molybdenum produced in 2004. In 2005, Henderson expects to again increase production to 14,100 t. The mine and mill employs 485 workers. Henderson is currently developing the new 2,200-m production level, which is expected to produce at a rate of 18,100 metric tons per year by mid-2006. Reserves at yearend 2004 were 144 Mt with a grade of 0.21% molybdenum.

The Climax Mine, also owned by Phelps Dodge, was the first major molybdenum mine in the United States. The mine is located on the Continental Divide at Fremont Pass between Leadville and Copper Mountain. The mine has been on care-and-maintenance status since 1995. Phelps Dodge reports that at yearend 2004, Climax still contained millable reserves of 144 Mt of ore grading 0.19% molybdenum. High molybdenum prices and projections have prompted Phelps Dodge to evaluate the economic viability of starting up mining operations at Climax for short- and mid-term production.

**Vanadium.**—Colorado is the only State currently producing vanadium ore. Vanadium, a metal used to harden steel, is a coproduct of uranium at the recently opened Cotter Corp. mines in Montrose County. Although these mines are known mainly for their production of uranium, they actually produce more vanadium by volume than uranium. In 2004, Cotter's mines produced 13,800 t of ore containing at least 128 t of vanadium. The USGS reports that average prices for vanadium more than doubled in 2004, averaging \$5.28 per pound compared with \$2.21 per pound in 2003 and \$1.34 in 2002 (Magyar, 2005). Cotter expects to achieve a production of 73,000 t of ore in 2005 and 130,000 t in 2006. Ore grades are expected to be 1.84% vanadium oxide.

## **Government Programs**

The CGS is working cooperatively with the USGS to upgrade the Colorado portion of the Mineral Resources Data System (MRDS), a comprehensive national computer database of nonfuel mineral mines and mineral occurrences. CGS continues to produce new reports on the geology and mineral resources of Colorado counties. Each report contains geologic and mineral resource maps. In

2004, progress was made on the reports for Chaffee, Lake, and Saguache Counties. Also in 2004, CGS completed seven new 1:24,000-scale geologic maps as part of the STATEMAP component of the National Cooperative Geologic Mapping Program. A complete listing of publications available from CGS is available on the internet at <http://geosurvey.state.co.us/>.

### **References Cited**

- Cappa, J.A., Young, G., Keller, J.W., Carroll, C.J., and Widmann, B.L., 2005, Colorado mineral and mineral fuel activity - 2004: Colorado Geological Survey Information Series 70, 42 p.
- Magyar, M.J., 2005, Vanadium: U.S. Geological Survey Mineral Commodity Summaries 2005, p. 182-183.

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

(Thousand metric tons and thousand dollars)

Mineral	2002		2003		2004	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Bentonite	W	W	W	W	5	W
Common	214	1,260	259	1,580	249	1,510
Gemstones	NA	269	NA	281	NA	360
Lime	20	1,250	26	2,330	26	2,570
Sand and gravel:						
Construction	40,700	222,000	37,500	213,000	40,900	235,000
Industrial	61	W	70	W	W	3,300
Stone:						
Crushed	15,000	96,000	10,400	64,000	11,000	67,300
Dimension	18	2,400	5	1,610	16	1,980
Combined values of cement, gold, gypsum (crude), helium (Grade-A), molybdenum concentrates, silver, soda ash, and values indicated by symbol W	XX	312,000 <sup>r</sup>	XX	391,000	XX	699,000
Total	XX	634,000	XX	673,000	XX	1,010,000

<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.

TABLE 2  
 COLORADO: CRUSHED STONE SOLD OR USED, BY KIND<sup>1</sup>

Kind	2002				2003				2004			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	11	4,620	\$30,900	\$6.68	6	1,920	\$12,000	\$6.27	6	1,800	\$10,800	\$6.02
Dolomite	1	W	W	4.63	1	W	W	4.63	1	W	W	4.63
Marble	--	--	--	--	--	--	--	--	1	W	W	8.17
Granite	8 <sup>r</sup>	6,720 <sup>r</sup>	45,000 <sup>r</sup>	6.70 <sup>r</sup>	9	4,960	32,200	6.48	9	5,230	33,900	6.48
Sandstone and quartzite	9	2,770	16,100	5.82	6	2,870	16,400	5.71	5	3,210	18,400	5.72
Volcanic cinder and scoria	2 <sup>r</sup>	W	W	5.67 <sup>r</sup>	2	W	W	7.62	3	W	W	6.32
Miscellaneous stone	10 <sup>r</sup>	629 <sup>r</sup>	2,790 <sup>r</sup>	4.43 <sup>r</sup>	6	457	2,450	5.35	7	557	2,970	5.32
Total or average	XX	15,000	96,000	6.42	XX	10,400	64,000	6.18	XX	11,000	67,300	6.12

<sup>r</sup>Revised. W Withheld to avoid disclosing company proprietary data; included in "Total or average." XX Not applicable. -- Zero.

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

TABLE 3a  
 COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS  
 IN 2003, BY USE<sup>1</sup>

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
<b>Construction:</b>			
<b>Coarse aggregate (+1½ inch):</b>			
Macadam	W	W	\$5.51
Riprap and jetty stone	349	\$3,530	10.12
Filter stone	W	W	8.37
Other coarse aggregates	479	2,670	5.57
<b>Total or average</b>	<b>828</b>	<b>6,200</b>	<b>7.49</b>
<b>Coarse aggregate, graded:</b>			
Concrete aggregate, coarse	(2)	(2)	7.72
Bituminous aggregate, coarse	872	6,680	7.66
Bituminous surface-treatment aggregate	(2)	(2)	4.13
Railroad ballast	(2)	(2)	12.12
<b>Total or average</b>	<b>1,280</b>	<b>10,100</b>	<b>7.86</b>
<b>Fine aggregate (-¾ inch):</b>			
Stone sand, bituminous mix or seal	736	2,690	3.66
Screening, undesignated	(3)	(3)	2.11
Other fine aggregates	11	21	1.91
<b>Total or average</b>	<b>747</b>	<b>2,710</b>	<b>3.63</b>
<b>Coarse and fine aggregates:</b>			
Graded road base or subbase	357	1,370	3.82
Unpaved road surfacing	(2)	(2)	5.26
Crusher run or fill or waste	(2)	(2)	0.55
<b>Total or average</b>	<b>445</b>	<b>1,430</b>	<b>3.21</b>
Other construction materials	194	1,590	8.21
<b>Agricultural:</b>			
Limestone	(4)	(4)	27.56
Poultry grit and mineral food	(4)	(4)	35.27
Chemical and metallurgical, sulfur oxide removal	(4)	(4)	15.06
Special, mine dusting or acid water treatment	(4)	(4)	35.33
Other miscellaneous uses and specified uses not listed	54	246	4.56
<b>Unspecified:<sup>5</sup></b>			
Reported	6,360	39,100	6.15
Estimated	440	2,600	6.00
<b>Total or average</b>	<b>6,800</b>	<b>41,800</b>	<b>6.14</b>
<b>Grand total or average</b>	<b>10,400</b>	<b>64,000</b>	<b>6.18</b>

W Withheld to avoid disclosing company proprietary data; included in "Other coarse aggregates."

<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>Withheld to avoid disclosing company proprietary data; included in "Total or average."

<sup>3</sup>Withheld to avoid disclosing company proprietary data; included with "Other fine aggregates."

<sup>4</sup>Withheld to avoid disclosing company proprietary data; included with "Unspecified: Reported."

<sup>5</sup>Reported and estimated production without a breakdown by end use.



TABLE 3b  
 COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS  
 IN 2004, BY USE<sup>1</sup>

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
<b>Construction:</b>			
<b>Coarse aggregate (+1½ inch):</b>			
Riprap and jetty stone	323	\$3,660	\$11.34
Filter stone	W	W	9.09
Other coarse aggregates	261	2,020	7.74
Total or average	584	5,680	9.73
<b>Coarse aggregate, graded:</b>			
Bituminous aggregate, coarse	945	7,530	7.97
Bituminous surface-treatment aggregate	(2)	(2)	7.50
Total or average	945	7,530	7.97
<b>Fine aggregate (-¾ inch):</b>			
Stone sand, concrete	(3)	(3)	4.45
Stone sand, bituminous mix or seal	674	2,250	3.35
Screening, undesignated	(3)	(3)	2.99
Total or average	951	3,470	3.65
<b>Coarse and fine aggregates:</b>			
Graded road base or subbase	259	970	3.75
Unpaved road surfacing	(4)	(4)	4.61
Crusher run or fill or waste	(4)	(4)	3.55
Other coarse and fine aggregates	705	3,720	5.27
Total or average	964	4,690	4.86
Chemical and metallurgical, cement manufacture	(2)	(2)	6.18
Special, mine dusting or acid water treatment	(2)	(2)	3.33
Other miscellaneous uses and specified uses not listed	64	635	9.92
<b>Unspecified:<sup>5</sup></b>			
Reported	4,060	22,400	5.52
Estimated	2,900	19,000	6.78
Total or average	6,930	41,800	6.04
Grand total or average	11,000	67,300	6.12

W Withheld to avoid disclosing company proprietary data; included with "Other coarse aggregates."

<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>Withheld to avoid disclosing company proprietary data; included in "Grand total or average."

<sup>3</sup>Withheld to avoid disclosing company proprietary data; included in "Total or average."

<sup>4</sup>Withheld to avoid disclosing company proprietary data; included with "Other coarse and fine aggregates."

<sup>5</sup>Reported and estimated production without a breakdown by end use.

TABLE 4a

COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2003, BY USE AND DISTRICT<sup>1,2</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) <sup>3</sup>	W	W	--	--	W	W
Coarse aggregate, graded <sup>4</sup>	--	--	--	--	W	W
Fine aggregate (-¾ inch) <sup>5</sup>	W	W	--	--	W	W
Coarse and fine aggregate <sup>6</sup>	W	W	--	--	W	W
Other construction materials	--	--	--	--	91	745
Agricultural <sup>7</sup>	--	--	--	--	--	--
Chemical and metallurgical <sup>9</sup>	(8)	(8)	--	--	--	--
Special <sup>10</sup>	--	--	--	--	--	--
Other miscellaneous use <sup>11</sup>	--	--	--	--	7	33
Unspecified: <sup>12</sup>						
Reported	381	2,400	--	--	4,830	29,200
Estimated	30	160	360	2,200	30	170
Total	476	3,160	360	2,200	6,940	42,100
Use	District 5		District 6		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) <sup>3</sup>	665	4,610	--	--	--	--
Coarse aggregate, graded <sup>4</sup>	W	W	--	--	--	--
Fine aggregate (-¾ inch) <sup>5</sup>	W	W	--	--	--	--
Coarse and fine aggregate <sup>6</sup>	W	W	41	158	--	--
Other construction materials	103	847	--	--	--	--
Agricultural <sup>7</sup>	(8)	(8)	--	--	--	--
Chemical and metallurgical <sup>9</sup>	--	--	--	--	--	--
Special <sup>10</sup>	(8)	(8)	--	--	--	--
Other miscellaneous use <sup>11</sup>	46	213	--	--	--	--
Unspecified: <sup>12</sup>						
Reported	1,150	7,440	--	--	9	54
Estimated	20	100	--	--	--	--
Total	2,530	16,300	41	158	9	54

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>No production for District 3.<sup>3</sup>Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregates.<sup>4</sup>Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and railroad ballast.<sup>5</sup>Includes stone sand (bituminous mix or seal), screening (undesignated), and other fine aggregates.<sup>6</sup>Includes crusher run (select material or fill), graded road base or subbase, and unpaved road surfacing.<sup>7</sup>Includes agricultural limestone and poultry grit and mineral food.<sup>8</sup>Withheld to avoid disclosing company proprietary data; included with "Unspecified: Reported."<sup>9</sup>Includes sulfur oxide removal.<sup>10</sup>Includes mine dusting or acid water treatment.<sup>11</sup>Includes other specified uses not listed.<sup>12</sup>Reported and estimated production without a breakdown by end use.

TABLE 4b

COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2004, BY USE AND DISTRICT<sup>1,2</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) <sup>3</sup>	W	W	--	--	W	W
Coarse aggregate, graded <sup>4</sup>	--	--	--	--	W	W
Fine aggregate (-¾ inch) <sup>5</sup>	--	--	--	--	W	W
Coarse and fine aggregate <sup>6</sup>	W	W	--	--	W	W
Chemical and metallurgical <sup>7</sup>	--	--	--	--	W	W
Special <sup>8</sup>	--	--	--	--	--	--
Other miscellaneous use <sup>9</sup>	64	635	--	--	--	--
Unspecified: <sup>10</sup>						
Reported	404	2,230	--	--	2,690	14,800
Estimated	56	330	360	2,200	2,400	17,000
Total	607	3,790	360	2,200	7,210	44,500
Use	District 5		District 6		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) <sup>3</sup>	W	W	--	--	--	--
Coarse aggregate, graded <sup>4</sup>	W	W	--	--	--	--
Fine aggregate (-¾ inch) <sup>5</sup>	W	W	--	--	--	--
Coarse and fine aggregate <sup>6</sup>	W	W	30	139	--	--
Chemical and metallurgical <sup>7</sup>	--	--	--	--	--	--
Special <sup>8</sup>	W	W	--	--	--	--
Other miscellaneous use <sup>9</sup>	--	--	--	--	--	--
Unspecified: <sup>10</sup>						
Reported	937	5,170	--	--	26	161
Estimated	28	110	--	--	--	--
Total	2,770	16,500	30	139	26	161

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>No production for District 3.<sup>3</sup>Includes filter stone, riprap and jetty stone, and other coarse aggregates.<sup>4</sup>Includes bituminous aggregate (coarse) and bituminous surface-treatment aggregate.<sup>5</sup>Includes stone sand (bituminous mix or seal), stone sand (concrete), and screening (undesignated).<sup>6</sup>Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.<sup>7</sup>Includes cement manufacture.<sup>8</sup>Includes mine dusting or acid water treatment.<sup>9</sup>Includes other specified uses not listed.<sup>10</sup>Reported and estimated production without a breakdown by end use.

TABLE 5a  
 COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2003,  
 BY MAJOR USE CATEGORY<sup>1</sup>

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	4,070	\$25,800	\$6.33
Plaster and gunitite sands	98	804	8.24
Concrete products (blocks, bricks, pipe, decorative, etc.)	118	963	8.17
Asphaltic concrete aggregates and other bituminous mixtures	2,450	16,200	6.61
Road base and coverings <sup>2</sup>	6,410	32,200	5.03
Fill	879	3,460	3.93
Snow and ice control	112	712	6.34
Other miscellaneous uses <sup>3</sup>	137	1,650	12.06
Unspecified: <sup>4</sup>			
Reported	12,400	64,400	5.20
Estimated	11,000	66,000	6.11
Total or average	37,500	213,000	5.67

<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 (cement and lime).

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

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

TABLE 5b  
 COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2004,  
 BY MAJOR USE CATEGORY<sup>1</sup>

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	4,690	\$32,600	\$6.96
Plaster and gunitite sands	35	360	10.15
Concrete products (blocks, bricks, pipe, decorative, etc.)	126	676	5.36
Asphaltic concrete aggregates and other bituminous mixtures	2,010	14,700	7.35
Road base and coverings <sup>2</sup>	6,350	31,500	4.96
Fill	1,330	5,380	4.04
Snow and ice control	73	528	7.23
Railroad ballast	151	1,860	12.36
Other miscellaneous uses <sup>3</sup>	282	2,510	8.89
Unspecified: <sup>4</sup>			
Reported	12,500	65,300	5.22
Estimated	13,000	79,000	5.97
Total or average	40,900	235,000	5.75

<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 (cement and lime).

<sup>3</sup>Includes roofing granules and filtration.

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

TABLE 6a  
 COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2003, 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 (including concrete sand)	552	4,300	1,510	9,110	64	349
Plaster and gunitite sands	13	110	W	W	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.)	W	W	--	--	--	--
Asphaltic concrete aggregates and other bituminous mixtures	320	2,520	W	W	770	4,760
Road base and coverings <sup>2</sup>	1,780	8,720	905	6,720	429	2,440
Fill	400	1,980	196	717	9	12
Snow and ice control	10	73	--	--	--	--
Other miscellaneous uses <sup>3</sup>	16	224	268	1,190	--	--
Unspecified: <sup>4</sup>						
Reported	3,990	21,700	3,270	16,600	248	1,290
Estimated	970	5,500	3,600	18,000	190	700
Total	8,050	45,100	9,700	52,500	1,710	9,550
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	526	3,270	1,150	6,760	265	1,990
Plaster and gunitite sands	W	W	16	156	2	13
Concrete products (blocks, bricks, pipe, decorative, etc.)	W	W	106	846	W	W
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	653	5,540
Road base and coverings <sup>2</sup>	585	1,720	1,450	5,210	1,260	7,390
Fill	169	462	79	172	26	112
Snow and ice control	W	W	47	247	52	357
Other miscellaneous uses <sup>3</sup>	333	2,270	296	1,820	15	229
Unspecified: <sup>4</sup>						
Reported	2,450	12,800	1,720	8,950	577	2,930
Estimated	4,700	35,000	1,300	6,100	220	1,100
Total	8,720	55,300	6,140	30,200	3,070	19,600
	Unspecified districts					
	Quantity	Value				
Concrete aggregate (including concrete sand)	--	--				
Plaster and gunitite sands	--	--				
Concrete products (blocks, bricks, pipe, decorative, etc.)	--	--				
Asphaltic concrete aggregates and other bituminous mixtures	--	--				
Road base and coverings <sup>2</sup>	--	--				
Fill	--	--				
Snow and ice control	--	--				
Other miscellaneous uses <sup>3</sup>	--	--				
Unspecified: <sup>4</sup>						
Reported	123	204				
Estimated	--	--				
Total	123	204				

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 (cement and lime).

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

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

TABLE 6b  
 COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2004, 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 (including concrete sand)	828	6,490	1,180	7,480	W	W
Concrete products (blocks, bricks, pipe, decorative, etc.) <sup>2</sup>	18	177	W	W	W	W
Asphaltic concrete aggregates and other bituminous mixtures	614	5,800	W	W	W	W
Road base and coverings <sup>3</sup>	1,850	9,800	1,090	7,430	545	1,800
Fill	284	1,560	698	2,770	1	2
Other miscellaneous uses <sup>4</sup>	41	410	244	1,110	438	2,340
Unspecified: <sup>5</sup>						
Reported	761	4,230	5,810	30,100	213	1,180
Estimated	2,200	14,000	3,800	20,000	840	4,600
Total	6,610	42,100	12,900	69,200	2,040	9,930
Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	1,170	9,410	975	5,450	W	W
Concrete products (blocks, bricks, pipe, decorative, etc.) <sup>2</sup>	W	W	69	477	W	W
Asphaltic concrete aggregates and other bituminous mixtures	375	2,320	W	W	W	W
Road base and coverings <sup>3</sup>	389	1,090	1,150	3,930	1,330	7,430
Fill	188	601	123	302	37	151
Other miscellaneous uses <sup>4</sup>	369	3,200	237	1,890	809	6,770
Unspecified: <sup>5</sup>						
Reported	2,350	12,800	1,700	9,380	1,270	7,000
Estimated	4,400	30,000	1,400	6,700	620	4,100
Total	9,210	59,500	5,660	28,100	4,070	25,400
Use	Unspecified districts					
	Quantity	Value				
Concrete aggregate (including concrete sand)	--	--				
Concrete products (blocks, bricks, pipe, decorative, etc.) <sup>2</sup>	--	--				
Asphaltic concrete aggregates and other bituminous mixtures	--	--				
Road base and coverings <sup>3</sup>	--	--				
Fill	--	--				
Other miscellaneous uses <sup>4</sup>	--	--				
Unspecified: <sup>5</sup>						
Reported	414	684				
Estimated	--	--				
Total	414	684				

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 plaster and gunite sands.

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

<sup>4</sup>Includes filtration, railroad ballast, roofing granules, and snow and ice control.

<sup>5</sup>Reported and estimated production without a breakdown by end use.