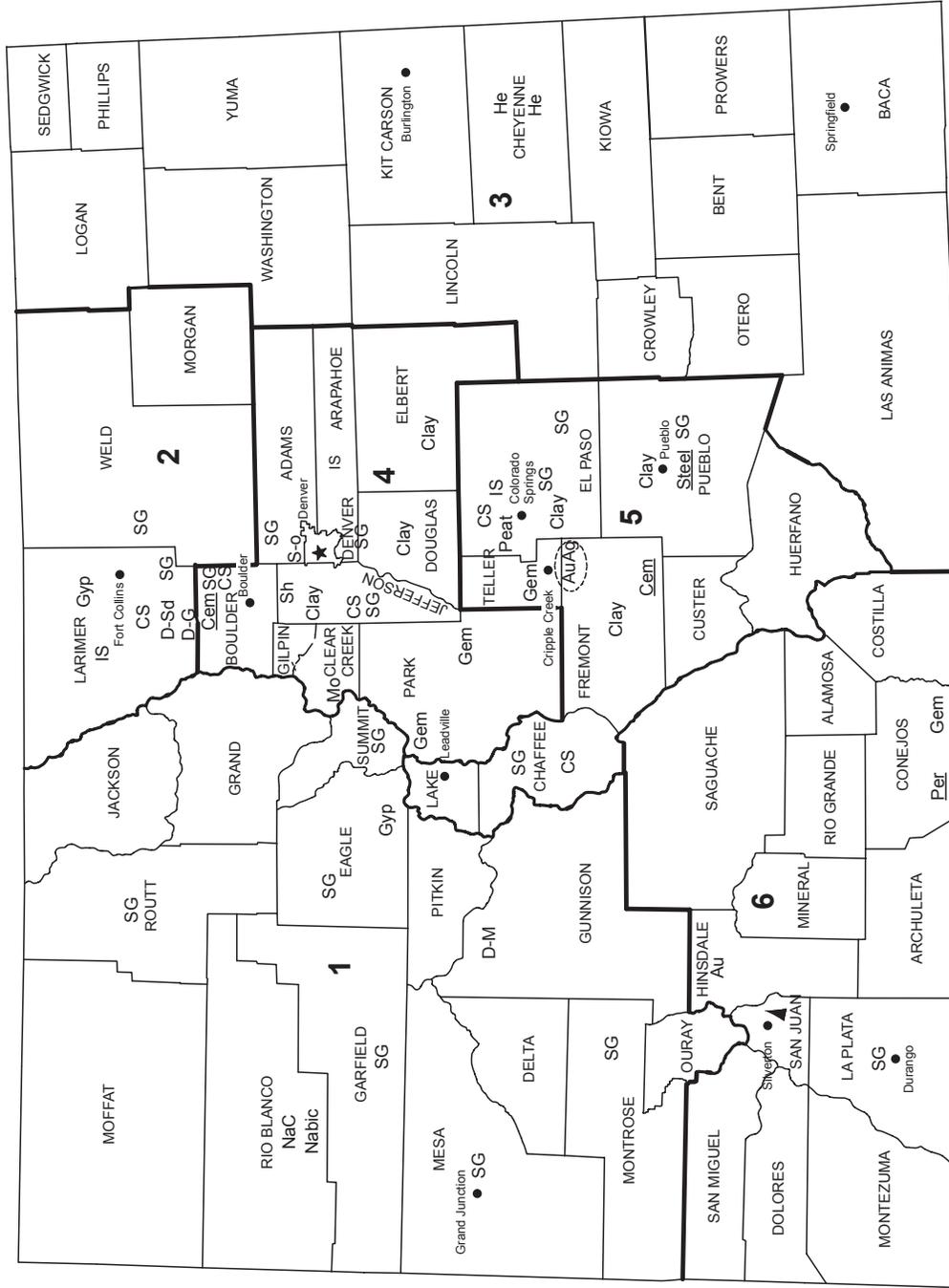


COLORADO



Au, Ag, Cu, Pb, Zn

LEGEND

County boundary

★ Capital

● City

1 — Crushed stone/sand and gravel districts

MINERAL SYMBOLS (Major producing areas)

- Ag Silver
- Au Gold
- Gem Cement plant
- Clay Common clay
- CS Crushed stone
- Cu Copper
- D-G Dimension granite
- D-M Dimension marble
- D-Sd Dimension sandstone
- Gem Gemstones
- Gyp Gypsum
- He Helium
- IS Industrial sand
- Mo Molybdenum
- Nabic Sodium bicarbonate
- NaC Sodium carbonate
- Pb Lead
- Peat Peat
- Per Perlite plant
- S-o Sulfur (oil)
- SG Construction sand and gravel
- Sh Shale
- Steel Steel plant
- Zn Zinc
- (dashed circle) Concentration of mineral operations

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 2003, the estimated value¹ of nonfuel mineral production for Colorado was \$673 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 6% increase from that of 2002² and followed a more than 17% increase from 2001 to 2002. The State increased to 22d from 23d in rank among the 50 States in nonfuel mineral production value, of which Colorado accounted for more than 1.5% of the U.S. total.

The State's two leading nonfuel mineral commodities in 2003, by value, were construction sand and gravel and portland cement, followed by gold, molybdenum concentrates, and crushed stone (third in 2002). Significant increases took place in the production and values of all metals in 2003 in contrast to small decreases in the two aggregate commodities; portland cement was up, slightly. In 2003, about 30% of Colorado's nonfuel mineral production value resulted from the production of metals—gold, molybdenum concentrates, and silver—in descending order of value; this was a significant increase from the 23% of 2002.

In 2002, Colorado's rise in value was led by increases in the production and related values of molybdenum concentrates and construction sand and gravel, up about \$30 million and \$28 million, respectively, and a substantial rise in those of soda ash, up about \$13 million, and gold. Additionally, significant increases also took place in crushed stone, up \$7.7 million, and cement (portland and masonry), up nearly \$4 million. Relative to these, most other nonfuel minerals showed significantly smaller changes in value, for the most part small decreases, that were inconsequential to the net result for the year (table 1).

Compared with USGS estimates of the quantities produced in the other 49 States during 2003, Colorado remained second in rank in molybdenum concentrates, third of 3 States that produce soda ash, and fifth in gold. The State rose to 8th from 10th in gypsum and decreased to 10th from 8th in construction sand and gravel. Additionally, Colorado produced significant quantities of portland cement, crushed stone, dimension stone, and gemstones (11th based on value).

The following narrative information was provided by the Colorado Geological Survey³ (CGS) much of the data is based on its own surveys, estimates, and information gathered from company annual reports.

Exploration and Development Activities

Constellation Copper Corp. conducted exploratory drilling in 2003 on the Cashin copper deposit in Montrose County near the Utah border. Cashin is located 24 kilometers northeast of Constellation's Lisbon Valley copper deposit in Grand County, Utah. The Cashin deposit is considered a satellite of the Lisbon Valley deposit and may eventually provide ore feed to the planned processing facilities at Lisbon Valley. Copper was originally discovered in the Cashin area in 1896 and was mined from 1899 to the mid-1900s. Historic mining in the Cashin area focused on high-grade deposits along steeply dipping, northeast-trending faults. Mineralization consists principally of the copper carbonates, malachite, and azurite. Chalcocite, neotocite, and chrysocolla are also present. Native copper (and some native silver) was occasionally found in the high-grade parts of the historic mine. Copper mineralization at Cashin is hosted by the Wingate Sandstone of Triassic age. Based on previous drilling, a mineral inventory of approximately 12 million metric tons (Mt) grading 0.5% copper (130 million pounds of copper) was estimated for Cashin prior to the 2003 exploration program. Much of the 2003 drilling targeted areas had never previously been tested. Assay results released by Constellation suggest that the drilling was successful in delineating additional copper mineralization, as well as upgrading the resource that was partially defined by previous exploration.

Calais Resources conducted exploration drilling at its Consolidated Caribou project in Boulder County in late 2003, the highlight of which was a 1,108-meter (m) core-drilling program (The Mining Record, 2004). Several previously untested gold-bearing veins were encountered in the drilling. Calais Resources announced that the company expected to commence a 20,000-m core-drilling campaign in April. The Consolidated Caribou project is located within the northeast-trending Colorado Mineral Belt. Mineralization is hosted mainly by northeast- and east-west-striking quartz veins and breccia zones. Country rock consists of Proterozoic age gneiss and

¹The 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 2003 USGS mineral production data published in this chapter are preliminary estimates as of July 2004 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. Specialist contact information may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals/contacts/comdir.html>; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Values, percentage calculations, and rankings for 2002 may differ from the Minerals Yearbook, Area Reports: Domestic 2002, Volume II, owing to the revision of preliminary 2002 to final 2002 data. Data for 2003 are preliminary and are expected to change; related rankings also may change.

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

granodiorite that have been cut locally by Tertiary age intrusives, principally monzonite and quartz monzonite. A study by Calais Resources in 1998 indicated combined resources of 1.3 Mt of ore containing more than 13,000 kilograms (kg) of gold (10 grams per metric ton) and 364,000 kg of silver (280 grams per metric ton). Also, there are recoverable quantities of lead, zinc, and copper in the ore. Geologic modeling that incorporates new drill data and updated interpretations of historic geologic data, using sophisticated three-dimensional modeling software, is continuing.

In early 2003, Hinsdale County Commissioners approved a plan of mining operations for Midas Mining Co. (also known as Ophir-Nevada Mining Co.) to reopen the Ophir Lode, a historic gold, silver, and base-metal mine in the Henson Creek mining district near Lake City in the San Juan Mountains. The county stipulated that a maximum of six truckloads of ore per day could be transported out of the mine site via public roads. The trucks must be no larger than 10-wheel tandem dump trucks. When operational, the company expects this small-scale operation to produce about 6,400 metric tons (t) of ore per year, operating seasonally. The mined ore will not be processed at the mine site. The company received its mining permit from the Colorado Division of Minerals and Geology in 2003. As of March 2004, mining had not yet begun at the site.

Commodity Review

Industrial Minerals

Cement.—The Portland Plant near Florence is operated by Holcim (US), Inc. Cement is produced using the dry method in its processing plant, which has a capacity of 1.7 million metric tons per year. In 2003, the plant produced slightly more than 1.1 Mt of cement, employed about 180 people, and has not lost production time to accidents in 500 days. The majority of its product is used in the metropolitan Denver area and throughout Colorado; some cement is also distributed to western Kansas and Nebraska. Limestone from the Fort Hays Member of the Niobrara Formation of Upper Cretaceous age is mined by Holcim as the principal raw ingredient for its cement. The Codell Sandstone, also of Cretaceous age, is mined for use as a silica additive.

Portland and masonry cement are produced at the CEMEX mine and processing plant near Lyons in Boulder County. The plant uses the dry-processing method and employs about 100 people. Cement production in 2003 was 467,000 t, most of which was used in the greater metropolitan Denver area. Cement ingredients (limestone and shale) are mined locally from the Niobrara Formation and the overlying Pierre Shale.

Clay and Shale.—Common clay is mined in eastern Colorado, especially near the Front Range in Jefferson, Elbert, Douglas, El Paso, Pueblo, and Fremont Counties. In 2003, mines in Colorado produced a total of 214,000 t of common clay, the same as in 2002. The value of this clay was estimated at \$1.26 million. In eastern Colorado, clay is mined principally from three formations: the Laramie Formation (Upper Cretaceous), the Dakota Sandstone (Lower Cretaceous), and the Dawson Formation (Upper Cretaceous to Tertiary). Elsewhere in the State, clay deposits within the Lykins, Morrison, Benton, Niobrara, Mesaverde and Vermejo Formations (ranging in age from Triassic to Cretaceous) have also been exploited.

The Pierre Shale in northern Jefferson County is mined by Texas Industries, Inc. for use as lightweight aggregate. The mined shale is kiln-fired to the point where it expands in size and becomes low in density and weight. Lightweight aggregate is used in place of regular sand, gravel, or crushed stone in applications where excessive weight is undesirable, such as floors and walls in multistory buildings. Cinder blocks are commonly made with lightweight aggregate.

Crushed Stone and Sand and Gravel.—The largest segment of the nonfuel mineral industry in Colorado continued to be crushed stone and sand and gravel. Colorado produced nearly 49.9 Mt of aggregate in 2003 and ranked 10th in the Nation for sand and gravel production. The total value of Colorado aggregate produced was \$292 million. This was a decrease of 9% below the 2002 value of \$319 million. Sand and gravel represent 66% of Colorado's total aggregate production, and while sand and gravel production totaled nearly 37 Mt, it was down 17% from last year's production. Similarly, crushed stone production decreased 9%. Average unit values of \$5.51 and \$6.40 per metric ton were calculated for sand and gravel and crushed stone, respectively. The top uses for sand and gravel are concrete aggregate, road base and coverings, construction fill, and asphaltic concrete aggregate. Crushed stone is used primarily as an aggregate for road construction and highway maintenance.

Dimension Stone.—The Yule quarry is operated by Sierra Minerals Corp. In 2003, the Yule quarry produced 699 cubic meters (1,900 t) of world-renowned white marble. This represents a significant decrease of about 45% from that of 2002. The number of employees at the quarry decreased from 13 to 7. The bulk of the quarried stone is used for sculpting, national cemetery headstones, and monuments, although recently, slab and tile stone production has been on the rise. In 2002, Sierra was awarded a contract to cut a massive block of marble to replace the cracked Tomb of the Unknown Soldier in Washington, DC (original carved from Yule marble in 1931). Two blocks have already been cut, but both proved to be imperfect, so mining crews are searching the quarry for yet another suitable block, which they hope to have cut by the summer of 2004. Other structures using Yule marble include the Lincoln Memorial, the Colorado State Capitol and Annex buildings, and Denver International Airport. The majority of the Yule marble is marketed under the name Colorado Yule Marble. Very high-quality stone shipped to Italy is marketed under the name Sierra White.

A relatively small operation, the Colorado Red Rose quarry produced blocks of red granite for use as countertops, monuments, and building stone. Annual production from the quarry is about 900 t, most of which is sold in Colorado. The Red Rose quarry uses an innovative technique to cut the stone. Having tried unsuccessfully to use traditional methods, the quarry founder invented and

patented an automated water jet channeler, which uses a very small stream (the size of a pencil lead) of highly pressurized water to erode the stone crystal by crystal. The channeler may be used either horizontally or vertically and improves both the speed and quality of production and may be run unattended. A typical block (about 3 x 1.7 x 0.9 m) may be cut (channeled) on all four sides and removed from the deposit using plugs and feathers in less than 2 days. Colorado Rose Red celebrated 20 years of water jet channeling in 2002.

Sandstone continued to be quarried in several places in Colorado, especially along the base of the Front Range in Larimer and Boulder Counties. The Permian age Lyons Sandstone is quarried in flat slabs and used as building stone, walkway stone, and decorative wall facing. The Cretaceous age Dakota Sandstone is quarried for similar uses in several places around the State. Alabaster is quarried from the Permian age Lykins Formation at a small mine near Fort Collins by Colorado Alabaster Supply. In 2003, the company produced just under 180 t of stone. Its alabaster is used mainly for sculpting and is marketed both locally and nationwide. The White Banks mine in Pitkin County also produced alabaster, as well as dark-colored marble, and quartz. The Eocene age Castle Rock rhyolite is quarried by the Ames Construction Company near the town of Castle Rock.

Gypsum.—Centex Construction Products Inc.'s American Gypsum operation produced 535,000 t of gypsum in 2003 from its mine in the town of Gypsum. This represents about a 7% increase in production compared with that of 2002. The company is in the process of developing a new mining area northeast of the current site. During a span of a few years, mining will shift to the new area as reserves are depleted in the original site. The future mining area ensures that the wallboard plant in the town of Gypsum can operate for at least another 20 years. Approximately 56 million square meters of wallboard are manufactured at the plant per year. About 50% of the wallboard goes to the Colorado construction industry, and the remainder is marketed throughout the United States. The mine and plant employ approximately 120 people. The bedded gypsum deposit is within the Eagle Valley Formation evaporite sequence of Pennsylvanian age.

Colorado Lien (a subsidiary of Pete Lien & Sons, Inc. of South Dakota) produced gypsum from the Munroe quarry north of Fort Collins near Livermore. Gypsum is extracted from the Permian Lykins Formation using a portable crusher. Annual production averages about 45,000 t. The majority of the material quarried is sold within the State to the cement industry.

Soda Ash.—Colorado soda ash and sodium bicarbonate are derived from nahcolite, a naturally occurring sodium bicarbonate mineral that is present in large quantities in the sedimentary rocks of the Piceance basin in northwestern Colorado. The nahcolite is disseminated in oil shale of the Eocene age Green River Formation at depths of about 610 to 760 m below the surface. It is estimated that 29 billion metric tons of nahcolite are present within the Piceance Creek basin.

In 2003, American Soda shipped 500,000 t of soda ash and 85,000 t of sodium bicarbonate, slightly more production than that of 2002. Nahcolite is solution mined from 25 to 30 vertical wells that penetrate several nahcolite-rich oil shale beds of the Green River Formation. American Soda LLP (formerly a subsidiary of Williams Companies) was acquired by Solvay America, Inc. in September 2003. The company controls more than 1,800 hectares (ha) of mineral leases on U.S. Bureau of Land Management (BLM) land. The estimated in situ nahcolite resource is 3.2 billion metric tons, with more than 900 Mt of recoverable nahcolite.

In February 2003, White River Nahcolite was purchased for \$20.6 million by Natural Soda AALA, Inc. (a subsidiary of AmerAlia, Inc.). In 2003, the plant produced about 70,000 t of sodium bicarbonate. High-grade nahcolite (more than 80%) was recovered from the "Boise Bed" of the Green River Formation—a bed that was not present at the American Soda LLC plant. Dissolution of the nahcolite was through horizontal drill holes along the base of the Boise Bed. The mine's designed capacity was 113,000 metric tons per year. Both food-grade and industrial-grade products were produced. Natural Soda, Inc. also owns the Rock School Lease, an undeveloped nahcolite property nearby. The two properties, both leased from the BLM, together comprised more than 3,800 ha in the Piceance Creek basin. These leases contain in situ nahcolite resources estimated to exceed 3.6 billion metric tons.

Metals

Gold, Silver, and Base Metals.—The Cripple Creek & Victor Gold Mining Co. (CC&V) continues to operate the only large precious-metal mine in Colorado. The Cripple Creek & Victor Mine in Teller County produced about 8,830 kg of gold in 2003, up 27% from the nearly 6,970 kg produced in 2002. The increase is due to the October 2002 completion of a major expansion and capital improvement project. The project included a fleet of nine 280-t Euclid Hitachi EH 4500 haul trucks, an expanded heap-leach pad, construction of a new maintenance facility, a new crushing facility, and an expanded gold recovery plant. Gold prices increased substantially in 2003, averaging \$363 per ounce according to Kitco, Inc. (2004⁴). This is an 18% increase from the 2002 average gold price of \$310 per ounce. The CGS estimates that the raw value of the gold produced at the mine in 2003 was approximately \$103 million. Silver was produced as a byproduct at the mine as well. In 2003, about 4,420 kg of silver was produced. The raw value of silver produced is less than 1% of the gold. Production at the mine is expected to again increase in 2004 to an estimated 11,000 kg of gold as benefits and efficiencies of the earlier expansion are fully realized. The current reserve base is sufficient to support gold production until 2012. CC&V is a joint venture between AngloGold and Golden Cycle Gold Corp. The mine currently employs

⁴A reference that includes a section mark (§) is found in the Internet Reference Cited section.

approximately 300 people and is the largest private employer in Teller County.

The Pride of the West Mill northeast of Silverton in San Juan County has been rehabilitated to process base-and precious-metal ore derived from historic mine waste piles in the Animas River watershed. The project is managed by the Silver Wing Co., Inc. of Silverton, Colorado. In February 2003, the project received final approval from the State to begin processing material. In August 2003, the mill began processing ore. Concentrates have been produced but have not been shipped yet. Extreme cold weather and a lack of insulating snow cover in November 2003 resulted in the mill “freezing up,” and it was shut down for the rest of the winter. The Pride of the West Mill has strong support and assistance from the Animas River Stakeholders Group (its Web site is located on the Internet at URL <http://www.waterinfo.org/arsg/main.html>), a coalition of private, State, and Federal interests that are working to clean up mine waste that contributes to the pollution of the Animas River.

The Golden Wonder is a small, underground gold mine about 2 miles southeast of Lake City in Hinsdale County. High-grade gold ore was mined from epithermal quartz veins. The ore was trucked out of State in “super sacks” for milling and further processing. No quantitative information regarding production for this mine is publicly available.

Molybdenum.—The Henderson Mine in Clear Creek County continued to be North America's largest primary producer of molybdenum. The underground mine is owned by Climax Molybdenum Co. (a subsidiary of Phelps Dodge Corp.). The operation employed about 320 workers at the mine and mill. In 2003, the mine and mill produced 10,100 t of molybdenum metal contained in concentrates. That is about an 8% increase from the 9,300 t produced in 2002. In 2003, the estimated average price for molybdenum contained in technical-grade molybdic oxide was \$5.33 per pound, up 42% from an average of \$3.75 in 2002. Using the average price, the calculated value of molybdenum produced at the Henderson Mine in 2003 was estimated to be \$119 million.

Government Programs

Late in 2002, a Denver-area Girl Scout troop began a campaign to create a bill to make Colorado Yule Marble the official State Rock. The Governor signed this bill into law in March 2004. The addition of the white Yule Marble completes Colorado's patriotic theme of red (State Mineral, rhodochrosite), white, and blue (State Gemstone, aquamarine).

The CGS released a new digital publication entitled “Directory of Active and Permitted Mines in Colorado—2002.” This CD-ROM contains information on each mine and quarry in Colorado including commodity, location, mine operator contact information, production information (where available), and basic geology. A high-quality color shaded-relief map showing the mine locations, highways, cities and towns, railroads, and other features is included on the CD-ROM. The directory lists the operating mines in the State as well as mines that have valid, active permits from the Colorado Division of Minerals and Geology but operate only sporadically or were otherwise temporarily closed at the time of this investigation (Guilinger and Keller, 2004). Additionally, the CGS completed fieldwork for 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 the CGS can be found on the Internet at URL <http://geosurvey.state.co.us/>.

References Cited

Guilinger, J.R., and Keller, J.W., 2004, Directory of active and permitted mines in Colorado—2002: Colorado Geological Survey Information Series 68, CD-ROM. Mining Record, The, 2004, Calais active on three gold district properties: *The Mining Record*, v. 115, no. 1, January, p. 5.

Internet Reference Cited

Kitco, Inc., 2004, Gold 2003, accessed April 6, 2004, at URL http://www.kitco.com/scripts/hist_charts/yearly_graphs.cgi

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN COLORADO^{1,2}

(Thousand metric tons and thousand dollars unless otherwise specified)

| Mineral | 2001 | | 2002 | | 2003 ^P | |
|---|---------------------|----------------------|----------|---------|-------------------|---------|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Clays, common | 254 | 1,500 | 214 | 1,260 | 214 | 1,260 |
| Gemstones | NA | 269 | NA | 269 | NA | 274 |
| Gold ³ kilograms | 6,660 | 58,300 | W | W | W | W |
| Lime | 33 | 2,000 | 20 | 1,250 | 20 | 1,320 |
| Sand and gravel: | | | | | | |
| Construction | 37,300 | 194,000 | 40,700 | 222,000 | 37,000 | 204,000 |
| Industrial | W | W | 61 | W | 63 | W |
| Silver ³ kilograms | 2,830 | 399 | W | W | W | W |
| Stone: | | | | | | |
| Crushed | 13,800 ^r | 88,300 ^r | 15,000 | 96,000 | 13,600 | 88,400 |
| Dimension | 11 | 2,130 | 18 | 2,400 | 17 | 2,050 |
| Combined values of cement, clays [bentonite, fire (2000)], gypsum (crude), helium (Grade-A), molybdenum concentrates, soda ash (2001-02), stone [dimension marble and sandstone (2000)], and values indicated by symbol W | XX | 193,000 | XX | 311,000 | XX | 376,000 |
| Total | XX | 540,000 ^r | XX | 634,000 | XX | 673,000 |

^PPreliminary. ^rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

¹Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

²Data are rounded to no more than three significant digits; may not add to totals shown.

³Recoverable content of ores, etc.

TABLE 2
 COLORADO: CRUSHED STONE SOLD OR USED, BY KIND¹

| Kind | 2001 | | | | 2002 | | | |
|----------------------------|--------------------|---------------------------------|---------------------|-------------------|--------------------|---------------------------------|-------------------|------------|
| | Number of quarries | Quantity (thousand metric tons) | Value (thousands) | Unit value | Number of quarries | Quantity (thousand metric tons) | Value (thousands) | Unit value |
| Limestone | 10 | 4,820 | \$30,900 | \$6.40 | 11 | 4,620 | \$30,900 | \$6.68 |
| Dolomite | 1 | W | W | 4.63 | 1 | W | W | 4.63 |
| Granite | 8 | 4,310 | 29,200 | 6.78 | 7 | 3,970 | 26,800 | 6.76 |
| Traprock | 1 | W | W | 3.79 | 1 | W | W | 4.18 |
| Sandstone and quartzite | 8 | 1,780 | 10,900 | 6.12 | 9 | 2,770 | 16,100 | 5.82 |
| Volcanic cinder and scoria | 1 ^r | W | W | 3.58 ^r | 1 | W | W | 3.86 |
| Miscellaneous stone | 16 | 2,360 | 15,100 | 6.42 | 11 | 3,070 | 20,000 | 6.51 |
| Total or average | XX | 13,800 ^r | 88,300 ^r | 6.38 | XX | 15,000 | 96,000 | 6.42 |

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

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

TABLE 3
 COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS
 IN 2002, BY USE¹

| Use | Quantity (thousand metric tons) | Value (thousands) | Unit value |
|---|---------------------------------------|----------------------|---------------|
| Construction: | | | |
| Coarse aggregate (+1 1/2 inch): | | | |
| Riprap and jetty stone | 115 | \$1,100 | \$9.54 |
| Other coarse aggregates | 53 | 225 | 4.25 |
| Total or average | 168 | 1,320 | 7.87 |
| Coarse aggregate, graded: | | | |
| Concrete aggregate, coarse | 44 | 281 | 6.39 |
| Bituminous aggregate, coarse | 517 | 3,850 | 7.44 |
| Bituminous surface-treatment aggregate | W | W | 4.18 |
| Railroad ballast | W | W | 4.37 |
| Total or average | 604 | 4,310 | 7.14 |
| Fine aggregate (-3/8 inch): | | | |
| Stone sand, bituminous mix or seal | 496 | 2,080 | 4.19 |
| Screening, undesignated | (2) | (2) | 3.31 |
| Coarse and fine aggregates: | | | |
| Graded road base or subbase | 137 | 503 | 3.67 |
| Unpaved road surfacing | 46 | 282 | 6.13 |
| Terrazzo and exposed aggregate | W | W | 4.65 |
| Crusher run or fill or waste | W | W | 3.53 |
| Total or average | 458 | 1,760 | 3.83 |
| Other construction materials | 75 | 624 | 8.32 |
| Agricultural: | | | |
| Limestone | (3) | (3) | 27.56 |
| Poultry grit and mineral food | (3) | (3) | 24.52 |
| Other agricultural uses | 129 | 2,820 | 21.87 |
| Total or average | 129 | 2,820 | 21.87 |
| Chemical and metallurgical, cement manufacture | (2) | (2) | 4.52 |
| Special: | | | |
| Mine dusting or acid water treatment | (2) | (2) | 29.10 |
| Asphalt fillers or extenders | (2) | (2) | 21.42 |
| Other miscellaneous uses: | | | |
| Specified uses not listed | 20 | 95 | 4.75 |
| Glass manufacture | (2) | (2) | 19.40 |
| Unspecified:⁴ | | | |
| Reported | 10,900 | 69,100 | 6.36 |
| Estimated | 1,100 | 7,300 | 6.48 |
| Total or average | 12,000 | 76,400 | 6.37 |
| Grand total or average | 15,000 | 96,000 | 6.42 |

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

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

²Withheld to avoid disclosing company proprietary data; included in "Grand."

³Withheld to avoid disclosing company proprietary data; included with "Other."

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

TABLE 4
 COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2002, BY USE AND DISTRICT^{1,2}

(Thousand metric tons and thousand dollars)

| Use | District 1 | | District 2 | | District 4 | |
|---|------------|--------|------------|-------|-----------------------|--------|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Construction: | | | | | | |
| Coarse aggregate (+1 1/2 inch) ³ | W | W | W | W | W | W |
| Coarse aggregate, graded ⁴ | W | W | -- | -- | W | W |
| Fine aggregate (-3/8 inch) ⁵ | -- | -- | -- | -- | W | W |
| Coarse and fine aggregate ⁶ | W | W | W | W | W | W |
| Other construction materials | 32 | 280 | 34 | 313 | -- | -- |
| Agricultural ⁷ | -- | -- | W | W | -- | -- |
| Chemical and metallurgical ⁸ | -- | -- | W | W | W | W |
| Special ⁹ | -- | -- | W | W | -- | -- |
| Other miscellaneous use ¹⁰ | -- | -- | -- | -- | -- | -- |
| Unspecified:¹¹ | | | | | | |
| Reported | 266 | 1,410 | -- | -- | 9,630 | 62,600 |
| Estimated | 30 | 170 | 330 | 1,600 | 230 | 1,300 |
| Total | 397 | 2,450 | 689 | 7,210 | 11,600 | 73,500 |
| Use | District 5 | | District 6 | | Unspecified districts | |
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Construction: | | | | | | |
| Coarse aggregate (+1 1/2 inch) ³ | 71 | 499 | -- | -- | -- | -- |
| Coarse aggregate, graded ⁴ | 38 | 198 | -- | -- | -- | -- |
| Fine aggregate (-3/8 inch) ⁵ | W | W | -- | -- | -- | -- |
| Coarse and fine aggregate ⁶ | W | W | 6 | 33 | -- | -- |
| Other construction materials | 9 | 31 | -- | -- | -- | -- |
| Agricultural ⁷ | W | W | -- | -- | -- | -- |
| Chemical and metallurgical ⁸ | -- | -- | -- | -- | -- | -- |
| Special ⁹ | W | W | -- | -- | -- | -- |
| Other miscellaneous use ¹⁰ | W | W | -- | -- | -- | -- |
| Unspecified:¹¹ | | | | | | |
| Reported | 933 | 4,890 | (12) | (12) | 33 | 201 |
| Estimated | 530 | 4,200 | 7 | 36 | -- | -- |
| Total | 2,190 | 12,600 | 13 | 70 | 33 | 201 |

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

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

²No production for District 3.

³Includes riprap and jetty stone and other coarse aggregates.

⁴Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and railroad ballast.

⁵Includes stone sand bituminous mix or seal and screening (undesigned).

⁶Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregate, and unpaved road surfacing.

⁷Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

⁸Includes cement manufacture.

⁹Includes asphalt fillers or extenders and mine dusting or acid water treatment.

¹⁰Includes glass manufacture and other specified uses not listed.

¹¹Reported and estimated production without a breakdown by end use.

¹²Less than 1/2 unit.

TABLE 5
 COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2002,
 BY MAJOR USE CATEGORY¹

| Use | Quantity (thousand metric tons) | Value (thousands) | Unit value |
|---|---------------------------------------|----------------------|---------------|
| Concrete aggregate (including concrete sand) | 6,020 | \$37,100 | \$6.15 |
| Plaster and gunitite sands | 42 | 418 | 9.08 |
| Concrete products (blocks, bricks, pipe, decorative, etc.) | 238 | 1,610 | 6.78 |
| Asphaltic concrete aggregates and other bituminous mixtures | 2,580 | 20,800 | 8.08 |
| Road base and coverings | 5,470 | 25,900 | 4.73 |
| Road stabilization (cement and lime) | 56 | 301 | 5.38 |
| Fill | 1,700 | 7,820 | 4.61 |
| Snow and ice control | 67 | 506 | 7.55 |
| Other miscellaneous uses ² | 210 | 1,700 | 8.11 |
| Unspecified: ³ | | | |
| Reported | 16,800 | 87,600 | 5.23 |
| Estimated | 7,500 | 38,000 | 5.07 |
| Total or average | 40,700 | 222,000 | 5.45 |

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

²Includes railroad ballast.

³Reported and estimated production without a breakdown by end use.

TABLE 6

COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2002, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

| Use | District 1 | | District 2 | | District 3 | |
|---|------------|--------|------------|--------|------------|--------|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Concrete aggregate (including concrete sand) | 563 | 4,340 | 2,230 | 12,700 | 532 | 3,810 |
| Concrete products (blocks, bricks, pipe, decorative, etc.) ² | 30 | 406 | W | W | -- | -- |
| Asphaltic concrete aggregates and road base materials ³ | 1,750 | 8,540 | 1,660 | 9,110 | 747 | 4,510 |
| Fill | 363 | 1,620 | W | W | W | W |
| Other miscellaneous uses ⁴ | 20 | 197 | 283 | 1,040 | 32 | 172 |
| Unspecified: ⁵ | | | | | | |
| Reported | 5,810 | 30,400 | 4,180 | 21,100 | 351 | 2,830 |
| Estimated | 1,200 | 5,900 | 3,000 | 15,000 | 42 | 180 |
| Total | 9,740 | 51,500 | 11,300 | 58,700 | 1,710 | 11,500 |
| Use | District 4 | | District 5 | | District 6 | |
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Concrete aggregate (including concrete sand) | 1,110 | 7,220 | 1,510 | 8,430 | 78 | 558 |
| Concrete products (blocks, bricks, pipe, decorative, etc.) ² | W | W | 101 | 578 | W | W |
| Asphaltic concrete aggregates and road base materials ³ | 1,210 | 12,200 | 1,820 | 7,430 | 927 | 5,200 |
| Fill | 337 | 851 | 618 | 3,740 | 70 | 450 |
| Other miscellaneous uses ⁴ | 153 | 1,040 | 237 | 1,900 | 9 | 68 |
| Unspecified: ⁵ | | | | | | |
| Reported | 5,830 | 30,000 | 235 | 1,140 | 351 | 2,060 |
| Estimated | 1,600 | 8,100 | 1,200 | 5,900 | 610 | 3,000 |
| Total | 10,200 | 59,400 | 5,690 | 29,100 | 2,040 | 11,300 |

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

¹Data are rounded to no more than three significant digits; may not add to totals shown.²Includes plaster and gunite sands.³Includes road and other stabilization, cement, and lime.⁴Includes railroad ballast and snow and ice control.⁵Reported and estimated production without a breakdown by end use.