

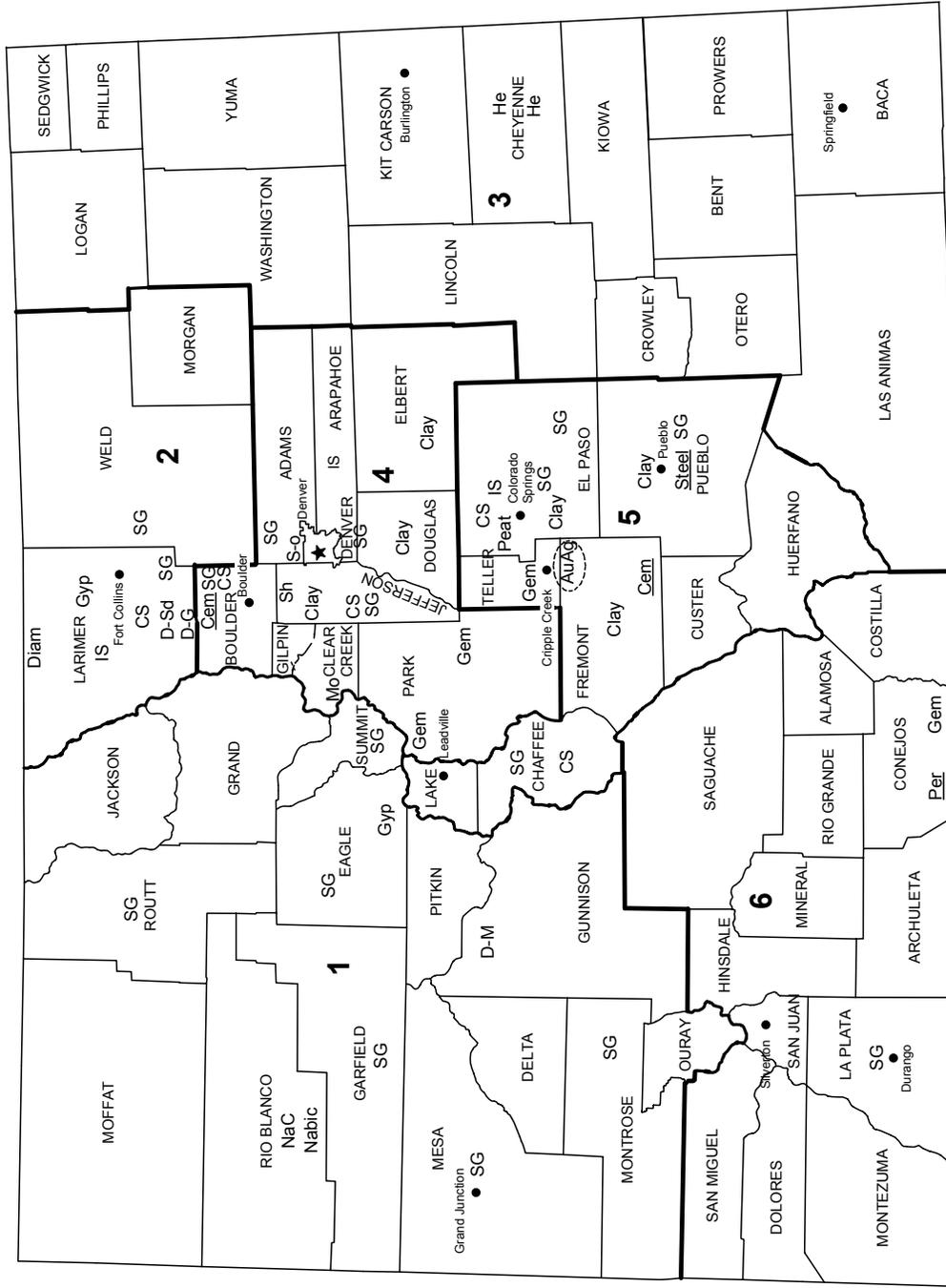
COLORADO

LEGEND

- County boundary
- ★ Capital
- City
- 1 — Crushed stone/sand and gravel districts

MINERAL SYMBOLS (Major producing areas)

- AuAg Gold-silver
- Cem Cement plant
- Clay Common clay
- CS Crushed stone
- D-G Dimension granite
- D-M Dimension marble
- D-Sd Dimension sandstone
- Diam Diamond
- Gem Gemstones
- Gyp Gypsum
- He Helium
- IS Industrial sand
- Mo Molybdenum
- Nabc Sodium bicarbonate
- NaC Sodium carbonate
- Peat Peat
- Per Perlite plant
- S-o Sulfur (oil)
- SG Construction sand and gravel
- Sh Shale
- Steel Steel plant
- (---) Concentration of mineral operations



Source: Colorado Geological Survey/U.S. Geological Survey (2002)

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 2002, the estimated value¹ of nonfuel mineral production for Colorado was \$614 million, based upon preliminary U.S. Geological Survey (USGS) data. This was nearly a 14% increase from that of 2001² and followed about an 8% decrease from 2000 to 2001. The State increased to 23d (from 26th in 2000) 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.

Nearly 80% of Colorado's nonfuel mineral production value in 2002 was from the production of industrial minerals, especially construction sand and gravel, portland cement, and crushed stone (in descending order of value), the State's three leading nonfuel mineral commodities. Metals mined in the State included molybdenum, gold, and silver. In 2002, increases occurred in the production and values of molybdenum, construction sand and gravel, crushed stone, gold, and soda ash (in descending order of change). Molybdenum led the way with the largest rise in value owing partly to a small overall increase in ore grade and a more than 50% increase in the commodity's average price in 2002 over that of 2001. The construction aggregates had a combined total increase of about \$37 million (table 1). Gold and soda ash had a combined total increase of about \$20 million.

In 2001, crushed stone increased in both production and value, up \$6.6 million. Otherwise, decreases of more than \$30 million in portland cement and \$22 million in construction sand and gravel, a drop in the value of gold, and decreases of about \$3 million each in Grade-A helium and molybdenum accounted for the State's decrease in total value for the year. Relative to these, all other nonfuel minerals showed significantly smaller changes in value 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 2002, Colorado remained second in rank in molybdenum concentrates and third in soda ash. The State rose to fifth from seventh of the 10 gold-producing States, and it rose to eighth from ninth in construction sand and gravel. Additionally, the State produced significant quantities of portland cement, crushed stone, gypsum, and gemstones (based on value).

The following narrative information was provided by the Colorado Geological Survey;³ much of the data are based on its own surveys and estimates.

Exploration and Development Activities

Calais Resources announced that an extensive exploration and resource drilling program is slated to begin in June 2003 at the Caribou Consolidated District project in Boulder County. The current proven plus probable resource is 14 metric tons (t) of gold and 620 t of silver. Calais Resources hopes to expand the total resource to more than 31 t of gold and 930 t to 1,200 t of silver. Several previously unexplored geologic targets will be drilled as well.

Mineral Systems, Inc. of Golden conducted exploration for precious metals and molybdenum on Webster Pass near Montezuma in Park and Summit Counties during the summers of 2001 and 2002. The work has consisted of surface geologic mapping, geochemical sampling, and the completion of four exploration drill-core holes. Additional drilling is planned for 2003.

In 2002, the Grace Mine, a historic gold mining property near Empire in Clear Creek County was under consideration for development into a working mine. According to an article in the October 31, 2002, Denver Post, a partnership that includes Transcontinental Minerals Inc., Consolidated Empire Mines Ltd., and MR3 Systems Inc. proposed to conduct surface mining initially with possible underground mining in the future. The ore would be partially processed at a mill onsite and further processed at a proposed facility in Denver. The mine as proposed would employ 25 to 35 workers. The Grace Mine produced about 6 t of gold from the 1860s to the 1930s.

In December 2002, Gold-Ore Resources Ltd. completed the purchase of La Plata Minerals Ltd., which wholly owned a copper and precious-metals porphyry deposit in the La Plata Mountains northwest of Durango. The La Plata property includes the Allard zone

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2002 USGS mineral production data published in this chapter are preliminary estimates as of July 2003 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 2001 may differ from the Minerals Yearbook, Area Reports: Domestic 2001, Volume II, owing to the revision of preliminary 2001 to final 2001 data. Data for 2002 are preliminary and are expected to change; related rankings may also change.

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

and the Copper Hill zone, areas with significant historical mine workings. Gold-Ore completed surface geochemical sampling in the area. In 2003, the company plans to compile existing geologic and assay data from previous operators to evaluate the precious-metal potential of the project area.

Newmont Mining Corp. of Denver became the largest gold-mining company in the world when it completed its buyout of Normandy Mining, Ltd. of Australia and Franco-Nevada Mining Corp Ltd. of Canada in early 2002. At yearend of 2002, Newmont reported equity gold reserves of 2,700 t worldwide. Although Newmont does not have any operating mines in Colorado, the company is a major employer of mineral exploration and mining industry professionals in the Denver area. In addition to its corporate headquarters, Newmont operates the gold industry's largest research and development laboratory at a facility in the Denver area.

Commodity Review

Industrial Minerals

Aggregate.—The largest segment of the nonfuel mineral industry in Colorado is sand and gravel and crushed stone. Other important industrial minerals and construction materials currently (2002) produced in Colorado include cement, clay, decorative stone, dimension stone, gypsum, silica sand, soda ash, and sodium bicarbonate.

The top uses for aggregate are road base and coverings, concrete and asphalt, and fill material. Colorado produced nearly 56.7 million metric (Mt) of aggregate in 2002 and ranked eighth in the Nation for sand and gravel production, according to estimates made by the USGS. In 2002, 61% of Colorado's aggregate production was sand and gravel, while 39% was crushed stone. Sand and gravel production was up about 9% from 37.3 Mt in 2001 to 40.7 Mt in 2002. Similarly, crushed stone production has increased 15.2% over last year's total. The total value of Colorado aggregate production in 2002 was \$319 million. This is an increase of 13% more than the 2001 value of \$282 million. The average unit value of Colorado sand and gravel was \$5.28 per metric ton. Colorado crushed stone had an average value of \$6.50 per metric ton. Lafarge Corp. is Colorado's leading producer of sand and gravel and crushed stone. In 2002, 10,200 t of dimension stone with an estimated value of just more than \$2 million was quarried in Colorado. The Yule Quarry in Gunnison County will continue to produce fine-quality marble in 2003 but at a somewhat diminished rate. In 2002, the Yule Quarry produced 1,300 cubic meters (3,470 t) of marble, which was a decrease of about 22% compared with the 4,479 t quarried in 2001. In 2003, the quarry will produce a large block that will be used to replace the Tomb of the Unknown Soldiers in Washington D.C. The fresh block of marble for the Tomb is scheduled to be hauled out of the quarry and down the mountain on July 4th with a celebration and ceremony to mark the occasion. The marble from the quarry is also used by monument fabricators and sculptors. The owner of the quarry is Sierra Minerals Corp. of Centennial, Colorado. The quarry employed 13 people. The stone is marketed under the name Colorado Yule Marble.

Sandstone continues 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 Dakota Sandstone also is quarried in several places around the State.

Alabaster has been quarried since 1969 at a site in the foothills near Fort Collins by Colorado Alabaster Supply. Alabaster is used mainly as artistic media by sculptors. The White Banks Mine in Pitkin County produces alabaster, dark-colored marble, and quartz.

Ohio-based Oglebay Norton Co. mines and markets "Colorado Silica Sand," specialty industrial sand that is used for hydraulic fracturing of oil and gas wells, filter media for water purification plants, gravel packs around water wells, and other applications where roundness, permeability, and strength are important parameters. The sand is also used for landscaping purposes. The company quarries the sand near Colorado Springs from Quaternary age eolian deposits that are composed of mostly well-sorted and well-rounded grains of quartz. In 2002, about 64,000 t of industrial sand and gravel was produced in the State. No estimate of the total monetary value of this production has been made public.

Decorative stone has become a more important part of the Colorado minerals industry in recent years. Decorative stone is rock that is used primarily for landscaping purposes. Both crushed rock and whole boulders are used. Gneiss, granite, marble, obsidian, quartz pegmatite, sandstone, and volcanic rock are some of the rock types currently being mined in the State for decorative use. Natural boulders that have a covering of lichen on them are commonly known as "moss rock" in the landscaping industry. Usually, the larger the percentage of the rock covered with the colorful lichen, the more valuable it is. Colorado has numerous decorative stone mines and quarries, and they are typically small operations. No specific production figures are presently available for statewide decorative stone production.

Cement.—Holcim (US) Inc. operated one portland cement manufacturing plant in the State, the Portland Plant near Florence. In August 2002, Holcim shut down another cement plant, the La Porte Plant near Fort Collins. The Portland Plant completed a \$225 million expansion in 2001 that nearly doubled its capacity from 0.9 million to 1.7 million metric tons per year. The plant converted from the wet process to the dry process. It employed about 180 people. Limestone from the Fort Hays Member of the Niobrara Formation is mined as the principal raw ingredient for the cement. Colorado's other operational cement plant is that of CEMEX, Inc. at Lyons in Boulder County.

GCC Rio Grande, Inc., (formerly Rio Grande Portland Cement Co.) (a subsidiary of the Mexican company Grupo Cementos de Chihuahua) has been planning and permitting a new cement plant at Pueblo for the past several years. The company plans to spend

approximately \$200 million to build the mine and processing plant and produce about 2.3 Mt of cement per year with around 100 employees. The company has signed a lease with the Colorado State Land Board to mine limestone from a local deposit for cement manufacture. The Fort Hays Member of the Niobrara Formation will be mined as the main cement ingredient. Gypsum, another ingredient of cement, will be mined locally as well. Construction of the plant is scheduled to begin in mid-2003.

Clay and Shale.—Common clay is used mainly for brickmaking, and shale is mined to produce lightweight aggregate. Clay is mined primarily in eastern Colorado especially near the Front Range in Jefferson, Elbert, Douglas, El Paso, Pueblo, and Fremont Counties. In 2002, mines in Colorado produced a total of 295,000 t of common clay valued at about \$1.66 million. Clay is mined principally from three formations in eastern Colorado: the Laramie Formation (Upper Cretaceous), the Dakota Sandstone (Lower Cretaceous), and the Dawson Arkose (Tertiary).

Shale is mined from the Pierre Shale of Cretaceous age in northern Jefferson County by TXI for use as lightweight aggregate. The 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.

Gemstones.—According to preliminary estimates made by the USGS, the total value of reported gemstone production in Colorado in 2002 was \$267,000. This is a slight decrease compared with 2001 when \$269,000 worth of gemstones was produced.

The Kelsey Lake Mine, in Larimer County near the Wyoming border, produced diamonds through the month of April 2002. As of early 2003, the mine was in care-and-maintenance mode. The company is currently seeking additional financing to start up once again. In 1996, a 28.3-carat light-yellow diamond was recovered at the mine—the fifth largest diamond ever found in the United States. A slightly smaller 28.2-carat stone was also discovered. This stone was cut into a 16.86-carat polished diamond—the largest finished diamond ever produced by a North American mine. The Kelsey Lake Mine is an open pit operation, with a reserve estimated at 16.9 Mt grading 3.7 to 5.1 carats per 100 t of kimberlite ore.

The Kelsey Lake diamond resource consists of two kimberlite pipes in the State Line district, the Kelsey Lake-1 and Kelsey Lake-2. The two kimberlite bodies, each about 4.3 ha in size, are about 0.8 kilometer (km) apart. The ore continues to a depth of at least 107 meters (m) according to drill data released previously by the company in press reports. A geologist who has been involved with finding the diamonds in the area since 1975 and who is now vice president of operations for Great Western believes that diamonds weighing up to 100 carats will likely be discovered as mining proceeds. The prediction is based on a geostatistical analysis of the deposit. The mine and recovery plant employed about 25 people when in production.

In March 2002, Consolidated Pacific Bay Minerals Ltd. of Vancouver, British Columbia, Canada, announced it had completed a “potential diamond production study” on the George Creek property in the State Line district in northern Larimer County. No details of the study were announced, although a company press release suggests that there is potential for a viable diamond mining operation at the site. The average grade of the 1.5-m-wide, 1.6-km-long kimberlite dike at the Greens Creek property is quoted in the same press release as being 83 carats per 100 t.

Amazonite and smoky quartz are specimen minerals found in pegmatites within the Pikes Peak Batholith near Florissant and Lake George west of Colorado Springs. Amazonite is a bright-blue-green to bright-green variety of microcline feldspar. The crystals found in the Pikes Peak region rank as some of the best in the world. Independent prospectors and miners work small mines in the pegmatites to find pockets containing the beautiful crystals, which are later sold at gem and mineral shows, in rock shops, and on the Internet.

Aquamarine is Colorado’s official State Gemstone. It is a form of beryl, a silicate mineral. Gem-quality light-blue crystals are found in Colorado around the 3,900-m elevation of 4,300-m Mount Antero in the Sawatch Range in Chaffee County. The aquamarine crystals are found in large miarolitic cavities within pegmatites in Tertiary age granite stocks. This locality is considered one of the finest in North America for collecting this prized mineral, and specimens are displayed in many museums. Many mineral collectors visit the site every summer.

In 2002, the Bad Boys of Cripple Creek Mining Company, Inc. operated a small turquoise mine near Cripple Creek. The company also produced and sold jewelry made from this turquoise. Other turquoise mines in the State include the King Mine in Conejos County, the Turquoise Chief Mine in Lake County, and Hall Mine near Villa Grove in Saguache County; these mines are not currently active.

Gypsum.—Centex Construction Products Inc.’s American Gypsum operation produced 500,000 t of gypsum in 2002 from its mine in Eagle County. That figure is a slight increase from the 2001 production of 493,000 t. In 2002, the company received a special-use permit from Eagle County for the relocation of its mining operations as reserves at the current mine site are depleted. During a span of a few years, mining will shift to the new site. The future mining area ensures that the wallboard plant in the town of Gypsum can operate for at least another 20 years. The new mine site will be northeast of the current operations. Approximately 56 million square meters of wallboard are manufactured annually at the plant. About 50% of the wallboard goes to the Colorado construction industry, and the remainder is marketed throughout the US. The mine and plant employed approximately 120 people. The bedded gypsum deposit is within the Eagle Valley Formation evaporite sequence of Pennsylvanian age.

Helium.—Grade-A helium is produced at the Ladder Creek gas-processing plant near Cheyenne Wells in southeastern Colorado. The helium is produced by separating it from the other natural gases. It is liquefied at -458° F. Helium is used for several purposes

including cryogenic applications (24%), pressurizing and purging (20%), welding cover gas (18%), and controlled atmospheres (16%). The total U.S. private production of Grade-A helium in 2002 was estimated by the USGS to be 85 million cubic meters with an estimated value of \$250 million. The Colorado portion of this production has not been publicized. Only five other States, Kansas, Texas, Oklahoma, Utah, and Wyoming, produce helium.

Soda Ash.—Soda ash (Na_2CO_3) is used primarily in the manufacture of glass, soap and detergents, other chemicals, and to remove sulfur dioxide from powerplant emissions. Sodium bicarbonate (NaHCO_3), also known as baking soda, is used in food products, animal feed, cleaning products, and pharmaceuticals. Nahcolite is a naturally occurring sodium bicarbonate mineral that is present in large quantities in the sedimentary rocks of the Piceance Creek Basin in northwestern Colorado. It is estimated that 29 billion metric tons (Gt) of nahcolite are present within the basin.

In late 2000, American Soda, LLP began production of soda ash and sodium bicarbonate in Rio Blanco County. The company built a state-of-the-art solution mine with 26 production wells, a 71-km dual pipeline, a processing plant near Parachute in Garfield County, and a rail spur to produce and ship its sodium products. The mine and plant have a nameplate production capacity of 730,000 metric tons per year (t/yr) of soda ash and 140,000 t/yr of sodium bicarbonate. In 2002, the second full production year, the company shipped 500,000 t of soda ash and 64,000 t of sodium bicarbonate. The soda ash production is a 76% increase from the 284,000 t produced in 2001. In 2003, the company plans to increase production to near full capacity. Ten to twelve new production wells are planned for completion in 2003. The average life of each well is about 3 years.

The solution mine in Rio Blanco County within the Piceance Creek Basin consists of production wells that use hot water to dissolve nahcolite from several stratigraphic horizons in the Eocene age Green River Formation, which lies about 600 m below the surface. The company controls more than 2,800 hectares (ha) of mineral leases on BLM land and estimated that the nahcolite in situ resource is 3.2 Gt, with more than 900 Mt of recoverable nahcolite.

White River Nahcolite Minerals, LLC (a subsidiary of IMC Chemicals) has been producing sodium bicarbonate by solution mining for several years at a site close to American Soda's mine. In February 2003, White River Nahcolite was purchased for \$20.6 million by Natural Soda AALA, Inc. (a subsidiary of AmerAlia, Inc.). Natural Soda AALA intends to refurbish and expand the mine and plant as soon as possible to ensure a production rate of more than 90,000 t/yr. The mine's designed capacity is 114,000 t/yr, and the plant produced both food-grade and industrial-grade products. Natural Soda, Inc. also owned the Rock School Lease, an undeveloped nahcolite property nearby. The two properties, both leased from the U.S. Department of the Interior's Bureau of Land Management, comprised more than 3,800 ha in the Piceance Creek Basin. These leases contain in situ nahcolite resources estimated to exceed 3.6 Gt.

Metals

Gold.—Gold prices increased substantially in 2002, averaging about \$310 per troy ounce. This was a 14% increase from the 2001 average of \$273 per troy ounce. The Cripple Creek and Victor Gold Mining Co. (CC&V) (a joint venture between AngloGold Ltd. and Golden Cycle Gold Corp.) continued to operate the only major precious-metals mine in Colorado. CC&V in Teller County produced 6,970 kilograms (kg) of gold in 2002, up 4.6% from the 6,660 kg produced in 2001 because of the October completion of the \$168.5 million expansion and capital improvement project. The project included a new fleet of 280-t haul trucks, an expanded heap leach-pad, construction of a new maintenance facility, a new crushing facility, and an expanded gold recovery plant. The value of the gold produced at the mine in 2002 was estimated to be \$69 million. The companies planned to increase gold production at the mine in 2003 to an estimated 10,600 kg. When the full benefits and efficiencies of the expansion are realized, the mine is expected to produce 12,400 kg of gold per year. The current reserve base is sufficient to support gold production until 2012. In 2002, the mine employed approximately 300 people and was the largest private employer in Teller County.

Gold was originally discovered in the Cripple Creek district in 1891. Since then, the district has produced about 715 t of gold, easily making it the largest gold-producing area in Colorado history. Early mining was from "bonanza" high-grade vein deposits. Present mining is done by open pit methods on low-grade, disseminated gold ore. Both the high-grade veins and the low-grade ore in the district are hosted by a mid-Tertiary alkalic volcanic and diatreme complex.

The Pride of the West Mill northeast of Silverton in San Juan County has been rehabilitated to process ore from mine waste piles in the Animas River watershed. The project was managed by the Silver Wing Co., Inc. Silver Wing also owns a 90% interest in the Gold King Mine, which may eventually provide fresh ore to the mill. In February 2003, the project received final approval from the State to begin processing the ore. The mill is expected to start production in the spring of 2003. The mill, which has a capacity of 270 metric tons per day, uses differential flotation to produce lead, zinc, and copper concentrates. A gravity circuit is also present. The concentrates will be shipped to smelters out of State. A small carbon-in-pulp cyanide leach system will scavenge gold from ore in enclosed agitation tanks at the end of the milling process. The cyanide in solution is then destroyed by hydrogen peroxide. The company is currently in the process of constructing a liner for the tailings pond. In 2002, a 13,600-t stockpile of ore from mine tailings awaited processing at the site, delivered by the Animas River Stakeholders Group (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 Pride of the West milling project has strong support and assistance from the Animas River Stakeholders Group. Some of the

group's funding is derived from U.S. Environmental Protection Agency grants. The project has received financial assistance (loans) from Region 9 Economic Development District and San Juan 2000 Economic Development Association, a local San Juan County group. Local business and economic development groups appreciate the project because it will diversify the area's economy, employing as many as 50 people when it achieves full production.

Gold King Mines Corp. (a subsidiary of Silver Wing Co., Inc.) has acquired the American Tunnel Water Treatment Plant at Gladstone. The water-treatment plant is necessary to process mine water when the Gold King Mine begins operation. Rehabilitation of the underground workings at the Gold King Mine is expected to commence in 2003.

Molybdenum.—The Henderson Mine in Clear Creek County continues 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.). In 2002, the mine and mill produced 9,300 t of molybdenum metal contained in concentrates, up 9% from the 8,530 t produced in 2001 because of a slight increase in ore grade through the mill. According to the USGS, the 2002 average price for molybdenum contained in technical-grade molybdic oxide was \$3.75 per pound, up significantly from an average of \$2.36 in 2001. The price spiked to as high as \$9 per pound in early June 2002 because of fears of a supply shortage. The value of molybdenum produced at Henderson in 2002 is estimated to be \$77 million. The operation continued to employ about 320 workers at the mine and mill.

The Henderson ore body is elliptical in shape and lies about 1,100 m beneath the summit of Red Mountain. It occurs within a Tertiary age rhyolite porphyry intrusive complex that was localized by the Berthoud and Vasquez Faults. The ore body is estimated to contain 730 Mt of ore averaging 0.2% to 0.3% molybdenite. Molybdenite (molybdenum sulfide) occurs in stockwork veins and is relatively evenly distributed throughout the ore body. Ore is mined using the block caving method.

Government Programs

In April 2002, Governor Owens signed a bill making rhodochrosite (manganese carbonate, $MnCO_3$) the official State Mineral of Colorado. The Sweet Home Mine near the town of Alma in Park County continued to produce the most prized specimen-quality rhodochrosite crystals in the world. Since 1991, the former silver mine has produced the beautiful cherry-red crystals from open cavities in hydrothermal quartz-calcite-sulfide veins. Some of the larger crystals have commanded prices of more than \$100,000, and one, the "Alma King," is rumored to have fetched nearly \$1 million.

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2000		2001		2002 ^p	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	296	2,000	254	1,500	295	1,660
Gemstones	NA	277	NA	269	NA	267
Gold ³ kilograms	W	W	6,660	58,300	W	W
Lime	37	2,170	33	2,000	32	2,050
Sand and gravel:						
Construction	43,900	216,000	37,300	194,000	40,700	215,000
Industrial	65	W	W	W	W	W
Silver ³ metric tons	W	W	3	399	W	W
Stone:						
Crushed	13,000	81,900	13,900	88,500	16,000	104,000
Dimension metric tons	W	W	10,800	2,130	10,200	2,040
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	285,000	XX	193,000	XX	289,000
Total	XX	588,000	XX	540,000	XX	614,000

^pPreliminary. 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	2000				2001			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	10	3,050	\$17,600	\$5.76	10	4,820	\$30,900	\$6.40
Dolomite	1	W	W	4.53	1	W	W	4.63
Granite	9	4,450	33,100	7.43	8	4,310	29,200	6.78
Traprock	1	W	W	3.69	1	W	W	3.79
Sandstone and quartzite	10	2,910	16,300	5.60	8	1,780	10,900	6.12
Volcanic cinder and scoria	2	W	W	9.05	2	W	W	5.39
Miscellaneous stone	17	2,080	12,800	6.16	16	2,360	15,100	6.42
Total or average	XX	13,000	81,900	6.31	XX	13,900	88,500	6.38

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 2001, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	\$3.53
Riprap and jetty stone	389	\$3,830	9.86
Other coarse aggregates	433	1,540	3.55
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	9.92
Bituminous aggregate, coarse	980	8,080	8.24
Bituminous surface-treatment aggregate	W	W	4.08
Railroad ballast	W	W	5.29
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	4.96
Stone sand, bituminous mix or seal	319	1,150	3.62
Screening, undesignated	W	W	4.94
Coarse and fine aggregates:			
Graded road base or subbase	1,060	5,180	4.91
Unpaved road surfacing	W	W	3.56
Terrazzo and exposed aggregate	W	W	9.13
Crusher run or fill or waste	37	357	9.65
Other construction materials	22	97	4.41
Agricultural:			
Limestone	W	W	26.43
Poultry grit and mineral food	W	W	23.69
Other agricultural uses	W	W	9.62
Chemical and metallurgical, cement manufacture	W	W	4.04
Special:			
Mine dusting or acid water treatment	W	W	28.36
Asphalt fillers or extenders	W	W	21.35
Other miscellaneous uses:			
Specified uses not listed	W	W	4.63
Glass manufacture	W	W	19.29
Unspecified:²			
Reported	6,620	40,100	6.06
Estimated	750	3,700	4.98
Total or average	13,900	88,500	6.38

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.

²Reported and estimated production without a breakdown by end use.

TABLE 4
 COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2001, 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	(5)	(5)	--	--	W	W
Fine aggregate (-3/8 inch) ⁶	--	--	--	--	W	W
Coarse and fine aggregate ⁷	W	W	W	W	W	W
Other construction materials	11	40	2	27	--	--
Agricultural ⁸	--	--	W	W	--	--
Chemical and metallurgical ⁹	--	--	W	W	W	W
Special ¹⁰	--	--	W	W	--	--
Other miscellaneous use ¹¹	--	--	--	--	--	--
Unspecified: ¹²						
Reported	153	812	--	--	5,300	33,100
Estimated	30	190	540	2,600	100	540
Total	295	1,850	1,040	8,720	10,100	64,100
	District 5		District 6		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) ³	578	2,960	13	67	--	--
Coarse aggregate, graded ⁴	W	W	--	--	--	--
Fine aggregate (-3/8 inch) ⁶	49	175	--	--	--	--
Coarse and fine aggregate ⁷	W	W	4	24	--	--
Other construction materials	9	30	--	--	--	--
Agricultural ⁸	W	W	--	--	--	--
Chemical and metallurgical ⁹	--	--	--	--	--	--
Special ¹⁰	W	W	--	--	--	--
Other miscellaneous use ¹¹	W	W	--	--	--	--
Unspecified: ¹²						
Reported	1,040	5,420	(5)	(5)	128	776
Estimated	30	120	50	280	--	--
Total	2,190	12,600	68	366	128	776

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 macadam, riprap and jetty stone, and other coarse aggregates.

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

⁵Less than 1/2 unit.

⁶Includes stone sand bituminous mix or seal, stone sand (concrete), and screening (undesigned).

⁷Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregate, and unpaved road surfacing.

⁸Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

⁹Includes cement manufacture.

¹⁰Includes asphalt fillers or extenders and mine dusting or acid water treatment.

¹¹Includes glass manufacture and other specified uses not listed.

¹²Reported and estimated production without a breakdown by end use.

TABLE 5
 COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001,
 BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates (including concrete sand)	6,690	\$39,100	\$5.84
Plaster and gunite sands	43	406	9.44
Concrete products (blocks, bricks, pipe, decorative, etc.)	375	3,510	9.36
Asphaltic concrete aggregates and other bituminous mixtures	2,730	16,100	5.90
Road base and coverings	5,520	28,100	5.09
Road stabilization (cement and lime)	228	1,350	5.92
Fill	2,640	11,900	4.51
Snow and ice control	72	484	6.72
Other miscellaneous uses ²	214	1,400	6.54
Unspecified: ³			
Reported	10,600	51,800	4.89
Estimated	8,200	40,000	4.84
Total or average	37,300	194,000	5.20

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

²Includes filtration and railroad ballast.

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

TABLE 6
 COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	386	2,980	1,970	11,600	W	W
Asphaltic concrete aggregates and other bituminous mixtures	--	--	W	W	W	W
Road base and coverings ³	1,380	7,500	1,540	9,020	265	833
Fill	164	636	457	1,700	146	452
Other miscellaneous uses ⁴	33	305	641	3,180	991	7,230
Unspecified: ⁵						
Reported	4,490	22,900	2,010	9,250	269	1,400
Estimated	2,400	11,000	2,300	11,000	300	2,500
Total	8,840	45,400	8,930	45,700	1,970	12,400
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	2,730	17,100	1,720	9,410	W	W
Asphaltic concrete aggregates and other bituminous mixtures	625	3,460	373	1,760	W	W
Road base and coverings ³	356	1,250	817	3,350	1,400	7,510
Fill	1,110	6,370	736	3,350	30	106
Other miscellaneous uses ⁴	142	1,100	98	334	421	2,510
Unspecified: ⁵						
Reported	2,080	10,400	1,470	6,600	330	1,250
Estimated	1,400	6,900	570	2,600	1,200	5,500
Total	8,460	46,600	5,770	26,700	3,370	16,900

W Withheld to avoid disclosing company proprietary data; included with "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 filtration, railroad ballast, and snow and ice control.

⁵Reported and estimated production without a breakdown by end use.