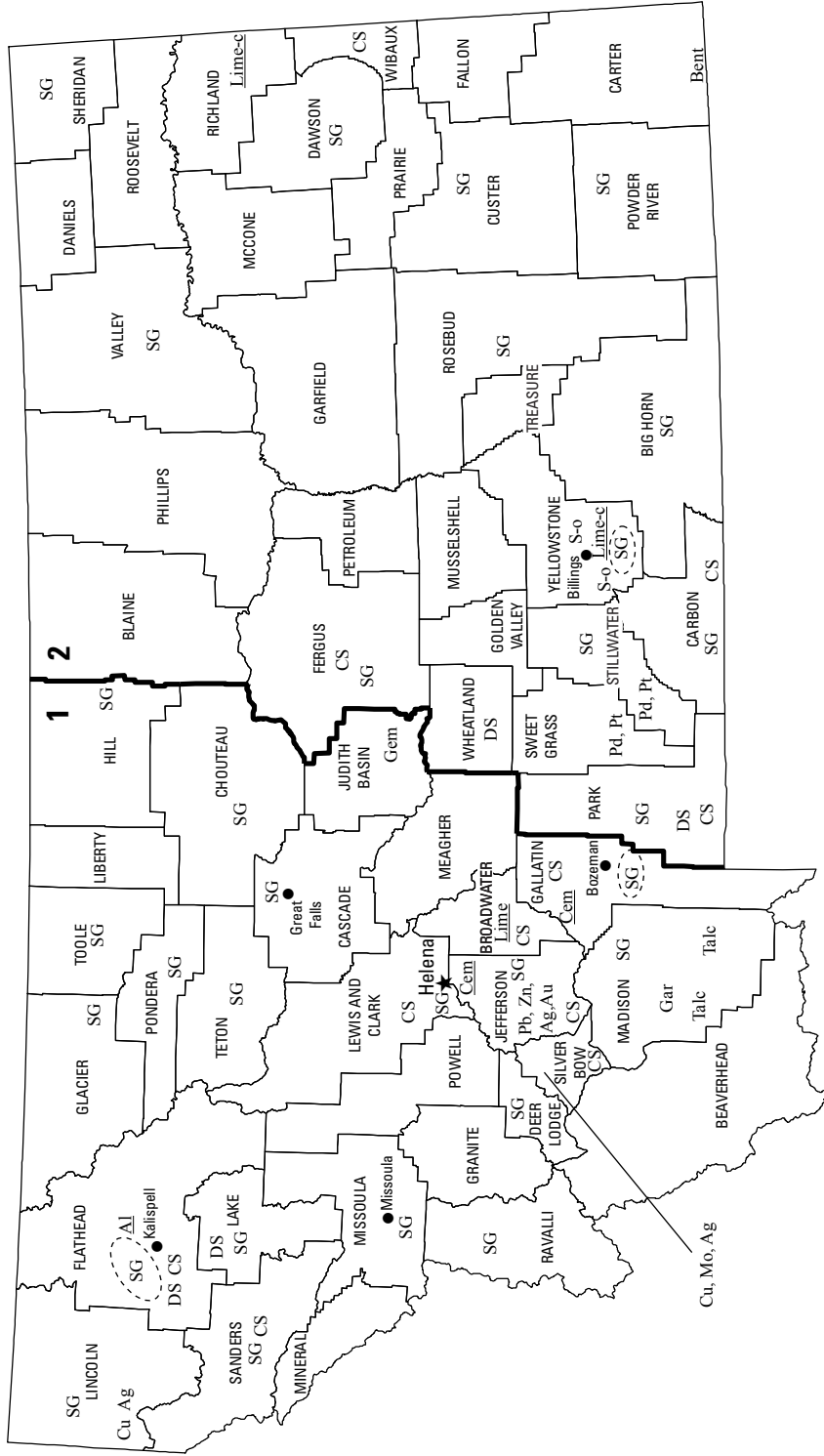




2009 Minerals Yearbook

MONTANA

MONTANA

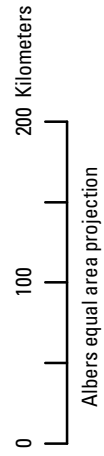


LEGEND

- County boundary
- ★ Capital
- City
- Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

- Ag Silver
- Al Aluminum plant
- Au Gold
- Bent Bentonite
- Cem Cement plant and quarry
- CS Crushed stone
- Cu Copper
- DS Dimension stone
- Gar Garnet
- Gem Gemstones
- Lime-c Lime plant - captive
- Lime Lime plant
- Mo Molybdenum
- Pb Lead
- Pd Palladium
- Pt Platinum
- S-o Sulfur (oil)
- SG Construction sand and gravel
- Talc Talc
- Zn Zinc
- Concentration of mineral operations



Source: Montana Bureau of Mines and Geology/U.S. Geological Survey (2009).

THE MINERAL INDUSTRY OF MONTANA

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

In 2009, Montana's nonfuel raw mineral production¹ was valued at \$982 million, based upon annual U.S. Geological Survey (USGS) data. This was a decrease of \$388 million, or 28%, from the production value of \$1.37 billion in 2008, which had no overall change from that of 2007. The State declined to 18th in 2009 from 17th in 2007–08 in rank among the 50 States in nonfuel raw mineral production value and accounted for almost 1.7% of the U.S. total production value, down from 1.9% in 2007–08. The State remained fifth in the Nation in the per capita value of its nonfuel mineral production. With a population of about 975,000 inhabitants, the per capita production value was \$1,010.

Metals accounted for 80% of Montana's total nonfuel mineral production value in 2009, down by about 3% from 2008. Molybdenum concentrates, copper, platinum, and palladium, in descending order of value, were the State's leading metallic nonfuel minerals. These metals, plus construction sand and gravel, gold, portland cement, silver, and lime (listed in descending order of value), accounted for 94% of the State's total nonfuel mineral production value.

Metals commodities decreased overall by 30% in 2009 in total production value following an increase of almost 4% in 2008. Industrial mineral commodities also decreased in total production value, falling by 17% in 2009. This decrease was preceded by a 15% decrease in 2008.

Lime, crushed stone, and bentonite clay were the only mineral commodities in the State to increase in production value. Together these mineral commodities increased by \$18.9 million. The decline in Montana's total nonfuel mineral production value was led by gold, copper, and molybdenum, in descending order of production value. These three mineral commodities combined dropped by about \$220 million, or 57% of the net decrease of \$388 million. Other very significant decreases in production value occurred in portland cement, gold, lead, palladium, platinum, construction sand and gravel, and zinc. Smaller decreases occurred in industrial garnet, silver, dimension stone, and crude talc.

In 2009, Montana continued to be the only State to produce primary palladium and platinum. The State again ranked first in the production quantity of crude talc and industrial garnet among the three talc- and industrial garnet-producing States,

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 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

fourth out of five lead-producing States, and fifth out of six cadmium-producing States (as byproduct of zinc concentrates). The State remained 5th out of 7 copper- and molybdenum-producing States, 5th out of 6 zinc-producing States, and 6th out of 11 silver-producing States. Montana rose in rank from third to second in bentonite clay. The State dropped in rank from 5th to 8th in gold, 8th to 21st in dimension stone, and ceased to produce masonry cement altogether in 2009.

Primary aluminum was produced at a facility in Flathead County. Montana ranked 9th out of 11 aluminum-producing States in 2009, an increase from 11th in 2007–08.

The Montana Bureau of Mines and Geology² (MBMG) provided the narrative information that follows. Production and other data in the following text are those reported by the MBMG, based on its surveys and estimates. The data may differ from some production figures reported by the USGS.

Overview

The mineral industry in Montana saw significant changes in 2009. Early in the year, the demand for and the prices of most mineral commodities remained significantly depressed by the economic downturn during 2008, and the international financial market had reduced a significant portion of funding for minerals exploration. However, prices for most metals showed a steady climb through the year, most notably for gold. The market appeared to have stabilized by the fourth quarter. The number of exploration projects in the State was significantly lower than in recent years. By yearend, funding for exploration had not recovered and only limited capital was available for projects nearing development and production. Most exploration companies that were heavily dependent on investment capital ceased to exist. Smaller mining and exploration companies that were producing were limited to cash flow and profits for capitalization. Larger mining companies were generally more stable, but most kept capital-intensive projects on hold until financial uncertainties were resolved.

Some industrial mineral companies in the international market noted recovery beginning at the end of the first quarter followed by steady growth in 2009. Local industries tied to the construction trades realized a very slow recovery. Specialty markets, such as decorative stone, were severely negatively affected by the downturn in the building construction industry. Production costs of some industrial minerals remained high because of energy prices. Portland cement sales were unchanged from the low levels of 2008.

²Robin B. McCulloch, Associate Research Mining Engineer, authored the text of the State mineral industry information provided by the Montana Bureau of Mines and Geology.

Mineral Exploration and Development

Industrial Minerals

Clays.—North of Avon, Ash Grove Cement Co. drilled a clay deposit in the Nevada Creek drainage area for clays to be used in cement manufacturing. The continuity was good but results were not yet available. The clay appeared to be hydrothermally altered volcanic ash that encapsulated gold-bearing gravel deposits.

Metals

Gold.—Exploration continued at an extremely low level despite considerable mineral endowment in Montana. Companies have found permitting slower than they would like, but still possible. However, the prevailing outside perception of gold mining in Montana was that the ban on open-pit cyanide-leaching operations in the State has made permitting a mine very difficult. On the investment side, this has left projects struggling for capital. There were 13 projects in 2009 at various levels of activity.

In the Garnet ghost town area, Grant Hartford Corp. continued drilling gold targets for a second year. The company contracted mapping of the area's geology and tested both gold placers and lode deposits. Some initial tests identified gold-bearing gravel associated with debris flows. Lode deposits were explored by almost 11,500 m of reverse-circulation drilling and a small trenching program. The program identified a resource of about 19,000 kilograms (kg) (about 611,000 troy ounces) of gold on four zones, including about 64,000 metric tons (t) (more than 70,500 short tons) of ore near the Nancy Hanks Mine; 65,300 t (72,000 short tons) of ore grading at 7.75 g/t (0.226 troy ounces per short ton) gold on the Willie vein system; 3,100 kg (99,700 troy ounces) of gold indicated and inferred in the Tostman zone; and two out of nine holes in a 1.5- to 3-m-thick (5- to 10-ft) zone ranging from 9.19 to 15.2 g/t (0.268 to 0.444 troy ounces per short ton) gold on the Tiger vein. The company is planning to continue the drilling programs in 2010 (Grant Hartford Corp., 2009).

East of Lincoln, Atna Resources, Ltd. assembled data on the Columbia (7-Up Pete) Gold Project. This property was drilled by Phelps Dodge Corp. and Western Energy Co. in the 1980s and 1990s. The gold and silver occur in veins that are up to 45 m (150 ft) wide and dip to the west. The original feasibility analysis identified open pit production rates of 2,330 kg per year (75,000 troy ounces per year) over 7.5 years. In September 2009, Atna Resources reported measured and indicated gold resources of about 15.1 million metric tons (Mt) (16.6 million short tons) grading at 1.5 g/t (0.045 troy ounces per short ton) gold, for a total of about 23,000 kg (about 742,000 troy ounces) of gold. Inferred resources totaled 9.7 Mt (10.7 million short tons) grading 1.4 g/t (0.042 troy ounces per short ton) gold totaling about 14,100 kg (about 453,000 troy ounces) of gold. The company also reported significant silver associated with the gold resource (Atna Resources Ltd., 2009). The company planned to commence feasibility studies early in the 2010 field season.

Near Virginia City, two individuals started development on a gold placer in upper Alder Gulch. Because of permitting delays, the project started up just before the first freeze in autumn. Full production was scheduled for the 2010 field season. St. Lawrence Co. drove a decline to examine drill intercepts of gold structures in Norwegian Creek. West of Dillon, Silica Resources, Inc. drilled a number of holes on the Elkhorn Mine deposit near the ghost town of Coolidge.

Near Superior, an individual purchased the southern half of the Calumet gold placer in Quartz Creek. The initial excavation defined the boundaries of the upper end of the remaining deposit. The individual indicated that production would begin in 2010.

West of Drummond, another individual excavated a few pits on a gold placer in lower Bear Gulch. Nearly all of the sites yielded gold but bedrock was not intercepted. Many of the exposures showed 3–4.5 meters (m) of topsoil. Future work was planned for the upcoming years.

Polymetallic Projects.—At Marysville, RX Exploration Inc. resumed exploration late in the summer on the historic Drumlummon Mine. Historic production from this property has totaled more than 31,000 kg (1 million troy ounces) of gold and greater amounts of silver. After securing a discharge permit for the mine water, the company contracted CDM, Inc. to design and build a water treatment plant for dissolved arsenic. The plant was completed and installed, allowing the company to dewater while rehabilitating the number 1 shaft. Current drilling has identified a resource of more than 141,000 Mt (about 156,000 short tons) containing almost 2,200 kg (70,700 troy ounces) of gold and about 59,400 kg (more than 1,910,000 troy ounces) of silver in the Charley vein. On the D-Block, more than 145,000 t (160,000 short tons) of rock grading 13.7 g/t (0.4 troy ounces per short ton) gold and 137 g/t (4.0 troy ounces per short ton) silver were identified by prior operators in the 1980s. Numerous preexisting stopes contained ore-grade resources as indicated on historic maps. The drilling also intercepted previously unknown mineralized structures adjacent to and beyond old workings. The company started a decline to access resources in the D-Block-Charley vein area. This development work could allow RX Exploration to gather bulk samples to complete metallurgical work. When the water is pumped below the current level, the company planned to initiate drilling to expand the known resource base for the mine (RX Exploration Inc., 2009).

South of Butte, Timberline Resources Corp. and Highland Mining, LLC entered into a joint venture in July for the Butte Highlands Project (Timberline Resources, 2009a). A decline was driven about 2,000 m (6,600 ft) toward drill intercepts below the historic Butte Highlands Mine, a gold-copper skarn. The project was initially designed to facilitate continued drilling of an identified gold resource of more than 16,000 kg (500,000 troy ounces). Approximately 10 to 15 drill stations will be developed for 120 drill holes. The joint venture planned on collecting a 9,070-t (10,000-short ton) bulk sample for metallurgical analysis. Development work was being conducted by Small Mine Development and an Amended Exploration Permit was granted by the Montana Department of Environmental Quality in August (Timberline Resources Corp., 2009b).

South of Nye, Nevoro, Inc. was acquired by Starfield Resources Inc. (Starfield Resources Inc., 2009a). Both companies had interests in copper-nickel ore bodies. This acquisition provided Starfield Resources with access to extensive resources of both copper-nickel and chromite deposits. By yearend, Starfield Resources had not yet announced its intent on activities in the Stillwater Complex but had identified three general targets—the “A” and “B” chromitites near the top of the Ultramafic Series, the Volatile Enriched Zone at the top of the Ultramafic Series, and the potentially mineralized dunite bodies cutting the Ultramafic Series (Starfield Resources Inc., 2009b).

Commodity Review

Industrial Minerals

Cement.—Ash Grove Cement Co. maintained production at Montana City at a reduced rate compared to previous years except for a brief suspension when tremolite was identified in the pit in March. Subsequent testing of rock and air supplies showed no asbestiform minerals existed at concentrations above government standards. The company upgraded dust control systems at the coal mill. Operating again in April, operations focused heavily on cost savings, power monitoring, and efficiency studies. However, in the fall, the company announced the plant would shut down due to slow sales (Harrington, 2009). Ash Grove anticipated a spring reopening in 2010.

Near Three Forks, Holcim (US) Inc. continued steady production of portland cement. Some recovery in the market was predicted in late 2010. The permit for replacing 20% of the company’s fuel needs with used tires was stalled in the Montana Department of Environmental Quality. The draft environmental impact statement (DEIS) showed no impact on the environment, but the final impact statement and record of decision had not been finalized. When initially proposed, the project could lower pollution potential at the plant while recycling all of the waste tires generated in the Montana operation.

North of White Sulphur Springs, Holcim’s Black Butte Mine continued production as Montana’s only iron ore mine. The ore was used in the production of portland cement.

Garnet and Tungsten.—At Alder, Ruby Valley Garnet, LLC maintained steady production of garnet from the dry placer deposit in Red Wash. Late in the fall, the company streamlined operations with a change in management and workforce reductions. The company continued to expand production. Exploration conducted during the summer delineated hard rock resources of up to 20% garnet at the head of the drainage area that already was being mined. GMA Garnet (USA) Corp. has contracted Ruby Valley Garnet’s total production.

In Glen, Apex Abrasives Inc. completed the initial phase of construction of its processing plant at the former General Electric tungsten mill. The company planned to reprocess the garnet-rich tailings in the ponds to produce tungsten concentrates and garnet for water-jet cutting media. Preliminary production prior to seasonal closures produced a highly saleable product. Full production was anticipated with the spring thaw.

Lime.—Graymont Western U.S.A. maintained production of burnt lime at its plant northwest of Townsend. Demand was down during 2009 and was further negatively affected by the

anticipated closure of the Smurfit Stone linerboard plant near Missoula in early 2010.

Stone, Crushed.—South of Billings, production continued at Montana Limestone Co.’s Warren quarry. The quarry produced approximately 590,000 t (650,000 short tons) per year and provided feed for the Western Sugar Cooperative, the Dakota Coal Co. burnt lime plant in Frannie, Wyoming, as well as seven various-sized limestone products ranging from rip rap to fine grind. The reserves were owned by Bighorn Limestone Co., which was jointly owned by Western Sugar Cooperative and Montana Limestone Co.

Stone, Dimension.—Within the Libby-Kalispell-Thompson Falls area, a large number of small decorative stone quarries constituted a substantial local economic influence. Most of them were located along Pritchard Formation (Super Belt Supergroup) outcrops. Products ranged from thinly bedded sheets of various stones ranging from 2.5 to 5 centimeters (cm) thick to various thicker bedded blocks (8–20 cm thick), used for dry stacking and landscaping purposes.

Most of the decorative stone products were used in the construction of high-value housing and businesses. The financial decline in 2008 in housing construction did not affect the demand as much as the anticipated 19% decrease through the early quarters of 2009. However, the slump caught up in the latter half of 2009; demand was rumored to have dropped by 50%. Inventories at many of the stone yards were full by early fall—a time when, in previous years, inventories would have been substantially reduced.

Talc.—Barretts Minerals Inc. produced a number of talc products from the Treasure and Regal Mines, located east of Dillon. One of the products was used in the production of ceramic substrate for catalytic converters. The 2008 economic decline triggered a stagnation of U.S. automotive sales, which in turn temporarily eliminated the demand for that portion of talc sales. The company was forced to reduce its workforce for most of the year, but has since rehired its production staff with the increase in sales later in the year. As with most of the mining industry, Barretts Minerals has not yet replaced support personnel. In operations, the company continued construction of new shop facilities at the Regal Mine while looking to expand reserves northeast of the mine. The exploration program yielded good results.

South of Ennis, Rio Tinto Minerals maintained talc production at its Yellowstone Mine. Following the labor reduction programs of the previous year, the company maintained labor levels while it hired a few new employees. As with many of the industrial minerals companies, the focus was on cost reduction and optimizing operations. Internal capital was in short supply throughout the industry. Rio Tinto continued to look into divesting the talc business of Rio Tinto Minerals.

Metals

Copper and Silver.—The Troy Mine, near Troy in northwestern Montana, was owned by Revett Minerals Inc. through a wholly owned subsidiary of Revett Silver Co. and operated by Genesis, Inc. In 2009, the company increased copper-silver ore production by 5% to about 3,400 t (3,700 short tons) per day. Its labor force was steady with 180

to 185 employees. In 2009, the 10% pay cut for employees implemented late in 2008 was fully reversed. Silver production increased by 10% but copper production declined by 12%. The company continued to expand its reserves in the deeper copper-silver zones. Development of the “C” bed, located about 110 m (370 feet) below the main ore body, was planned for 2010, with production scheduled in 2011. Many of the zones contained marginally economic amounts of metal, but the company has identified blocks of economic reserves within those zones.

Revett Silver, owner of the Rock Creek copper-silver project, continued to wait for the appeals and subsequent court decisions to be resolved prior to starting development of the property. It planned to initiate the development of the upper decline in 2010 barring further lawsuits against the permitting agencies.

On the east side of the Cabinet Mountains Wilderness, Mines Management Inc. ceased rehabilitation work in their decline until permitting of the Montanore copper-silver mine was completed. The draft environmental impact statement was completed and the company was waiting for the final record of decision. The company planned to start a bankable feasibility study near the end of 2009 (Mines Management Inc., 2009a, b).

Gold.—Across the State, several individuals worked placer deposits. Near Superior, two individuals produced gold from the lower Quartz Creek placer through late summer. All areas disturbed by mining operations were reclaimed after known reserves were exhausted. Near Avon, an individual briefly produced placer gold on Ophir Creek above Blackfoot City. Further exploration was planned for late fall but was delayed into 2010 owing to inclement weather. Other individuals worked in the Scratchgravel Hills north of Helena and near Helena at the Pretty Girl placer in Grizzly Gulch. The availability of process water was limited in the Scratchgravel Hills from spring to early summer. At Grizzly Gulch, most of the nuggets and flakes were crystalline and were derived from a skarn exposed at various locations throughout the drainage and surrounding area.

Near Whitehall, Barrick Gold Corp. continued stripping waste at its Golden Sunlight Mine. Development was focused on the west and northwest sides of the pit to access the remaining ore in the 5B optimized pit plan. During this 3-year stripping plan, the company overhauled equipment, expanded the truck fleet with three Cat 785 haul trucks, and rehabilitated the mill. The mill was scheduled to resume production on January 1, 2011 (Barrick Gold Corp., 2010, p. 56). The existing reserves were expected to be depleted in 2015. The company was also searching for compatible raw ore from underground properties within 161 km (100 miles) to purchase. Barrick Gold continued to explore for additional reserves from satellite ore bodies while permitting the ore deposit discovered under the crushing circuit. Preliminary work was done in anticipation of converting the mill to a gravity-flotation circuit after the ore body was exhausted, which should allow the company to reprocess the tailings to recover sulfide minerals for further gold recovery.

Platinum-Group Metals.—Stillwater Mining Co. maintained production from the largest operating mine complex in the State. Under adverse financial conditions, the company posted a net loss of \$9.2 million (Stillwater Mining Co., 2010). During 2009,

the company reduced staff by 27%, increased production by 6.2%, and added a second furnace at the smelter. It lost money on used catalytic converters purchased for recycling when the price for platinum-group metals declined in late 2008 and early 2009. Recovery was impaired when used catalytic converters were not available for purchase and recycling. General Motors Corp. backed out of its purchase contract via bankruptcy, which met with court approval in July (Stillwater Mining Co., 2009a, b). Because of the tough financial conditions, Stillwater took drastic cost-cutting measures that could improve its future.

At its East Boulder Mine, the company laid off the entire staff of approximately 650 people and then rehired 265 people after reevaluating its operations. Cuts were focused on management and support staff. Changes in mining methods reduced dilution and sidelined most of the fleet of diesel equipment.

At the Stillwater Mine, production increased to almost 12,300 kg (394,000 troy ounces) of platinum-group metals from 10,900 kg (349,000 troy ounces) in 2008. Stillwater reduced equipment, personnel, and dilution through changes in mining methods and were analyzing the company’s business practices. The difficult financial times the company faced in 2009 were met with remarkable business tactics and survival techniques.

Other Polymetallic Mines.—At Silver Star, Coronado Resources Ltd. maintained copper and gold production at its Madison Project (formerly the Broadway-Victoria Mine). The company direct shipped copper ore and gold ore from different areas of the mine on a mining contract with Blue Range Engineering Co. Inc. Cumulative shipments since 2008 have exceeded 54.4 kg (1,750 troy ounces) of gold and 612,000 kg (1.35 million pounds) of copper. Highlights of a limited ore-definition drilling program revealed one hole intercepting 14 m (45 ft) of ore grading at 25 g/t (0.74 troy ounce per short ton) gold, 41 g/t (1.2 troy ounces per short ton) silver, and roughly 1.1% copper. A second hole intercepted 8 m (25 ft) of ore grading at almost 20 g/t (0.58 troy ounce per short ton) gold, 130 g/t (3.9 troy ounces per short ton) silver, and roughly 5.7% copper (Coronado Resources Ltd., 2009).

Apollo Gold Corp. and Elkhorn Tunnels’ (a subsidiary of Elkhorn Goldfields LLC) Montana Tunnels Mine (gold, silver, lead, and zinc) remained in standby mode. Permits were granted but development capital has been difficult to raise. The open pit metals mine was located west of Jefferson City and had more than 7 years’ worth of reserves remaining. It was estimated that \$60 to \$85 million will be necessary to complete the prestripping and environmental stipulations of the mine permit. Elkhorn Goldfields and Apollo Gold Corp. signed a letter of intent to transfer ownership to Elkhorn Goldfields.

In Butte, Montana Resources maintained steady production of copper, molybdenum, and silver. The company continued to upgrade production and support. It completed a new computer control system for the mill. Exploration on the south side of the deposit increased the reserve base, especially for molybdenum, and deeper drilling in the pit showed promising results. Employment was steady, at 345–348 people who participate in a profit-sharing program.

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2007		2008		2009		
	Quantity	Value	Quantity	Value	Quantity	Value	
Gemstones, natural	NA	386	NA	380	NA	378	
Palladium ³	kilograms	12,800	148,000	11,900	136,000	12,700	108,000
Platinum ³	do.	3,860	162,000	3,580	182,000	3,830	149,000
Sand and gravel, construction		16,000 ^r	135,000 ^r	13,400 ^r	110,000 ^r	11,200	85,500
Stone, crushed		1,810	9,800	1,980 ^r	14,000 ^r	1,990	20,400
Combined values of cadmium (byproduct from zinc concentrates), cement, clays (bentonite, common), copper, garnet (industrial), gold, lead, lime, molybdenum concentrates, silver, stone (dimension), tale (crude), zinc		XX	910,000	XX	924,000 ^r	XX	619,000
Total		XX	1,370,000 ^r	XX	1,370,000 ^r	XX	982,000

^rRevised. NA Not available. 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
MONTANA: CRUSHED STONE SOLD OR USED, BY TYPE¹

Type	2008 ^r			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	3	1,480	\$10,500	9	1,570	\$16,600
Traprock	--	--	--	--	--	--
Sandstone and quartzite	--	--	--	--	--	--
Miscellaneous stone	27	500	3,530	33	417	3,800
Total	XX	1,980	14,000	XX	1,990	20,400

^rRevised. XX Not applicable. -- Zero.

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

TABLE 3
MONTANA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE¹

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Concrete aggregate (+1½ inch):		
Riprap and jetty stone	19	296
Filter stone	W	W
Coarse aggregate graded:		
Bituminous aggregate, coarse	W	W
Railroad ballast	W	W
Fine aggregate (-¾ inch), stone sand (concrete)	W	W
Coarse and fine aggregates:		
Graded road base or subbase	W	W
Unpaved road surfacing	69	411
Crusher run or fill or waste	W	W
Chemical and metallurgical:		
Cement manufacture	583	8,030
Lime manufacture	W	W
Sulfur oxide removal	W	W
Special, mine dusting or acid water treatment	W	W
Unspecified: ²		
Reported	48	340
Estimated	164	1,280
Total	1,990	20,400

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

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

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

TABLE 4
MONTANA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009 BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1½ inch) ²	W	W	W	W
Coarse aggregate, graded ³	W	W	W	W
Fine aggregate (-¾ inch) ⁴	W	W	--	--
Coarse and fine aggregates ⁵	W	W	W	W
Chemical and metallurgical ⁶	W	W	W	W
Special ⁷	--	--	W	W
Unspecified:⁸				
Reported	48	340	--	--
Estimated	146	1,130	19	148
Total	1,350	14,600	642	5,870

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.

²Includes filter stone and riprap and jetty stone.

³Includes bituminous aggregate (coarse) and railroad ballast.

⁴Includes stone sand (concrete).

⁵Includes crusher run or fill or waste, graded road base or subbase, and unpaved road surfacing.

⁶Includes cement and lime manufacture and sulfur oxide removal.

⁷Includes mine dusting or acid water treatment.

⁸Reported and estimated production without a breakdown by end use.

TABLE 5
MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products ²	790	\$7,610	\$9.63
Asphaltic concrete aggregates and other bituminous mixtures	331	2,390	7.21
Road base and coverings ³	2,570	16,600	6.47
Road and other stabilization (cement)	34	254	7.47
Fill	97	505	5.21
Snow and ice control	56	521	9.30
Other miscellaneous uses ⁴	30	342	11.40
Unspecified:⁵			
Reported	3,130	26,100	8.32
Estimated	4,120	31,100	7.55
Total or average	11,200	85,500	7.66

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

²Includes plaster and gunite sands.

³Includes road and other stabilization (lime).

⁴Includes railroad ballast.

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

TABLE 6
MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products ²	653	6,680	137	937	--	--
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	141	770
Road base and coverings ³	1,640	12,300	641	2,920	324	1,650
Fill	57	417	39	88	--	--
Other miscellaneous uses ⁴	268	2,430	7	50	--	--
Unspecified: ⁵						
Reported	1,840	15,800	1,290	10,300	10	22
Estimated	3,000	22,700	1,120	8,430	--	--
Total	7,460	60,300	3,230	22,700	475	2,440

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.