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2007 Minerals Yearbook

MONTANA [ADVANCE RELEASE]

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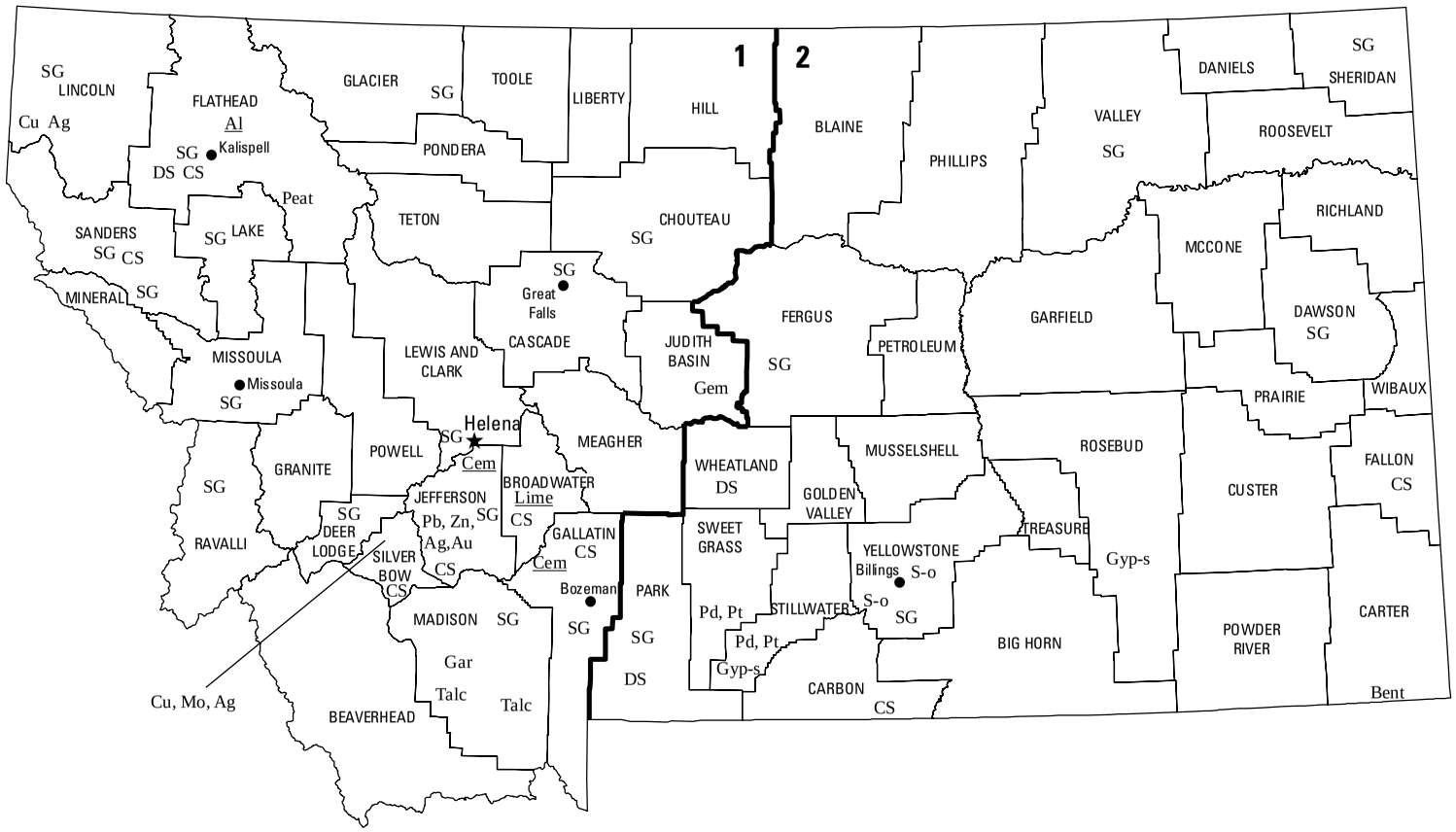
MONTANA



LEGEND

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

MINERAL SYMBOLS (Major 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
Gyp-s	Synthetic gypsum
Lime	Lime plant and quarry
Mo	Molybdenum
Pb	Lead
Pd	Palladium
Peat	Peat
Pt	Platinum
S-o	Sulfur (oil)
SG	Construction sand and gravel
Talc	Talc
Zn	Zinc

Source: Montana Bureau of Mines and Geology/U.S. Geological Survey (2007).

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 2007, Montana's nonfuel raw mineral production[1] was valued at $1.36 billion, based upon annual U.S. Geological Survey (USGS) data. This was an increase of $290 million, or about 27%, from the value of 2006, which in turn was up $223 million, or more than 26%, from that of 2005. The State rose in rank to 17th from 21st among the 50 States in nonfuel raw mineral production value and accounted for about 2% of the U.S. total. Yet, per capita, the State ranked 5th in the Nation in the value of its nonfuel mineral production; with a population of about 958,000, the value of production was more than $1,420 per capita.

Metallic minerals accounted for nearly 79% of Montana's total nonfuel mineral production value in 2007. Copper, molybdenum concentrates, platinum, gold, and palladium were, in descending order of value, the State's leading nonfuel minerals, followed by construction sand and gravel, cement (portland and masonry), zinc, and silver, the combined total of which accounted for more than 94% of the State's total nonfuel mineral production value. In 2007, nearly all of the State's nonfuel mineral commodities rose in value. Increases in the values of gold, molybdenum, zinc, and construction sand and gravel (descending order of change) led Montana's increase in value for the year, having a combined increase of more than $200 million for the three metal mineral commodities. Construction sand and gravel was next with an increase of nearly $39 million. To follow were lead, copper, and silver, the combined increase of which was nearly $45 million. Smaller yet significant increases also took place (in descending order) in the values of industrial garnet, dimension stone (up by $6.7 million), portland cement, and platinum. The unit values of all of these mineral commodities showed modest to substantial increases, except for that of construction sand and gravel, which was down somewhat. Decreases took place in the values of crushed stone (down by slightly more than $12 million), palladium, and bentonite clay (table 1).

In 2007, Montana continued to be the only State to have primary palladium and platinum mine production. The State also continued to be first in the quantity of talc produced, second in bentonite clay, and fifth in copper, molybdenum concentrates, gold, and silver (descending order of value). Montana rose in rank to first from third of three industrial garnet-producing States, to fourth from fifth in the production of lead, to seventh from eighth in gemstones (gemstones based upon value), was sixth in cadmium production (as a byproduct in zinc concentrates), and it remained a producer of significant quantities of construction sand and gravel. Significant increases took place in the production of most of the mineral commodities that led to the State's increase in value, particularly in those of lead, zinc, and gold, whereas a relatively small increase took place in the production of copper, and palladium production was down by more than 10%. Even though Montana's zinc production rose by more than 700% in 2007 from that of 2006, the State decreased to sixth from fifth in rank because of similarly large increases by several other producing States.

The Montana Bureau of Mines and Geology[2] (MBMG) provided the narrative information that follows. Production and other data in the following text are those reported by the MBMG, based upon its own surveys and estimates. The data may differ from some production figures reported by the USGS.

During 2007 mining operations in Montana continued the recent trend of steady growth. Some examples included two existing mines that were in the permitting process for expansions and one completed a prefeasibility study for an expansion. A medium-sized underground mine progressed rapidly on its way to a permit. A cement plant awaited the State's release of the final environmental impact statement (EIS) with regard to an alternative fuel permit. In another example, small-scale mine owners scrambled to find qualified ore to take advantage of an opportunity to sell gold ore to the Barrick Gold Corp.'s Golden Sunlight Mine, southeast of Butte.

In general, the State's mining and mineral processing operations continued to be challenged by high fuel costs, limited equipment availability, and large-diameter tire shortages that have plagued the entire industry in recent years. Also, shortages of skilled labor continued, especially for underground operations. However, the industry experienced a continuation of high mineral commodity prices and demand for products far and above anytime in the recent past.

Mineral Exploration and Development

Overall, the exploration for minerals in Montana has significantly lagged behind that of the Canadian Provinces as well as the State of Nevada. Investment dollars were slow to arrive in the State following initiative campaigns of the environmental and historical preservation community that culminated in a ban of the use of cyanide in conjunction with open pit gold mining. This resulted to a certain extent in the mistaken perception that mining could not be permitted in Montana. Although permitting had been slow in some cases, it was completed on many projects throughout the State.

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

All 2007 USGS mineral production data published in this chapter are those available as of June 2009. 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.

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

Discussions took place with industry and State agencies, these indicating that most underground mines could expect to be permitted within 3 to 4 years. Open pits were more of an unknown and most of the mining community agreed that the permitting of a large, new open pit mine could take between 5 and 10 years.

The State experienced a modest increase in exploration activities during the field season, such that by the fall for many new companies Montana became a more active exploration target; in part because of continuing high metal mineral commodity prices, this activity was expected to continue and increase during the next several years.

Copper.—In western Montana, southeast of Missoula, Kennecott Exploration Inc. drilled three to five holes in pursuit of a deep copper-porphyry target in and around the Copper Cliff mining district, which is located on the north slope of the Garnet Mountains area. The drilling confirmed a geophysical target and down-hole geophysics and further drilling were scheduled for the 2008 field season.

General Minerals Corp. permitted for a drilling program in the vicinity of the Bluebird copper mine located south of Philipsburg near the middle fork tributary drainage of Rock Creek. North of Butte, OT Mining Corp. completed final permitting for a 300-meter(m)-deep diamond drilling of a copper porphyry prospect that had been defined by previous geophysical and geochemistry work. The host rock was a Cretaceous-age pluton that was exposed at the surface prior to burial by the Eocene-age Lowland Creek volcanics. The company was looking for a partner for the project.

Gold.—Southeast of Whitehall, the Mayflower Mine, a high-grade gold and silver producer discovered in the 1890s, was sold to Golden Sunset Trail, Inc. The company planned to conduct a geophysics program to be followed by a drilling program off of the 180-m (600-foot) level in search of a parallel structure. Previous drilling by Brimstone Mining, Inc. identified reserves of about 19,000 metric tons (t) (21,000 short tons) of ore grading about 86 grams per ton (g/t) gold and about 580 g/t silver. The property had a projected potential on the existing structure of more than 3,100 kilograms (kg) (about 100,000 troy ounces) of gold; a complete mining infrastructure remained in place.

Timberline Resources Corp. drilled four holes south of Butte in the Highland Mountains to expand the 18,700 kg (600,000 troy ounce) resource previously identified by Orvana Resources Corp. during the 1990s. The target was skarn-hosted gold in the Wolsey Shale rock unit.

The Grant Hartford Co. permitted a drilling program on gold skarns in a prospect southeast of Missoula near Garnet. Pegasus Gold Corp. had previously established ore reserves on a number of deposits in this area in the 1990s. Grant Hartford planned its focus on the higher grade targets within those deposits.

East of Sheridan, Millstream Mines, Ltd. continued work on the Tamarack Mine and mill. The company has mined 1,360 t (1,500 short tons) of nearly 14 g/t gold (0.4 troy ounce per short ton) that the company intercepted during a drive towards drill-indicated resources. Work was focused on completing the rebuilding of the 100-short-ton-per-day mill.

Near Marysville, RX Exploration Inc. contracted rehabilitation work on the main level of the historic Drumlummon Mine, located astride the Continental Divide in the Rocky Mountains northwest of Helena. Past production from the mine of precious metals was 1 to 1.1 million metric tons (Mt) with an average grade of 17 g/t (0.5 troy ounce per short ton) gold, with additional silver content. High grade and large in extent, the ore consists of epithermal deposits which are very young and low temperature in origin. Substantial areas in the mine have never been developed, having been flooded since 1901; development in these areas has not taken place for a number of reasons, including a 20-year-long lawsuit at one point between competing mining companies (RX Exploration Inc., 2007). Blue Range Engineering Company Inc. completed nearly 550 m (1,800 feet) of rehabilitation of the 120-m (400-foot) level, also known as the Muskalene Tunnel, in preparation for a $1.5 million underground drilling program to delineate remaining reserves. Surface drilling has confirmed the reserves shown on previous mine maps.

There were several other exploration projects either of smaller scale or in earlier stages of work. Near Nevada Lake (Powell County), Darden Engineering, Inc. tested Finn District gold placer gravels on the Stuckey Ranch. Holes were dug in the American, Cattle Gulch, and Jefferson Creek drainages. The work has identified the paleo-stream channels of American, Washington, and Madison Creek drainages. With a minable resource not yet delineated, work was planned to continue on into 2008.

In another project east of Sheridan, a private group (the Hunt family) drilled a few holes at the old Smuggler Mine, which produced gold ore on a small scale from near surface workings before World War II. All previous (historic) mine workings were inaccessible at the present time. Downstream from Bannock, in Beaverhead County, a private individual was testing a placer deposit on lower Grasshopper Creek. The Cowen Bar has a placer gold history but limited exploration and development.

Near Virginia City, Moen Builders, Inc. sampled mine dumps in the Browns Gulch and Alder Gulch drainages to identify gold resources that could be shipped to the Golden Sunlight Mine. One of the adits on the Little Lode claim was reopened, but no ore was identified. The U.S. Grant mill was sold and the mine was being rehabilitated for a diamond-drilling project.

Gold and Copper.—East of Boulder, Elkhorn Goldfields Inc. started permitting for its Golden Dream Mine project, an underground gold-copper deposit located near the ghost town of Elkhorn. The company's application was completed in less than a year and permits and development were expected prior to the second quarter of 2009. Reserve defining drilling held steady at nearly 6,100 m (20,000 feet) per year; reserves were approaching 900,000 t at about 9.3 g/t gold-equivalent. Mineralization was contained in a chalcopyrite-magnetite skarn in the Meagher Limestone. Elkhorn had data that partially defined three other deposits and additional targets remained to be drilled in the vicinity of the current operation. Further mine permit applications were progressing relatively rapidly because the company was planning to process the ore at a remote site.

Near Silver Star, Coronado Resources Ltd. contracted Blue Range Engineering Company Inc. to develop resources on the company's Madison project (the former Broadway/Victoria Mine), at which 225 m of decline and 84 m of crosscuts and development were completed. Coronado purchased a crusher and mined nearly 610 t of ore grading 13 g/t gold and 1,320 t of ore grading 9.5% copper. The copper ore was a mixture of chalcocite and native copper. The gold ore was sold to the Golden Sunlight Mine, while the copper ore awaited shipment to an undisclosed site. The company was planning an underground drilling program for ore delineation.

Molybdenum.—West of Melrose, Bolero Resources Corp. drilled two helicopter-supported holes on the Cannivan Gulch molybdenum deposit, previously explored between the years 1968 and 1981. The deposit had been discovered and defined by Cyprus Minerals Co. in earlier explorations but was never permitted because of declining molybdenum metal prices. Bolero Resources proposed reopening reclaimed roads for an in-fill drilling program and thus far had not encountered much opposition.

Bolero Resources continued to drill at the Bald Butte molybdenum deposit, west of Marysville. The company contracted with Ruen Drilling Inc. to drill 16 diamond-drill holes of about 275 m to nearly 400 m in depth for ore definition. The results were expected to confirm Gulf Mineral Resources Co.'s previous work and add to the existing data for the future project.

Big Timber Reclamation Co. completed a trenching program on the intrusive at the Moffitt-Johnson copper mine, Southeast of Silver Star. The company identified molybdenum in the drill core of its copper-pyrite skarn deposit.

Silver and Copper.—In late November, Mines Management Inc., Spokane WA, completed the draft EIS on its Montanore silver-copper project, located on the Libby side of the Cabinet Mountains in northwestern Montana. The company raised $32 million to continue the deposit's reserve definition, which was initially started by Noranda Minerals in the 1990s. Mines Management planned to drive about 3,050 m (10,000 feet) of adit development to facilitate slightly more than 13,700 m (45, 000 feet) of diamond drilling, from which the data were intended to enable completion of a bankable feasibility analysis prior to development. The company anticipated a Record of Decision on the project by the end of 2008, whereas State agencies anticipated it more likely for 2009 or 2010. The company planned on developing the underground for drilling in spring 2008.

Near Noxon, R.C. Resources, Inc. (a subsidiary of Revett Silver Co.) continued to pursue necessary permits for its Rock Creek project (Cu, Ag), thus far a decade-long effort. The implementation of an extensive mitigation program to benefit the grizzly bear population and to include the salaries of two full-time positions for Montana Fish, Wildlife and Parks was required. Also required was the land acquisition of key grizzly bear habitat that would be deeded to the U.S. Forest Service (USFS). Pending the implementation of the mitigation plan and a posting of the reclamation bond, the USFS and Montana DEQ gave approval to drive an evaluation adit into the ore body in 2008. The evaluation adit phase of the project was to be followed by completion of a feasibility study and full mine development, assuming the study produces positive results. The evaluation adit phase was expected to take 18 to 24 months.

Other Polymetallic Projects.—West of Dillon, a drilling project was permitted for Silica Resources Corp. at and around the old Elkhorn Mine near the old mining camp town of Coolidge. Early mining operations ceased prematurely when a dam failed in Pattengail Creek in the 1920s and destroyed the narrow gauge railroad. The deposit consists of polymetallic-sulfide veins that produced recoverable copper, lead, zinc, and silver. Gold placers occur on the west side of the ridge near Crystal Park. North of Philipsburg, ASARCO, permitted to drill four holes at the former Black Pine Mine (silver, gold, and copper) and completed three of the four holes, each being about 300 m deep.

In the Nye area of southern central Montana, Beartooth Platinum Corp. drilled on a 15-kilometer-long platinum group metal-nickel-copper soil anomaly coinciding with the "B" chromite layer. The company budgeted for 34 holes totaling about 6,100 m. Trend Mining Co. made plans to reopen the Mouat (Mt. View) Mine for an underground drilling program focused on the copper-nickel zone in the Stillwater Complex. The mine is located southwest of the Stillwater Mining Co.'s Stillwater Mine

Commodity Review

Industrial Minerals

Cement.—At Montana City, Ash Grove West Cement, while maintaining cement production at capacity, experienced significant increases in the costs of coal, petroleum (petroleum coke), rail transportation, and trucking of its products. The company's labor force attained stability following a recent turnover from retirements. Despite the significant community development that has developed in between Ash Grove West's limestone quarry and the cement plant, operations have continued safely thus far.

Holcim (U.S.) Inc. awaited the Montana Department of Environmental Quality (DEQ) for its final EIS and approval on alternative fuel substitution at its cement plant near Three Forks. The company's project will probably consume all of the waste tires in Montana while replacing 20% of its coal requirements and a small percentage of its iron needs. The use of tires as fuel also will reduce nitrous oxide levels with the resulting change in temperature zones in the kilns. The plant produced cement at capacity and production was sold out. The softening of the residential building boom removed a possible need for cement rationing and the prices declined somewhat.

Garnet and Gold.—Near Alder, Ruby Valley Garnet LLC completed mining of the first phase of its Red Wash garnet deposit. The operations moved onto the adjacent property as the company progressed up the drainage towards a garnetiferous gneiss outcrop near the top of the ridge. The wash plant for the operation was reconfigured with a larger jig circuit and a more effective finishing circuit, resulting in an increase in the tonnage that was processed and better recovery rates. The primary market continued to be for blast media (sand blasting), but

garnet sand for water-jet cutting was also produced. With prices up, demand for the materials was steadily increasing.

Additionally for Ruby Valley, the company also started a second operation, one for garnets and gold at which the company will reprocess the Alder Gulch gold dredge piles. In addition to garnet and gold recovery, this project will reclaim the property of damages that were the result of mining performed in the 1880s. The company completed a test run in the fall and planned to initiate production during the 2008 season.

South of Melrose, Apex Abrasives Inc. began construction of a process facility designed to separate the scheelite from the garnet sand tailings at the former General Electric Co. millsite. The waste from the Len Tung (Browns Lake) tungsten deposit was to be separated into two marketable products, garnet sand that is very effective for water jet cutting media and scheelite concentrate. Production was expected to commence in spring 2008.

Lime and Calcium Carbonate.—Near Townsend, Graymont Western U.S., Inc. submitted a 50-year, life-of-mine permit application for its Indian Creek Quarry to the DEQ. The mine plan would allow the company to incorporate recently discovered, high-purity limestone resources into its production schedule. The plant produced quicklime, hydrated lime, and precipitated calcium carbonate at near plant capacity in a strong market. The company celebrated 25 years in business.

Talc.—East of Dillon, Barretts Minerals, Inc. completed a reserve definition-drilling program for talc at the Regal Mine. They have moved the county road and completed a redesign and expansion of their waste-rock dump. They have increased their workforce and procured a replacement shovel for one destroyed by fire. A second thickener has been added to the beneficiation plant.

South of Ennis, at Rio Tinto Minerals' primary talc mine, the Yellowstone Mine, the company upgraded support equipment with replacements for a grader, lubrication truck, and loader. While high costs for diesel and explosives were a concern, there were no significant tire shortages and the workforce was very stable. At its Three Forks processing operations, greenhouse gas emissions were reduced by 26% in the fine-grind circuit and similar reductions were planned in the coming year in other sections of the plant.

Other Industrial Minerals.—In the Lewistown area, Delta Mining and Apex Geoscience mined a small bulk sample of 27 t for diamonds and microdiamonds from their Homestead Kimberlite property. Also, Moen Builders contracted to perform renovation work at the Dillon Vermiculite mill, east of Dillon.

Metals

Copper and Silver.—Genesis Inc.'s Troy Mine (a wholly owned subsidiary of Revett Silver Co.) achieved the processing of slightly more than 1 Mt [nearly 1.1 million short tons of ore (about nearly 2,760 metric tons per day (t/d)] of copper and silver ore through the company's mill (Revett Minerals Inc., 2008). The underground room-and-pillar mine located south of the town of Troy in northwestern Montana appeared to have achieved a stable workforce and increasing production levels. Genesis continued to expand its reserves with an ongoing resource definition program that included both surface and underground drilling.

Gold.—At Whitehall, the Golden Sunlight Mining Co. continued mining its gold deposit at the Golden Sunlight Mine through underground access at a rate of 900 t/d as well as by open pit. Although the stage 5B pit neared completion, the increase in commodity prices helped to establish reserves for a stage 5C pit at about 7.3 Mt at 1.9 g/t gold. A positive prefeasibility analysis coupled with the final EIS and Record of Decision recommending against pit backfill allowed the company to apply for an expansion of operations to extend the mine life by 3 years. The company also resumed exploration of the property for satellite ore bodies, but results thus far were disappointing.

Near, Superior, a private party produced coarse gold from the Calumet gold placer on Quartz Creek. After having produced from the deposit margins for 2 years and reclaiming much of the existing disturbance, an expanded level of activities was expected on the remaining deposit during the coming years.

Platinum-Group Metals.—At Nye, Stillwater Mining Co. experienced a significant decrease in production at the Stillwater Mine. A shortage of experienced mine workers was possibly the most significant reason for this, although there was also a 1-week strike that took place during the year. Stillwater tried to compensate for the shortfall by reducing from four crews to three crews and going to a 43-hour week from a 37-hour week. In response, a significant number of senior-level miners and mechanics resigned, some to fill jobs located closer to home and some for higher wages elsewhere. At the same time, the company reduced its dependence on contracting companies for development and production. Additionally, a shortfall in mechanics created a backlog in maintenance and decreased availability of equipment contributed to the situation.

Near Big Timber at its East Boulder Mine, Stillwater Mining experienced a decrease in platinum-group metal production while transitioning from bulk mining methods to more selective methods although the company partially reversed that plan and was in the process of using both techniques. There was a change in mine management and some in the engineering department left the company.

The Stillwater Mining Co. was not able to take full advantage of the year's increased prices, mainly having hedged its platinum sales. Palladium hedges were closer to market prices so the difference between the actual and the potential palladium sales revenue was not so severe. The company's use of hedging was to be phased out in early 2008. Of the total metal production for the year, the recycling of catalytic converters represented 50% of the company's revenue.

Another change for Stillwater Mining was in its hiring practices from a minimum age of 21 to 19 and in focusing on local recruiting and the company's miner training programs. While not likely to solve immediate production problems, the current graduation rate of 100 miners per year was expected to provide a long-range solution to the labor problem if Stillwater is able to succeed in getting the new miners to stay. MBMG officials anticipated that similar solutions may need to be sought

for increasingly current and future shortfalls in geologists, mining engineers, management, and other technical services throughout the mining industry.

Both Stillwater mines successfully tested biodiesel in production equipment at a 50% mixture to diminish diesel particulate matter and in an attempt to stretch the fuel supply. Even with this adjustment the company's needs were expected to exceed the total current production in the region.

Other Polymetallic Mines.—In Butte, Montana Resources LLP had another profitable year of copper, molybdenum, and silver production. Large-diameter truck tires and skilled labor remained difficult to acquire. The company planned on purchasing additional trucks and a shovel and continued upgrading much of its support equipment. Its labor force was steady with only 4% turnover, mostly from retirements, possibly in part owing to its popular profit-sharing program. Open pit reserves were estimated to be approximately 500 Mt at 0.26% copper and 0.03% molybdenum in the current operation with more than 450 Mt at 0.48% copper in an adjacent deposit. Previously drilled underground resources were estimated to be about nearly 4,000 Mt at about 0.5% copper and 0.04% molybdenum. Stripping operations on the north side of the pit intended to eliminate a potential rock failure and uncover some previously unidentified ore.

North of Boulder, Montana Tunnels Mining Inc. (50% Apollo Gold Corp. and 50% Elkhorn Tunnels LLC) previously had completed their pit-wall stability project for the Montana Tunnels Mine in January, restarted the mill in March, and completed the rebuild on the crusher in August. With a steady workforce, the company employed 215 people, producing lead, zinc, gold, and silver. Montana Tunnels applied (in 2004) for an expansion permit to access remaining open pit minable reserves, but because of backups in the permitting process being performed by State authorities and associated contractors, it was possible that the mine might have to close for lack of permits and lack of permitted ore. A new permit would extend operations through 2015.

Reclamation

East of Lincoln, Lewis and Clark County, Newmont reclaimed 14,000 m (45,000 ft) of drill roads and pads on the McDonald Meadows deposit. Although they have acquired the deposit data, this State trust land was not yet under lease.

Government Programs

The MBMG continued its active participation in the STATEMAP and EDMAP programs mapping the geology in western and southwestern portions of the State. STATEMAP and EDMAP are components of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), which distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects, (2) STATEMAP, which is a matching-funds grant program with State geological surveys, and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. Many of the State's activities created more detailed 1:100,000 and 1:24,000 scale maps from 1:250,000 scale maps previously published. New geologic maps of the Briggs Ranch, Central Madison Valley, the north half of the Choteau 30 x 60, the north half of the Davis Point 7.5, the Plains 30 x 60, Radersburg-Toston Basin, the south half of the Southeast Missoula, Yellowstone Park Controlled Groundwater area, and the Yellowstone River area quads were developed. The new State geologic map was published and was selling well. Field mapping of both gold and sapphire placers continued. Additional information about the Montana mineral industry, including current publications and activities, are available at the MBMG Web site (http://www.mbmg.mtech.edu/).

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TABLE 1

NONFUEL RAW MINERAL PRODUCTION IN MONTANA[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2005		2006		2007	
		Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural		NA	644	NA	379	NA	386
Palladium[3]	kilograms	13,300	87,100	14,400	150,000	12,800	148,000
Platinum[3]	do.	3,920	113,000	4,290	158,000	3,860	162,000
Sand and gravel, construction		14,000	83,600	13,700	95,300	15,900	134,000
Stone:							
Crushed		3,430	16,600	4,040 r	21,800 r	1,780	9,610
Dimension		12	2,620	12	2,620	18	9,350
Combined values of cadmium (byproduct from zinc concentrates), cement, clays (bentonite, common), copper, garnet [industrial (2005, 2007)], gold, lead, lime, molybdenum concentrates, peat (2005), silver, talc (crude), zinc		XX	543,000	XX	641,000	XX	898,000
Total		XX	847,000 r	XX	1,070,000	XX	1,360,000

rRevised. do. Ditto. NA Not available. XX Not applicable.

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

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

[3]Recoverable content of ores, etc.

TABLE 2

MONTANA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2006			2007		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	5 r	2,860 r	$15,700 r	2	453	$2,450
Granite	9	102 r	793	9	100	1,210
Sandstone and quartzite	3 r	82 r	415 r	3	80	410
Volcanic cinder and scoria	2	465	2,440	2	475	2,540
Miscellaneous stone	24 r	537 r	2,440 r	12	667	3,000
Total	XX	4,040 r	21,800 r	XX	1,780	9,610

rRevised. XX Not applicable.

[1]Data 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 2007, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Concrete aggregate (+1½ inch), riprap and jetty stone	11	125
Coarse aggregate graded:		
Bituminous aggregate, coarse	W	W
Railroad ballast	W	W
Fine aggregate (-⅜ inch), stone sand (concrete)	W	W
Coarse and fine aggregates:		
Unpaved road surfacing	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	88	375
Chemical and metallurgical, cement manufacture	W	W
Unspecified:[2]		
Reported	1	5
Estimated	1,100	6,100
Total	1,780	9,610

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

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

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

TABLE 4

MONTANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2007, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	Districts 1 and 2[2]	
Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch)[3]	11	125
Coarse aggregate, graded[4]	W	W
Fine aggregate (-⅜ inch)[5]	W	W
Coarse and fine aggregates[6]	W	W
Chemical and metallurgical[7]	W	W
Unspecified:[8]		
Reported	1	5
Estimated	1,100	6,100
Total	1,780	9,610

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

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

[2]Districts 1 and 2 are combined to avoid disclosing company proprietary data.

[3]Includes riprap and jetty stone.

[4]Includes bituminous aggregate (coarse) and railroad ballast.

[5]Includes stone sand (concrete).

[6]Includes crusher run or fill or waste, unpaved road surfacing, and other coarse and fine aggregates.

[7]Includes cement manufacture.

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

TABLE 5
MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2007,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates and concrete products	1,240	$17,600	$14.18
Asphaltic concrete aggregates and other bituminous mixtures	862	15,800	18.28
Road base and coverings	3,160	17,600	5.56
Fill	472	3,260	6.91
Other miscellaneous uses[2]	61	381	6.25
Unspecified:[3]			
Reported	2,970	20,200	6.82
Estimated	7,100	59,000	8.26
Total or average	15,900	134,000	8.43

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

[2]Includes snow and ice control and railroad ballast.

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

TABLE 6
MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2007, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products	1,030	16,200	211	1,390	--	--
Asphaltic concrete aggregates and road base materials	3,010	28,800	741	3,090	276	1,450
Fill	332	2,760	141	505	--	--
Other miscellaneous uses[2]	61	381	--	--	--	--
Unspecified:[3]						
Reported	1,300	7,700	1,630	12,400	38	75
Estimated	5,900	48,000	1,300	11,000	--	--
Total	11,600	104,000	3,990	28,500	314	1,520

-- Zero.

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

[2]Includes snow and ice control and railroad ballast.

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