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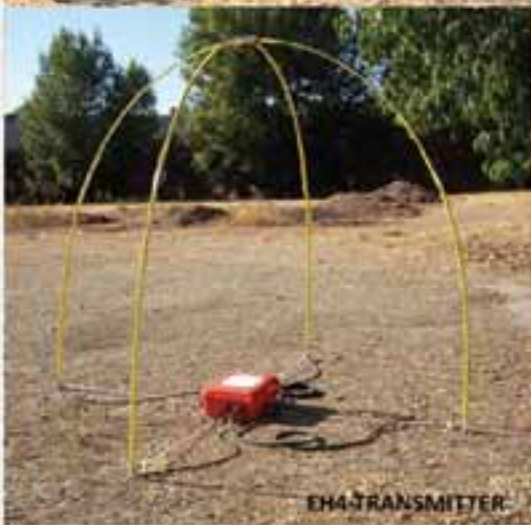
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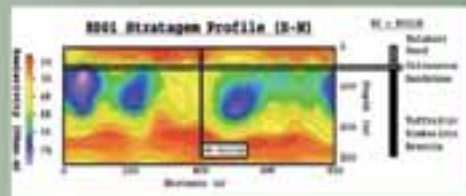


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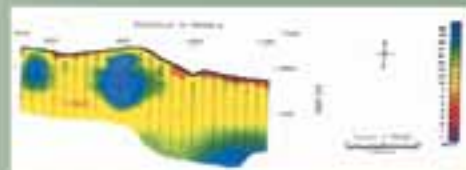
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Letter from the MMA President – Matt Wolfe

‘Made in Montana’

With each passing year as I watch my children grow, increasingly I take the time sit back and thank the Creator for giving me the ability to raise a family in this great state we call Montana. From a career perspective, it is very rewarding to be a part of the Montana mining industry, knowing that our industry is vital to the quality of life in Montana. I believe everyone who is taking the time to read this article will agree that the Montana quality of life is the primary reason most of us draw a Montana state boundary around our career aspirations.

“Made in Montana” is a fitting description for the many raw minerals that are produced by our members. Metals like gold, silver, copper, nickel, platinum, palladium and molybdenum and minerals such as talc, limestone, sapphire, garnet, tungsten, and coal are the foundation for Montana’s rich mining history and promising future.

Simple deductive reasoning about Montana’s mineral resources and a growing global demand for minerals demonstrates a promising future for our mining industry. In spite of political obstacles, Montana will continue to be a 145,556-square-mile hub for mineral exploration and production. Demand for our minerals together with increasing political unrest in the world will help shape the future policies of mining in Montana.

As the Montana Mining Association (MMA), we have a growing opportunity to participate in the process of guiding mineral policy into the future. With a concerted effort from mining companies, mining suppliers, mining communities, small miners and all Montana citizens who recognize the value of the responsible development of Montana’s natural resources, I believe we will experience

a resurgence of mining activity in the coming years. We are already beginning to see a similar resurgence in the oil and gas industry today, and I believe that mining will not be far behind as our nation comes to grips with a fundamental responsibility to produce the minerals we consume in a responsible and sustainable manner.

Thinking far into the future, even as new technologies are discovered that moderate our dependence on natural resources, mining will always have a prominent place as long as we have an industrial, consumer-based society. The example of a new, green hybrid car that uses (on average) 121 pounds of copper (more than double the copper used in a traditional gas-powered car) is significant. Often, technological advances that move away from dependence on one natural resource increase dependence on another.

MMA and its Focus on Mining Education

Thanks to the hard work of a prominent line of MMA executive directors, directors, and officers, the MMA continues to expand in both membership and activity. The MMA Safety Committee, Environmental Committee, Education Committee, Membership Committee, and Legislative Committee each experienced greater levels of participation and activity than has been seen since the heydays of the ‘80s.

Mining education has been elevated to a new level of importance within the MMA in the past year. The MMA recognizes that 21st-century education methods are critical in reaching generation Y and “generation next” with our message. Even as I write, the use of Internet web-



Often, technological advances that move away from dependence on one natural resource increase dependence on another.

sites for education is becoming outdated with the rise of social media. The MMA has started the process of learning to use social media and the Internet in order to reach a larger, younger audience.

In addition, the MMA recognizes that the good ol’ fashioned face-to-face classroom or public meeting forums provide the best quality education opportunities, more so than any other media source. A few of the initiatives started in the past year include the MMA Ambassador training and presentations, a revamping of the MMA website, launch of our first annual MMA Essay Contest (for Montana eighth-graders), and a greater participation with public schools and community organizations than we have experienced in many years.

The National Mining Association estimates that over the next five to 10 years, mining operations in the U.S. will need approximately 55,000 new employees to meet demand and to replace the retiring baby boomers. The MMA Ambassador outreach to public schools this past year was extremely effective and provided an eye-opening experience for many Montana public school students who realized that pursuing a career in mining could not only enable them to stay in Montana, but also could provide them with a higher average wage than any other industry in the state. The aver-



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Montana Mining Statistics

Here are a few more interesting statistics about the mining industry in Montana taken from a 2010 survey:

- Total number of mining operations: 284
- Direct employment: 8,900
- Direct & indirect employment: 20,630
- Annual direct mining payroll: \$700M
- Annual direct & indirect payroll: \$1.16B
- Annual mineral production value: \$1.74B
- Annual mining GDP: \$2.63B
- Mining – percent of Mont. GDP: 6.67%

age annual wage of a mining industry employee in Montana is currently \$79,082, compared to a state average of all other industries of \$34,610.

In conclusion, I would like to extend a word of encouragement to all members and friends of the Montana mining industry: be proud of your mining heritage! Mining was the very first industry to be established in Montana, followed by a host of other entrepreneurial industries that supported the influx of settlers. More than 150 years later, it is the responsibility of our generation to continue the Montana mining tradition in a responsible and sustainable manner. The results of our efforts today will determine the continued success of the next 150 years of mining in this great state that we call home. ♦

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MMA Executive Director's Message

Tom Hopgood



The publication of the 2013 issue of *Montana Mining* roughly marks the end of my first year with the Montana Mining Association. What a ride!

First off, thanks to the MMA Board of Directors for hiring me and trusting me with the day-to-day affairs of the association.

After starting the job on May 1st, we found ourselves busily getting ready for the annual meeting at the Copper King in Butte. Our Political Action Committee, Mine PAC, raffled off an ATV and other items. Many thanks to all those who bought and sold raffle tickets. Also, many thanks to those who donated as well as those who bid on other items. We raised \$14,724!! Because of the Mine PAC's successful fundraising, we were able to make PAC contributions to various state and federal candidates totaling \$5,724. We also coordinated individual donations to various candidates. Thanks to Tammy Johnson of Environomics, Inc., for her solid work on this project. Regardless of whether our candidates won or lost, the campaign gave us a great opportunity to meet the candidates and talk about issues important to the mining industry.

We were given the opportunity to participate in the public hearings conducted by the Legislature's Water Policy interim committee. Our goal was to protect the 35 gpm groundwater permitting exemption. We are glad to note the WPIC did not recommend limiting the exemption and more importantly, the 2013 Legislature has not moved in that direction, as least insofar as mining is concerned. We were also active in the legislatively sponsored Nutrient Working Group in its task of implementing variances from numerical nutrient standards. Although progress has been made, the final resolution of the issue is still some months away. We have also been working closely with other natural resource industry trade groups, including the Montana Petroleum Association and the Treasure State Resource Industry Association (formerly WETA).

Laura has been busy holding the entire operation together. Her cheerful, energetic and helpful demeanor is sincerely appreciated! In addition to her many office duties, Laura has coordinated the creation and implementation of the MMA's website, our new brochure and the MMA Membership

Directory. Debbie Shea has been invaluable in heading up the MMA Education Committee. Debbie and Laura have also been working hard in getting this magazine to press and getting ready for the 2013 MMA Annual Meeting.

Our committees have also been working hard. The committee reports are contained elsewhere in this magazine.

In October, we were able to move our office to a larger space on the second floor of the Red Lion – Colonial Inn in Helena. In August, president Tim Dimock was promoted to a new position with Barrick and moved to Salt Lake City. We wish Tim the best of luck in his new role and appreciate his efforts over the years. We welcome Matt Wolfe as our new president and Mark Thompson as our new first vice-president. Thanks for stepping up. ♦



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Montana Mining Association Mission Statement

The Montana Mining Association (MMA) is a Montana trade association dedicated to helping mining companies, small miners and allied trade members succeed, understand, comply and function in a complex business and regulatory world. The primary purpose of the Montana Mining Association is to protect and promote the mining industry in the state.

The Montana Mining Association monitors issues of concern and provides representation for its members at the state legislature and with various state and federal regulatory agencies. The Montana Mining Association supports national mining initiatives.

The Montana Mining Association provides information and education for its members and distributes information to the general public about the contribution of minerals and

mining to our economy and well-being. One of the MMA's primary functions is to promote and enhance the image of the mining industry.

The Montana Mining Association works in cooperation with other state and national mining associations, natural resource trade associations and groups with similar interests and needs.

The MMA serves the industry on a wide range of subjects through the expertise of its members. Many of the MMA's activities are conducted by various committees. The association has many active associates. Committees within the association are health and safety (including the health and safety of employees within the association), education, membership and legislative (including environmental and land use and political action committee).

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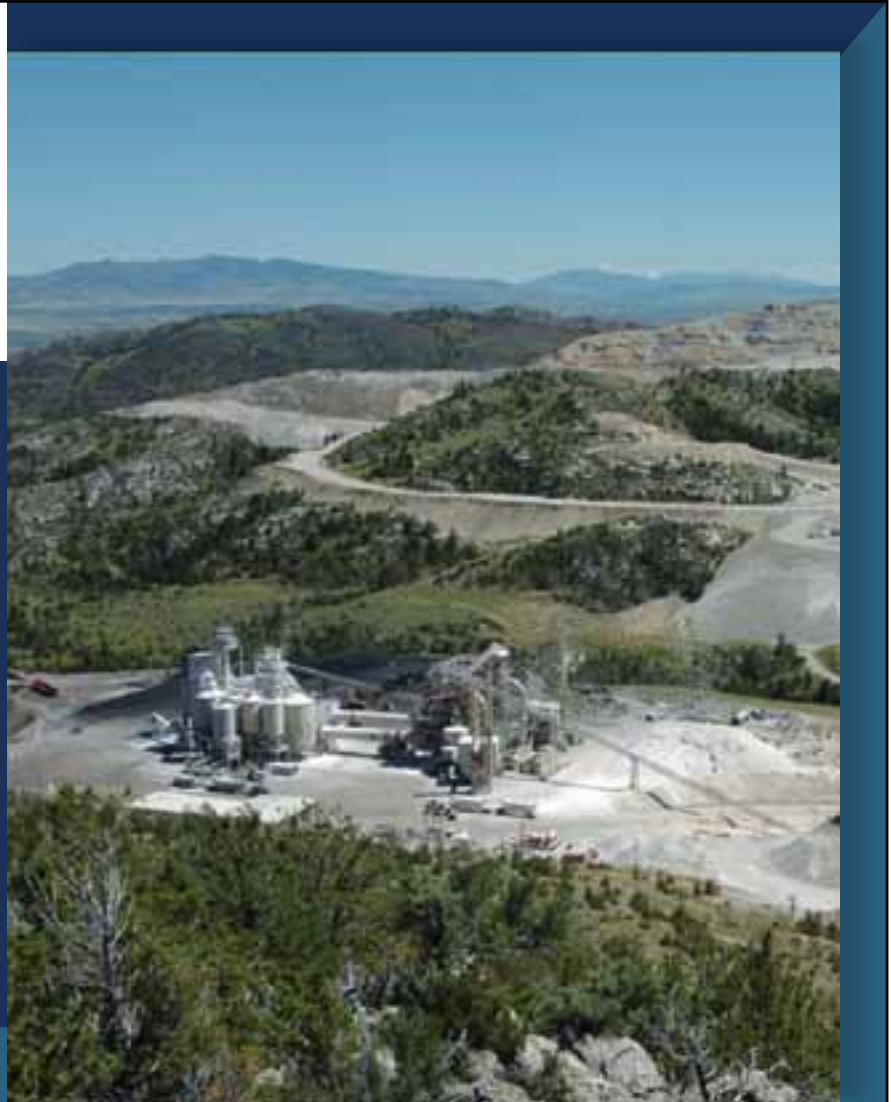
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Mines and exploration in Montana: 2012 in review

By Robin McCulloch, Mining Engineer

The 2012 year covered a wide range of operating conditions for some companies yet remained consistent for others. Metal prices were steady and high; industrial commodities showed increases that mirrored the economic recovery rate; the gold dump miners showed wild enthusiasm and, in spite of the televised reality shows, the placer miners just washed dirt. Venture capital was difficult to raise for most small to medium companies; hence, exploration was very limited.

Troy Mine (Cu, Ag)

In northwestern Montana, the Troy mine (Genesis, Inc.) a wholly owned subsidiary of Revett Minerals, Inc., maintained continuous production through November 2012. The company continued development on a decline to the "I" beds (a two-year project) while driving

north to the "C" bed deposits. Grades were steady, as were shipping and labor costs. In an effort to meet changing diesel particulate standards, the company has been replacing rolling stock, and is utilizing B75 biofuel. The biodiesel has lower carbon emission but is tough on fuel systems.

In mid-December, they started to experience seismic events that eventually lead to closure of the mine. Pillars in inactive portions of the main haulage failed and mine access to the new workings was lost. Early in 2013, a development drift, established for inspection of lower workings, was completed. They found minimal damage in their mining areas and are now preparing a plan for Mine Safety Health Administration's (MSHA) approval which includes re-routing utilities, re-establishing full mine ventilation and a secondary escape way. The com-

pany hopes to resume operations in April 2013.

Rock Creek Mine (Cu, Ag)

Revett Minerals' Rock Creek project continues in their 29th year of permitting. The supplementary EIS is in progress and is expected to be completed early in 2013. The company has won many of the critical court challenges and hopes the process will be completed by the end of the year.

Montanore Mine (Ag, Cu)

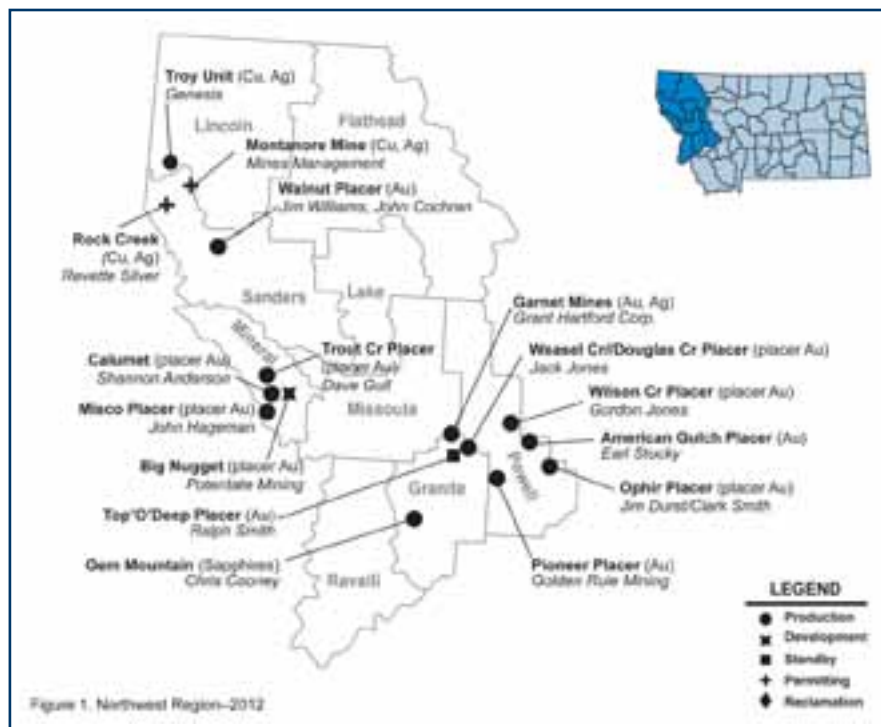
On the east side of the Cabinet Range, Mines Management, Inc. continues re-permitting of the Montanore mine. They are currently focused on the permit's biologic opinion, which is the last step prior to the Record of Decision. With permits in hand, the company will complete pumping of the decline, perform maintenance, and then extend the decline to the original target. That will be followed by an extensive drifting and drilling program to aid in reserve definition and mine feasibility. Development and operations will follow those activities.

Walnut Placer (Au)

Jim Williams and John Cochren operated their placer below Lyon's Gulch on the Vermillion River near Trout Creek. Their progress was delayed while testing a property in Alaska, but returned to finish out the year. The pay grades have been steady.

Trout Creek Placer

Dave Gull successfully mined the remaining reserves downstream from his house. Operations will be moved across the creek after reclamation of most of the existing disturbance. The placer contained bedrock of varying elevations and



potholes. Contrary to basic assumptions, the gold appears to be lying above the iron-rich red gravels.

Calumet Placer (Au)

Near Superior on Quartz Creek, Shannon Anderson maintained sporadic work on the Calumet placer but has yet to initiate significant reclamation or pre-stripping activity.

Misco Placer (Au)

Downstream on Quartz Creek, John Hageman mined steadily on the upper bench. Overburden depth is increasing but Hageman has a good sequence that facilitates concurrent reclamation while allowing steady production. The deposit has yielded some nice specimens of coarse gold.

Big Nugget Placer (Au)

Operations have been put on hold at the Big Nugget mine in Meadow Creek until the new company, Potentate Mining, completes their reserve definition

plan. Preliminary results have revealed multiple previously unknown targets.

Garnet Mines (Au)

In the Garnet Mountains near Drummond, Grant Hartford Corporation steadily shipped screened dump material from the Lead King mine most of the year. They plan to develop the Nancy Hanks mine from the bottom of their decline. Much of the necessary infrastructure, including a surface shop, has been completed.

The Top O’Deep Placer (Au)

The Top O’Deep Placer was mothballed during the season while the owner and operator tested other properties.

Douglas/Weasel Creek Placer (Au)

East of Top O’Deep, Jack Jones mined in lower Weasel Creek most of the summer. He had good recovery last year and found higher grades in the fractured marble below last year’s excavation, which caused him to get a larger excavator and

re-mine the same ground. Operations were curtailed when a forest fire forced evacuation of the drainage.

Pioneer Placer (Au)

In the Gold Creek drainage near Garrison, mining continued through the summer and fall.

Golden Rule Mining Company had a spectacular year. Following a difficult year with the Mine Safety Health Administration (MSHA), the manager developed a cooperative attitude with the inspectors, brought the company into compliance, and maintained production. They upgraded the wash plant, fine-tuned their recovery circuit, changed their stripping cycle to cheaper methods, and initiated a resource definition program. The activities earned them the right to the title of the most improved small mining operation in Montana.

Ophir Placer (Au)

North of Avon, multiple placer operations continued in both the Finn and



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Ophir Creek mining districts. Jim Durst worked with Clark Smith on the Ophir Creek placer. An initial testing program on the “mined out” ground showed the property to be actually pre-stripped to the top of the pay gravels. The gold is typically crystalline in nature, some from the bedrock skarn and some from the skarn upstream. A middle portion exhibited native silver annealed on the gold crystals. The deposit was heavily drifted, yielding numerous 36-inch-long posts. The most curious discovery was a 30-inch-diameter, 22-foot-long fir log found buried in the center of the pay gravels. Extensive work is planned for the coming year.

American Gulch Placer (Au)

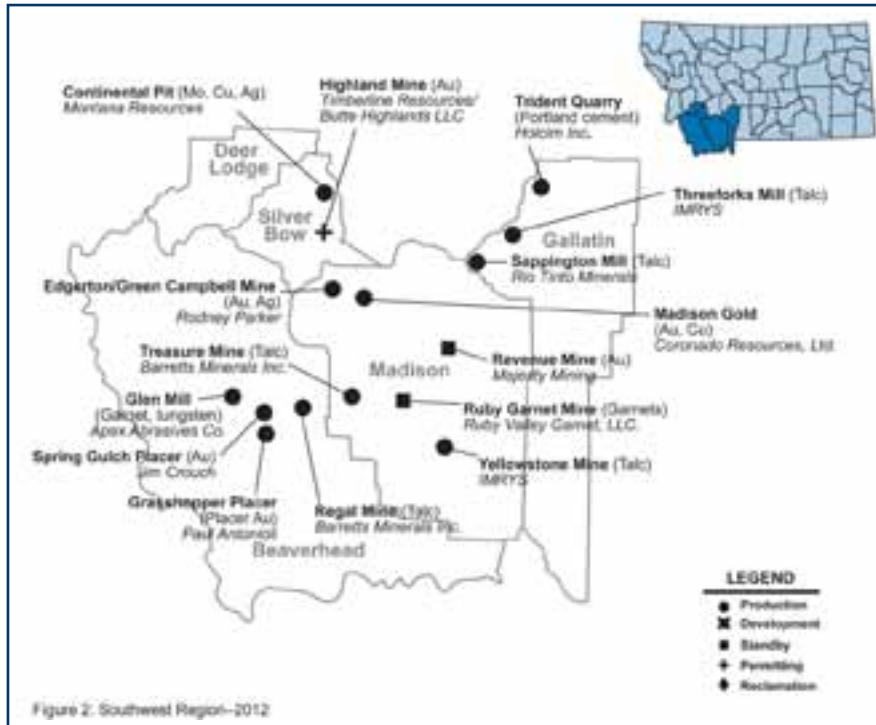
The American Gulch placer on the Stucky Ranch operated with steady success. Mid-summer results were poor until exploration redefined the paleo-channel. Old shafts and header piles from underground drift mines were important indicators to the high-value areas. Operations are expected to continue for some time.

Wilson Creek Placer

Gordon Jones continued to mine a lag deposit from a skarn on granite gneiss. The deposit has variable thickness with limited overburden. The operation is east of Helmsville.

Gem Mountain Sapphire (sapphire)

Chris Cooney maintained commercial production from the Anaconda bench. The company maintains both commer-



cial production as well as a hobby facility for the public. They have an outlet for sapphires in gravel along with heat-treated and cut sapphires for retail sales.

Continental Pit (Cu, Mo, Ag)

In the Butte-Anaconda area, mining was steady and prosperous. Montana Resources was impaired briefly by a failure in the Berkeley Pit wall near the main haulage road. Operations added a third 40 tcy, Bucyrus Erie BE-495HD shovel to their fleet and improved their dust collection system at the crusher. Labor has been steady at 350 employees, with the exception of some retirements. Production has been steady as has been grade.

Their reserve definition project has been very successful in adding 30 years to their reserve base. The new reserves are located between the present pit and I-15. Drilling has been expanded into a seven-year program as they continue to define the faulted blocks of ore in the target area.

Butte Highland Mine (Au)

Highland Mining, LLC. sold their 50 percent interest in the Butte Highlands Joint Venture, LLC to Montana State Gold Co. (MSGC), LLC. for \$24 million. MSGC will fund the remaining exploration and development until production is commenced.

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The status of the operation is:

- 1) Permitting is complete for surface facilities construction, underground drilling and development, and a 10,000-ton bulk metallurgical sample.
- 2) The infrastructure for production is complete.
- 3) Approximately 4,000 feet of workings have been completed.
- 4) The drill program has designed and is waiting for dewatering for access.
- 5) The discharge permit for dewatering has been applied for.
- 6) The modification of the U.S. Forest Service road permit is working through the system.
- 7) The DEQ hardrock permit is expected during 2013.

The operation is very well-designed and should go through permitting easily. The company should be hauling ore to the Golden Sunlight mill by late 2013 or 2014.

Madison Gold (Cu, Au)

West of Silver Star, Coronado Resources, Ltd. maintained campaign mining the last of their known gold and copper reserves at the end of the summer. Operations were closed and the property was sold to Lynx Gold.

Edgerton/Green Campbell Mine (Au)

Rodney Parker mined dumps at the Green Campbell mine complex for shipping to the Golden Sunlight mine. Grades were quite high in some areas.

Glen Mill (garnet, tungsten)

South of Melrose, Apex Abrasives, Inc. completed resizing inventory to meet the needs of their customers. By autumn, they had completely sold all available inventories.

Ruby Garnet mine (garnet products)

Garnet U.S.A. worked diligently to define their reserves and plan quarry boundaries for the new pit. The mill was reconfigured for the transition from placer to lode source garnet resources. Start-up operations are not scheduled at this time.

Regal and Treasure Mines (talc products)

Barretts Mineral, Inc., a subsidiary of Specialty Minerals, Inc., continued talc production from two open-pit mines east of Dillon. The company continued to expand their reserve base at both the Treasure Mine and the Regal Mine. They also drilled 20 holes on two prospects.

At the plant, at Barrett's Siding, an air classification mill was added. The company experienced a 10 percent growth, and labor was up five percent. There has been some turnover in staff due to retirements.

Yellowstone Mine (talc products)

South of Ennis, Imerys maintained steady production of talc of various talc products from the Yellowstone deposit. Labor has been steady as has the market. The company has continued to increase efficiencies and optimize processes to minimize energy consumption. There has been no construction at any of the Montana Imerys operations.

Spring Gulch Placer (Au)

Jim Crouch mined placer gold in Spring Gulch, north of Argenta, producing some nice crystalline nuggets. The deposit is a placer overlying a lode gold skarn. Values

tend to be localized with frequent rattlesnakes. Process water is minimal.

Grasshopper Placer (Au)

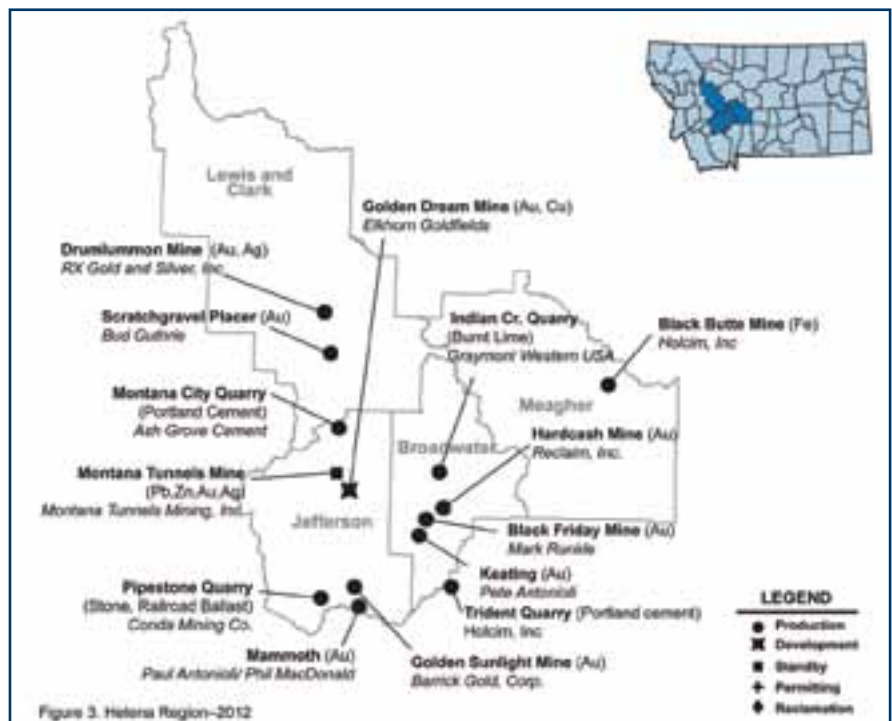
Paul Antonioli mined gravels on the south side of Grasshopper Creek below Bannack. Overburden ranged from 48 feet to over 70 feet. The pay zone was about four feet thick on an uneven, pocket-ridden bedrock.

Drumlummon Mine (Au, Ag)

U.S. Silver and RX Gold and Silver merged to form U.S. Silver and Gold, Inc. The company has discovered the Frankie vein, a 1.4- to eight-foot-wide vein grading 0.116 to 0.676 opt Au, and 2.0 to 56.19 opt Ag. High-grade intercepts were also found in the New Year, St. Louis, and Pixley veins. Future drilling will also explore the North Star vein.

The company has expanded exploration within the district and has identified potential resources at the Belmont mine. They have also explored areas of the Penobscot mine.

The merger has provided surplus milling capacity at the Coeur Mill near Osburn, Idaho. The company has planned to change milling from the



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Contact Mill in Philipsburg to Osburn, Idaho, which is a considerable trucking distance.

Scratchgravel Placer (Au)

Bud Guthrie continued placer production when sufficient water existed. Mining has been limited.

Montana Tunnels Mine (Au Ag, Pb, Zn)

Operations remained suspended at Montana Tunnels Mining located west

of Jefferson City. The mine is under care and maintenance until funding is secured.

Golden Dream Mine (Au, Cu)

Development was curtailed early in the year at Great Eastern Resources' mine near Elkhorn (Boulder) when water was intercepted in the decline. The operation is on hold until funding for a water treatment plant can be secured.

Indian Creek Quarry (burnt lime)

Near Townsend, Graymont Western US mined limestone and produced burnt and hydrated lime products. The company experienced an improving market and increased output by 50 percent. The mine has experienced a nearly sold-out condition for the first time in a number of years.

To meet the increasing demand, the company put in a master control center on Kiln 1. A new yard loader was purchased and a stockpile for a blending crusher was constructed. The company increased their personnel by five percent while improving their safety record.

Graymont donated \$25,000 to the Broadwater Health Foundation to support the local hospital and donated lime gravel to the county road department.

They are working on a memorandum of understanding with the Department of Defense in preparation for when the National Guard (Corps of Engineers) takes over the management of the area from the Bureau of Land Management.

Black Friday Mine (Au)

Near Radersburg, Joe Schmaus and Mark Runkle continued shipping dumps to the Golden Sunlight Mine. Darko Smilovitch was exploring the option of driving a decline to access remaining resources underground.

Keating Mine (Au)

Also near Radersburg, Pete Antonioli crushed and screened dumps for the Golden Sunlight Mine.

Hardcash Mine (Au)

Reclaim, LLC mined ore-grade resources from dumps at the Hardcash mine located west of the Keating mine. The company has developed sampling techniques that have yielded ore with very little variance in grade or tonnage from the estimates.

Golden Sunlight Mine (Au, Ag)

Northeast of Whitehall, Barrick Gold Corporation maintained steady production in the main Golden Sunlight pit.

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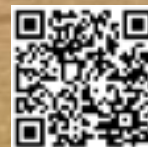
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Grades have been consistent with the drill data. The company is permitting expansion to the north and south in satellite ore bodies.

They have also found more ore near the mill. A new pit is planned 1,000 feet to the northeast where 4.2 million tons have been identified. A layback on the south pit wall will expand reserves in the main pit. They continue to have trouble stabilizing the west wall. All additional reserves will extend the mine life to

2017, not counting additional gold ore from external mines.

Trident Quarry (Portland cement)

Near Three Forks, Holcim, Inc. maintained production of Portland cement. Demand has grown slowly with the recovering economy. Labor has been steady but only standard maintenance has been followed. In 2013, the company will modify and improve the crushing circuit at the plant. All Portland cement

plants will be financially stressed by the new EPA standards as they modify their processes to meet the new criteria.

Mammoth Mine (Au)

South of Cardwell, Mammoth Mining, LLC continued production from the old tailings pond of the Mammoth mine. Production has been reduced while the Golden Sunlight mine scheduled delivery of the sticky tailings to match other less-sticky ore shipments for a better feed blend. The company hopes to totally remove all of the 1930s and older mine waste.

Black Butte Mine (Fe)

North of White Sulphur Springs, Holcim continued to campaign mine the iron ore deposit for flux for the Portland cement plant.

East Boulder Mine (Pt, Pd, Rh, Au, Cu, Ni, Co)

South of Big Timber, Stillwater Mining Company maintained production at the East Boulder mine. Production is up as is the grade, 0.3 opt pgm. Dilution is under four percent. Labor is increasing and they are still hiring. Safety has been a primary objective and the company has initiated a self-inspection program that has saved them thousands of dollars in fines from the MSHA.

The tunnel boring machine is on schedule to Graham creek and is expected to be completed the first quarter of 2013.

Stillwater Mine (Pt, Pd, Rh, Au, Cu, Ni, Co)

Southwest of Columbus, the Stillwater Mine has reached a production target of 2,500 tpd. Union contracts have been ratified and Stillwater Mining Company is focusing on core safety programs and miner training for local hires. Building a workforce from the mine area has been shown to reduce turnover. The Kiruna electric truck (30 tons) program is meeting its production objectives while limiting pollution. The company has also started to use stick powder to reduce nitrates.

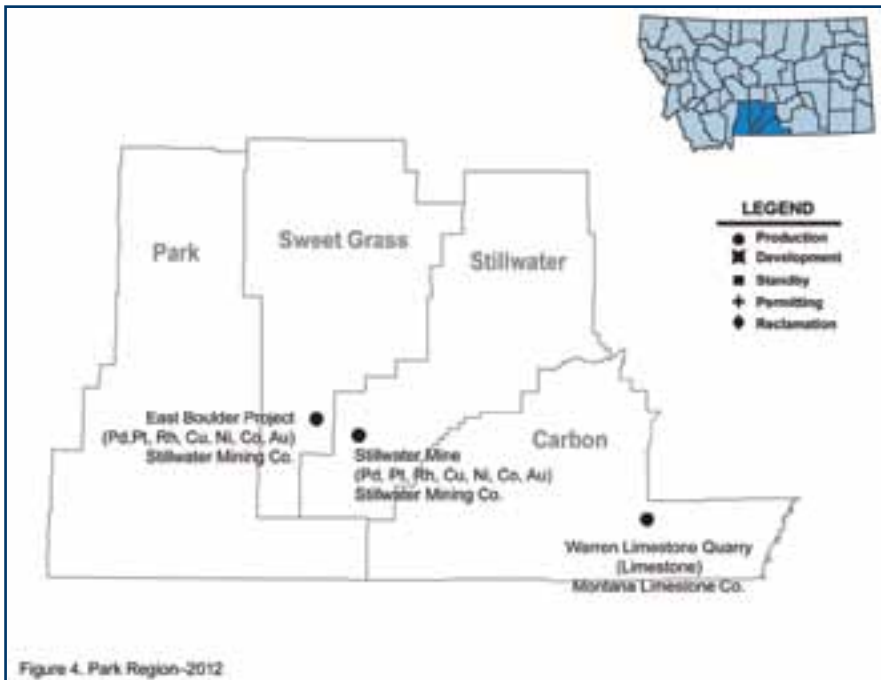


Figure 4. Park Region-2012

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The Blitz project is up and running as of the third quarter 2012. The company is planning a decline on the east end for ventilation and secondary escape-way. There has been some concern and resistance from local inhabitants as they seem to believe a mill and tailings pond will be forthcoming even though neither are planned by the company.

In Columbus, the company is working on modification to the smelter to improve production and efficiencies.

Warren Limestone Quarry (limestone)

South of Billings, the Montana Limestone Company (a subsidiary of Dakota Coal Company) maintained production of limestone from the Mission Canyon Formation. The company continues to produce limestone for the Western Sugar Cooperative in Billings and Sidney Sugar, Inc., in Sidney, as well as the Wyoming Lime Producers plant in Frannie, Wyoming. In addition, they produce a variety of stone products for general sales.

Metal and industrial mineral exploration increased slightly for placer deposits while metal lode mine exploration lagged severely behind comparable states of similar mineral wealth. Permitting from the State DEQ and Bureau of Land Management followed reasonable timeframes while U.S.

Forest Service permits tended to take a year, instead of less than one to two months.

JF Property (Au, Cu)

Near the Troy mine, Genesis, Inc. drilled to further define reserves on the JF property.

Eureka Gulch Placer (Au, sapphires)

West of Philipsburg, Potentate Mining Company completed gravel testing in Eureka gulch. Results are very good and the company is planning to commence mining on their property in the spring of 2013.

Lower Gold Creek Placer (Au)

Near the old dredge tailings of Gold Creek (west of Garrison), Gordon Jones contracted Knife River to test remaining gravels. Initial tests appeared positive but no future plans have been announced.

Smart Creek (Cu)

Near Philipsburg, Frank Antonioli continued exploration in Smart Creek. Results have not been announced.

Lincoln Gulch Placer (Au)

Loren Wirkkala returned to sample gravels in Lincoln gulch. Results were spotty, indicating that the main pay zones are narrow and not easily identi-

fied by wide-spaced sampling. Further work is planned in the coming year.

Columbia Gold Project (Au)

Atna Resources, Ltd. drilled seven reverse circulations holes (3,468 feet) on the old 7-Up Pete deposit located east of Lincoln. The company was after metallurgical samples while confirming down-dip mineralization.

The company is carrying a resource of 741,000 ounces of gold. The reserves are 16.7 million tons at 0.45 opt (ounces per ton) Au (Indicated) and 10.7 million tons at 0.045 opt Au (Inferred).

Atna Resources has started gathering baseline data to initiate permitting.

Stucky Ranch Placer (Au)

Hart Baitis has developed a testing program on the Stucky Ranch that may include placer deposits near Washington creek and Jefferson creek. The focus of the program is lag gravels on the ridges.

Bonny Deposit (Au, Ag)

Golden Sunlight drilled the Bonny deposit near the microwave tower, north of the Golden Sunlight mine.

New Departure (Ag)

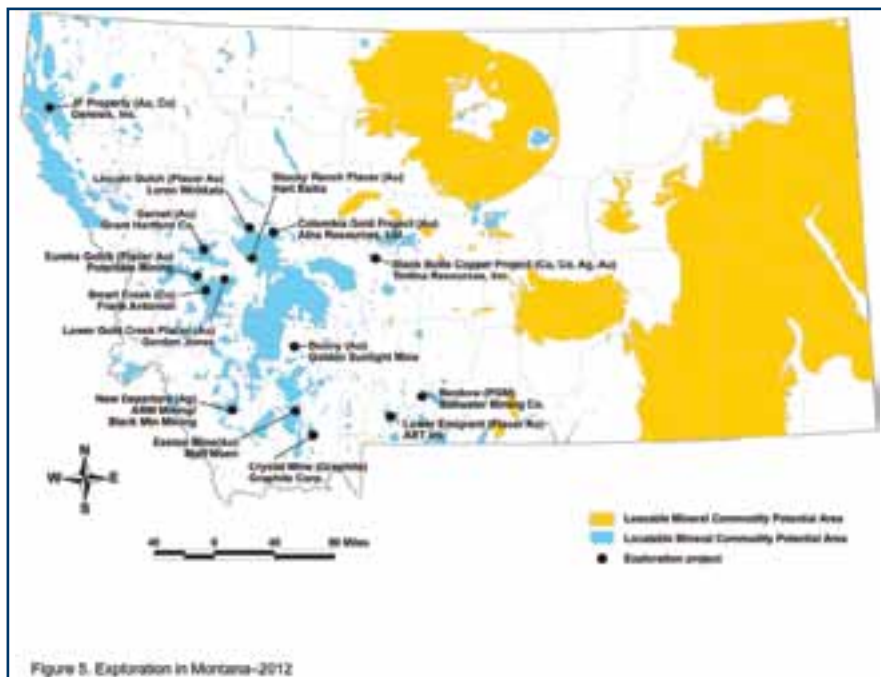
South of Argenta, Black Mountain Resources, Ltd. drilled one diamond drill hole and one reverse circulation hole. The portal of the Laczay tunnel was stabilized but the main development work planned was not completed. The property has a history of silver production.

Crystal Graphite Mine (graphite)

Graphite Corporation (Graphite Corp.) processed a dump at the Crystal Graphite mine located south of Dillon. Results are unknown at this time. The deposit contains crystalline graphite.

Lower Emigrant Placer (Au)

Jeff Frank with ART, Inc. initiated an extensive geophysical exploration program to define and examine gold placer resources on the Pittsburg mining property. Late season trenching identified remaining gold placer resources along Emigrant creek near Chico Hot Springs.





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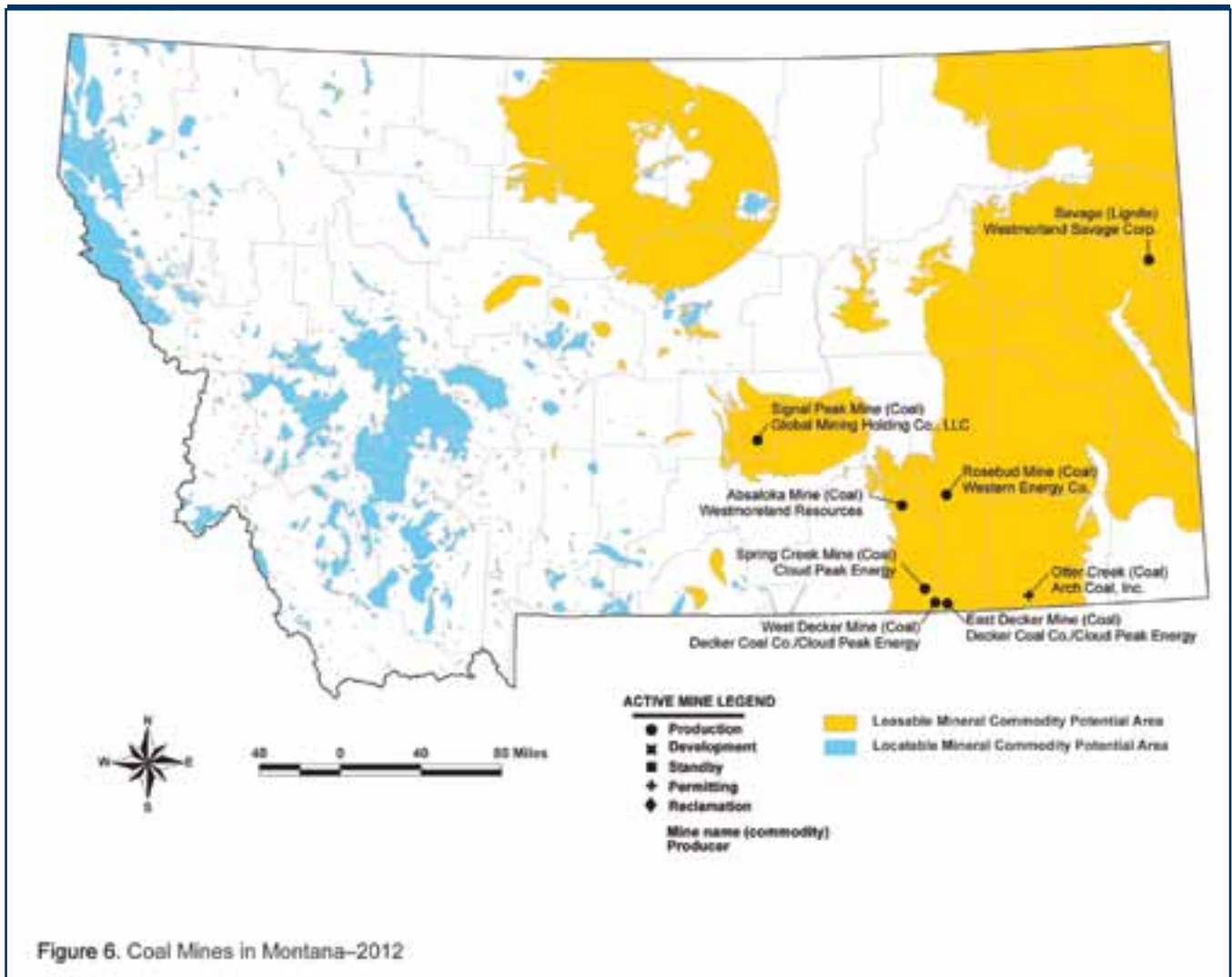


Figure 6. Coal Mines in Montana–2012

Black Butte Copper Project (Cu, Co, Ag, Au)

Tintina Resources, Inc. continued defining copper resources north of White Sulphur Springs. The company defined the Lowry deposit at 5.1 million tonnes at 2.6 percent Cu, 0.12 percent Co, and 14.6 percent g/tonne Ag through infill drilling. Cumulative to date, Tintina has inferred resources of 623 million pounds of copper at an average grade of 3.2 percent. They have an indicated resource of 533 million pounds of copper at 2.96 percent Cu. Their measured reserves are at 266 million tonnes at 2.99 percent Cu.

Permitting for a decline, which will facilitate a metallurgical sample, is planned to commence in 2013. An application for mining is planned in 2014. Many unexplored deposits exist and wait to be drilled.

Benbow deposit (Pt, Pd, Rh, Au, Cu, Ni, Co)

Stillwater Mining Company is working on a number of diamond drill holes located near the Benbow chromite mine. These holes will examine grade and rock conditions that are expected to be encountered by the Blitz project in their drive toward the east from the Stillwater mine.

Coal production was down by 13 percent to 36,661,187 tons. Most of the companies blamed the reduction on mild weather that reduced demand, as well as increased competition from wind energy. The environmental groups have rallied in endless protest against coal exports to the Pacific Rim. Those exports have been the first opportunity for market expansion for Montana in years.

Decker Coal Mine

Production from the Decker Coal Co. was up at both mines. East Decker was up 18 percent to 2,247,873 tons and the west Decker mine was up 64 percent to 484,570 tons. The mines are operated by Kiewit Mining Group for Cloud Peak Energy and Level 3 Communication. The property is managed by Ambre Energy. Cloud Peak Energy has sued Ambre Energy over decisions to sell more coal to the Asian Market without approval from Cloud Peak.

Savage Strip Mine

Westmoreland Savage Corp. decreased production at the Savage Strip mine (lignite) by 16 percent to 296,454 tons. Pur-

chasers of lignite range from the sugar plant to the Dakota Utilities mine-mouth generation facilities. Additional causes for reductions of coal demand and resulting production decrease include diminished sugar-beet production and mild winter weather.

Rosebud Mine

Western Energy produced 10 percent less coal at the Rosebud mine; however, the CELP (waste coal) production was up by 22 percent to 248,691 tons. The Rosebud production was 7,761,804 tons.

Absaloka Mine

The largest decline in production was at the Absaloka mine run by Westmoreland Resources. Production there declined by 51 percent to 2,714,063 tons. Production was reduced matching diminished demand. Other factors resulting in decreased production include a large unplanned maintenance program at the mine and a fire at a customer's facilities. Westmoreland Resources also announced completion of a lease with the Crow Tribe of 145 million tons.

Spring Creek Mine

Cloud Peak Energy continued to be the largest coal producer in Montana, with a 10 percent decrease at the Spring Creek mine to 17,200,109 tons.

Signal Peak Mine

The Signal Peak Energy mine was up by 11 percent to 5,707,623 tons. They have obtained a lease from the Bureau of Land Management for 35.5million tons of additional coal.

Otter Creek Mine

Arch Coal Co. continued to work through a combination of permitting and lawsuits by the environmental community on the Otter Creek coal lease.

Acknowledgments

The author would like to thank the companies, individual miners, Bob Cronholm (Montana Environmental Management Bureau, DEQ), Chris Yde (Coal and Energy Bureau, Montana DEQ), BLM minerals personnel, and the Montana Mining Association for their assistance with this report. Without their help, this report could not be possible. ♦

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Annual poll of Montana voters demonstrates guarded optimism, support for natural resource development

By Glenn Oppel

Government Relations Director, Montana Chamber of Commerce

Since 1992, the Montana Chamber of Commerce Power Base (P-Base) poll has scientifically measured voter sentiments on the state's economy, business issues, and political trends. The latest poll, conducted in November 2012 by an outside professional polling firm, surveyed 600 registered Montana voters on a variety of policy issues with a margin of error of plus or minus four percent. The 2012 results find voters are increasingly optimistic about the state economy, but still see the need for more and better-paying jobs as the state looks to emerge from effects of the Great Recession. I appreciate the opportunity to share a summary of the results with the mining community.

Right Track, Wrong Track?

When asked the basic question whether Montana's economy is on the "right track," a majority of voters—52

percent—said yes, while 25 percent said "the same" and 23 percent said "wrong track." The 52 percent of voters that think Montana was on the right track in 2012 is a marked improvement over a low of 41 percent at the front-end of the recession in 2009.

When it comes to the direction of the national economy, Montana voters are considerably less optimistic: 50 percent say the national economy is on the wrong track. This is, however, a substantial improvement over the 81 percent of Montana voters who felt the national economy was on the wrong track in 2008. The paradox between sentiments about the state and national economies illustrates the fact that Montana is one of the few states that is weathering the recessionary cycle. But Montana voters are guardedly optimistic, as you'll see from their priorities.

Voter Priorities for the Legislature

The poll asked voters, "When the Montana Legislature meets in January, what should be its number one priority?" With the state unemployment rate still hovering near six percent, it's no surprise that 31 percent of respondents listed "create jobs, increase wages, and improve the economy" as the top issue for the legislature. A distant second, with 16 percent, was "lower taxes, balance the budget, and cut spending."

"Affordable health care" was the third-highest legislative priority for voters, garnering a nod from 10 percent of respondents. This is no surprise, either, given that health-care costs have doubled over the past decade. Related, 25 percent identified "health-care costs" as their top "pocketbook" concern. Seventeen percent of voters picked "taxes" as their second biggest financial concern and 14 percent said "secure retirement." "Job security" was identified as a top financial concern by 10 percent of voters. Montana voters want to see more job creation, and want to see it happening in the natural resource sector of our economy.

Strong Support for Natural Resource Development


Although voters ranked promoting natural resource development as the fifth-highest priority for the Montana Legislature, there is strong, steady support for growth in this sector of the state economy. The P-Base poll asked registered voters, "Do you think state government should encourage and promote these industries because of the jobs and economic benefits provided, or restrict



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and discourage these industries because of potential environmental impact?" For coal, 71 percent said "encourage and promote" while 20 percent said "restrict and discourage." Voters were also positive about oil and natural gas (77 percent to 16 percent) and timber (83 percent to 10 percent). As for mining, voters were just as strong in their support—71 percent to 20 percent.

Further poll questions revealed that general voter support for natural resource development transferred over to support for more specific projects and issues. For example, a supermajority of voters—67 percent—agreed that the TransCanada Keystone XL Pipeline would create jobs and tax revenue, while only 24 percent agreed that it posed an environmental risk. More germane to the mining community, 58 percent expressed support for changing state law to make it easier to mine coal in Montana, while 30 percent opposed. In terms of a specific project, 66 percent of respondents were supportive of developing the Otter Creek coal tracts, while 20 percent were opposed.

Voters quite clearly realize that natural resource development is critical to growing Montana's economy, and creating higher-paying jobs is what the electorate is looking for. In fact, support comes from majorities of Republicans, Democrats, and Independents polled on every industry category.

Conclusions

The results of the 2012 P-Base survey demonstrate that Montanans want more economic growth that creates higher-paying jobs and a reliable tax base. They are strongly supportive of tapping into Montana's natural resources, even when given a choice to increase environmental protections.

In closing, with the P-Base poll, we gauged the trust that Montana voters have in business to protect the environment while growing the economy. Sixty-nine percent said "yes", business can be trusted to protect the

environment, while a small minority—21 percent—said "no."

It's time for policymakers to do what they can to rejuvenate Mon-

tana's natural resource economy and pull us out of the Great Recession for the foreseeable future. ♦

More details and complete poll results can be found at www.MontanaChamber.com/2012P-Base.pdf.

Feel free to contact me with any feedback or questions at 888-442-MONT (6668) ext. 104 or Glenn@MontanaChamber.com.



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Letting miners tell the mining story

MMA Ambassador Program creates awareness about our industry's heritage and modern opportunities

By Anika M. Hanisch

When Social Studies teacher Mary Jean Ferguson heard about the MMA's new Ambassador Program, she thought it would be a great fit for her American History and Montana History classes at Anaconda High School (AHS). Ferguson jumped at the opportunity to have a mining industry ambassador come to her classes to speak about the state's mining history and current activities.

She and her classes were impressed with the historic content of the presentation; some of it overlapped with history topics they had studied just days before. But even more, the students were especially engaged when their ambassador, Mike Moodry, told them about job opportunities in the state. "The next day, a couple of the guys were talking about how good it was to hear that," Ferguson says. "They want to stay in Montana and didn't realize there might be some good-paying jobs like that available."

Developed during last year's MMA Strategic Planning Session, the MMA Ambassador Program has taken off quickly. Mining industry members have visited business groups, middle schools and high schools, assisted-living communities, and other venues to share stories about the history of mining in Montana, answer questions about current opportunities, and explain the ubiquitous nature of material extraction in modern life.

There are already about 50 ambassadors in the program. "They've done an outstanding job," says Debbie Shea, MMA education director. "They've gone miles from where they live to meet with communities all over the state." That's included a concerted effort to bring the educational program to young people.

Moodry, lab supervisor at Golden Sunlight Mines in Whitehall, was curious about how he could make his presentation relevant to teens. When he spoke at AHS, he "geared it more toward the great job opportunities that the mining industry provides," he states. He also got the students talking. Moodry pointed out items in the room and showed them how pretty much everything was connected to mining. Ferguson thought he did a great job keeping the students interested. "I was kidding him afterwards, saying he probably should've been a teacher," she says. "Sometimes presenters are nervous with the kids, but he looked like he felt right at home."

Moodry has had other occasions where he's wondered how a presentation would go, but found himself pleasantly surprised. "I gave a large presentation to the Missoula Lions Club and was a bit apprehensive about how our message would be received... They've been perhaps the most supportive group

I've presented to," he says. "I was also surprised to find out almost everyone knew of, or were friends with, someone who was currently or was once employed in the industry."

Greg Gannon, environmental manager at the Holcim (US) Inc. Trident Plant in Three Forks, has also noticed how being an ambassador creates opportunities for healthy dialogue. At school presentations, he's asked if anyone has ever toured a mine, and typically no one raises their hand. "It is a great opportunity to communicate the facts of our industry," Gannon says. He likes to contrast hard statistics with some of the negative perceptions often broadcasted in the media. "[Mining] is not even in the top 15 most dangerous jobs defined by the U.S. Bureau of Labor Statistics," he states. Most students are very surprised to hear that.

In his presentations, Gannon often works with Mike Mullaney, production manager at the Trident Plant. Mullaney reiterated the satisfaction in being able to educate and share lesser-known

Did you know?

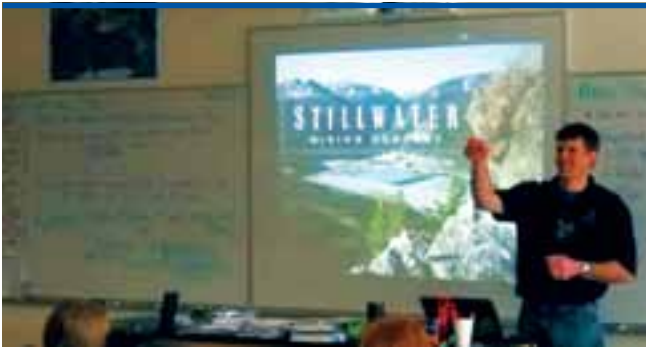
- Mining produces the critical raw materials used in housing, automobiles, and computers, as well as the mined coal and uranium that generates more than half our nation's electricity.
- In 2010, Montana was home to 284 mining operations, which provided direct employment to 8,900 people and another 11,730 people indirectly from mining activity occurring both in and outside the state.
- Jobs in the Montana mining industry are high paying—110 percent higher than the average wage in the state.

(Source: National Mining Association website)

More Mining Facts

- Every American consumes 3.6 million pounds of minerals, metals, and fuels in their lifetime.
- Your computer contains several mined materials including iron, aluminum, copper, gold, silver, platinum, and palladium.
- The average automobile contains 50 pounds of carbon, 42 pounds of copper, 41 pounds of silicon, 22 pounds of zinc, and more than thirty other mineral commodities, including titanium and gold.
- A Vesta V90 3MW Wind Turbine contains steel, zinc, copper, concrete, molybdenum, aluminum, and talc.

(Source: Montana Mining Association)



The MMA Ambassador Program has made presentations at schools, assisted-living communities, businesses, and civic groups in Libby, Troy, Thompson Falls, Kalispel, Missoula, Dillon, Anaconda, Butte, Whitehall, Manhattan, Trident, Ennis, Livingston, Columbus, Billings, Bozeman, and Big Timber.

facts—especially pertaining to how much mining affects basic quality of life. When he speaks to students, hardly any of them are aware of where cement comes from. “[It’s] a great opportunity to explain how we make our product from several minerals that are mined,” Mullaney says. “These minerals are used to produce a product that is the glue that keeps together the foundation for their school, home, sidewalks, churches, grocery stores, shopping malls, etc.”

Being an ambassador requires not only very flexible people skills, but also in-depth knowledge of a variety of mining activities across the state. Mark Briggs, mine operations training supervisor at Golden Sunlight, recently spoke at the Whitehall Rotary Club; his host was fellow mine employee Paul Buckley. Buckley appreciated that Briggs spoke on matters far broader than just local mining activities. “Even for me, there was a lot of new information,” Buckley says. “We mine gold here, but forget there is a talc mine just down the road. That’s a completely different operation.”

After hearing the overview of activities throughout the state, the Rotary Club members better understood the extent to which mining is involved in creating modern materials and goods. “No matter what you use or touch, you probably rely on a mine to make it available to you,” Buckley says.

After the presentation, the group had some very specific questions about mining’s economic impact. Briggs didn’t know the answers offhand, but promised to research and get back to them. He did so and was able to extend the education opportunity well beyond his presentation. “It was fun to do the research and follow up with them,” Briggs smiles.

Briggs, who has worked at Golden Sunlight for over 25 years, working up from equipment operator to his current supervisory role, has been very impressed with the diversity of the questions people ask him. “One older gentleman at the retirement center asked if there was any titanium mined in Montana,” Briggs recalls. “I think maybe he had some artificial joints in his body and wondered if it was mined here. I wasn’t sure about titanium, how it was processed or anything, so I did some research and sent it to him.”

For Briggs, those personal interactions are some of the most satisfying aspects of the MMA Ambassador Program. His talks provide an entertaining and relevant window into the industry.

PASS IT ALONG...

Is there a civic group or school in your region that might be interested in hosting an MMA Ambassador presentation? Share this article, and encourage them to contact Debbie Shea at dshea@montanaming.org, or call the Montana Mining Association Office at 406.495.1444.

It can be paradigm-shifting for people who have had little direct contact with modern-day mining.

Moodry has noticed that, too. Even during his presentation at the high school in a well-known mining town, there were eye-opening moments for the students. “They were interested to hear that most current-day mining in Montana occurs in places where mining was done in the past,” he says. “(This) gives current-day operators a chance to clean up mistakes made in the past.” Ferguson was interested those points, as well. Briggs was thorough in “talking about the environmental part of it, how different it is today,” she states. “There’s recovery done as you mine.”

After only a year, the MMA Ambassador Program has already been very successful in its stated goal to “to educate Montanans about miners and their contribution, both past and present, as well as their future work in our great state.”

Shea believes it is vital that the industry “not rely on the media to tell our story; but for us to paint the picture of what really has happened with mining in Montana, not only in the past but current information, as well.” Through the work of some very dedicated industry members, that’s happening now. ♦

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MMA profile on Doug Miller

By Nancy Kessler



Doug Miller has spent 35 years working in the mining industry, starting as a manual laborer down in the mines and moving up to his current position as vice-president for operations at Revett Mineral Inc.'s Troy Mine. But his success in the industry nearly didn't get off the ground, no less underground.

The Great Falls native planned on attending Montana State University in Bozeman to study civil engineering, but he accompanied a high school friend looking at Montana Tech in Butte, and liked what he saw.

"I never made it to Bozeman," Miller laughs. College summers spent working in mining convinced him to stay in Butte, where he earned a Bachelor of Science in Mining in 1978. His interest in hard-

rock mining led to jobs in gold, silver, copper and zinc mines first in Montana, and then in Idaho and Tennessee.

Eventually, Miller returned to Montana at the Troy Mine, which had been put on "maintenance status" by Asarco in 1993. Revett was formed in 1999 to acquire the Troy Mine, and Miller joined the new owners in 2004 to get the mine back into production.

Despite being closed for more than a decade, "starting up was not that difficult," he says. "Good care was taken in shutting down and during the downtime." But it was more fun to get back into operations and create "200 quality jobs for a talented and dedicated workforce, and being part of building the industry back to where it is today," he says.

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And Miller was delighted to be able to remain in his home state, where he and his wife raised their three children and enjoy horseback riding, camping, archery hunting, skiing and golf. "A lot of miners would like to work and live in Montana," he says. "It's been a challenging and interesting career, with hardly a dull moment. It's a dynamic industry; things change every hour. Every day there are bright spots and then things turn south. In the future, I'll refer to this as a learning experience."

Miller has learned all aspects of the industry, from management and operations to the science and safety of mining. "The safety of your people is a very important part of mining," he states. Safety issues led the mine to suspend operations in December 2012, but Miller is proud that the company has retained its entire workforce, which is performing maintenance work on equipment and receiving additional training.

"The company believes our employees are our greatest asset, and are an extremely important part of our future," he explains. Keeping miners employed is part of Revett's "diligent attempts to be good neighbors," helping the local economy and allowing staff to continue involvement in many community activities.

Robin McCulloch, former staff mining engineer for the Montana Bureau of Mines and Geology, credits Miller with developing that company perspective. "He's a real leader in the company, tenacious, and a forward-thinker," says McCulloch, who has known Miller since the 1970s. "Doug stays calm and collected and works through each issue. His caring and sincerity are critical. I really saw the empathy with his employees in this suspension, what his people mean to him. He really stepped up to the plate, and is looking long-range."

Miller is keen on sharing his knowledge of the industry as well, particularly through his 30-plus years of involvement with the Montana Mining Association, serving on MMA committees and as a director. The MMA offers everyone interested in mining the opportunity to affect legislation that improves the industry, he

says, and to educate the state and the nation on positive changes in mining.

Those efforts also are lauded by his peers. When the MMA developed its "Ambassador" initiative, Miller was the first to recruit volunteers. "And recruit he did," says Tammy Johnson, consultant with Environomics and an industry lobbyist. "In true fashion, Doug was the first to provide necessary speaker training for his volunteer employees. Doug has always believed that mining's story is one that needs to be told, in every venue possible, and has supported his volunteer ambassadors whenever and wherever they receive a call for a presentation."

Miller describes himself as an open book, straightforward and persevering, and hopes he has contributed to keeping high-paying mining in Montana. He credits his achievements to surrounding himself "with very good people. I owe my success to a lot of them."

But McCulloch says, "As an outsider looking in, it's easy to see who shines.

You have to be level-headed like Doug to work with miners and the various agencies and environmentalists. In Doug, I see somebody who really made changes and has grown in his career."

"Doug Miller is a champion in every sense of the word," adds Johnson. "He has such passion for the industry, his community, and his fellow employees. He is committed to doing whatever he can to see mining prosper today and well into the future, and he never ceases to inspire me."

If he hadn't taken that auspicious trip to Butte all those years ago, what would Miller have done? "I have no regrets," Miller replies, "but it's always been the same desire—to own a cattle ranch. Possibly I will when I retire. I was raised in that environment. The work ethic I learned on the ranch I brought to mining. They both are natural resource businesses, and both have tremendous respect for the land you're living off."

It's obvious Miller's colleagues have that same deep respect for him. ♦

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Vendors: *valued members of the mining industry and the MMA*

By Rebecca Colnar

Mining connects many components to make the industry successful. Vendors play a huge role in the mining industry, whether they are providing trucking, equipment, supplies, field services and so much more.

Westate Machinery, which started in the 1950s, is based out of Billings. The company offers rock crushing, casting and screening equipment for about a dozen mines in Montana. Jim Reno bought the company in 1985. "We were always part of the mining business in some shape or form before that, but once I bought the company, we [made] a real push to support the mining industry," notes Reno. The company sells equipment to both hard rock and coal mines.

"I believe the future is bright for both coal and hard-rock mines. Of course, as anyone in mining knows, the greatest obstacle is getting the necessary permits," says Reno. "Montana is blessed with reserves of everything, from coal and copper to platinum and much more. Our mines really are good stewards of the land and water. Mines provide good, high-paying jobs for people and help the economy of the state. As vendors, we contribute by hiring people and selling equipment to the mines."

John Junnila, with Westate, explains the company works hard to provide good customer service, including having an inventory to support the needs of the mines, and also providing the working knowledge necessary to fix equipment.

"One challenge we face is that a lot of the older people who have been involved in mining are retiring, and we need to hire younger guys. Younger people certainly have no problem with technology, but some of the basic knowledge regarding mining takes years to acquire," Junnila admits.

Westate Machinery has been involved in the Montana Mining Association for many years. Junnila remembers when it

was a vibrant organization and conventions were full of miners talking about new products. "Then the cyanide heap leach process was outlawed by the voters of Montana after the environmentalists scared everyone," explains Junnila. "This was unfortunate, because there were new projects in the planning stages that were abandoned after the cyanide process ban was passed. This put the industry in a tail-spin."

But there's hope again. The MMA is starting to build back up, and that's good for the miners. "Mining is good for the economy of the state. It's good to make a profit because we have huge expenses," Junnila says. "We have to make money to spend money and help the economy."

Junnila has been on the associate board for some time and Westate has given financial support to the MMA and mining in general. Reno praises the MMA Safety Committee.

"It's taking off and supported well by all mines—one of the biggest benefits to belonging to the MMA is the new safety program they have implemented. They have done a fantastic job. A lot of people are joining because of the safety program," says Reno. He praises the MMA for representing the mining industry during the Montana Legislative session.

"We need to work as a group. No one person can get things done, so we are much better off working together," concludes Reno.

Safety is certainly on the minds of many mining-related companies. The MMA Safety Committee is also strongly supported by Dick Irvin, Inc. (DII). DII is a Shelby, Montana trucking firm established in 1951, and continues to provide trucking services to Montana's mines as it has for the past 40 years.

"DII actively supports the MMA's Safety Committee and has been involved as a member of its board of directors for the past 20-plus years," says Mark Cole, DII.

"We are proud to be associated with one of Montana's most dynamic industries, and DII looks forward to a prosperous and successful involvement in Montana's mining future."

AFFCO, based in Anaconda, a town with a vibrant mining history, has a long history, as well. The Tuttle Manufacturing Company opened its factory in the 1880s. Later it was taken over by Copper King, Marcus Daly and his Anaconda Copper Company. Today, it's AFFCO, or the Anaconda Foundry Fabrication Company, which marries the artistry of days gone by with modern and innovative technological processes. The company manufactures a variety of goods including lamp posts. (Not very mine-oriented, but certainly popular with housing developments and neighborhoods.) For the mining industry, they have a foundry that can do anything from bin liners to boiler gates; they have a fabrication plant that can "bend, shape or cut" anything to bring life to a plan; and they have a machine shop and industrial supply. They are also the largest recycler of steel in Montana.

Brenntag is a distributor, supplying a full line of chemicals to the mining industry. They provide mill chemicals, environmental reclamation materials, and process chemicals for all types of mines. "We have been involved in the Montana mining industry since the forerunner of our current company was established in 1973," says Mark Redfern. Brenntag prides itself on being the world's leading chemical distributor, but still maintaining a local presence. "We have a worldwide supplier network, and we maintain local inventory in Billings, Montana; Dickinson, N.D.; Idaho Falls, Idaho; and Ogden, Utah, in addition to multiple sites in California, Nevada and Oregon. We are on call 24 hours per day."

Redfern explains Brenntag's role in Montana mining. "We provide safety training programs regarding the products

we sell, and are proud of our safety record in delivering our goods to the mining industry. Brenntag is committed to being environmental and safety stewards in all of our activities, which translates to service to the mining industry in not only product knowledge, but also things like storage regulations and tank configurations.”

“Brenntag’s Cornerstone program, which is the basis for all we are, began as a safety program and has expanded to encompass these components: safety first; leadership and accountability; employee involvement and ownership; commitment to excellence; continuous improvement; and world-class value creation,” says Redfern. “The mining industry in Montana contributes to a significant number of jobs in our company, including warehousing, customer service, purchasing, sales, and delivery personnel.”

Brenntag (or its predecessor) has been a member of the MMA for over 25 years. “I have served on the board of directors as a vice-president or board member representing ‘the suppliers’ for the past 10 years,” explains Redfern. “We have participated in legislative issues, sponsorships at annual meetings, and ongoing educational programs involving Montana’s youth.”

Mining Companies

Mines are supported by the dedicated vendors that supply goods and services to the industry.

“Recent employment surveys show that there are 8,900 people who are directly employed by mining companies in Montana. In addition, direct and indirect employment from mining in Montana is numbered at more than 20,603 jobs,” explains Matt Wolfe, with Stillwater Mining. “Our MMA associate members (vendors, contractors, and consultants) make up the vast majority of indirect employment from the mining industry in Montana. Our associate members are very active in the association and participate in each and every one of the board committees. The MMA is a team effort between operators, associates, and individual members. The participation from our associate



Jim Reno, owner of Westate Machinery.



Mark Redfern.

members is very much appreciated, and is critical to the continued success of the association.”

Mike Mullaney, production manager at the Trident Plant for Holcim, (US) Inc., and past MMA president, says, “If we did not have vendors providing goods and services to the mining operations, we would not be in business. There are many vendors that understand the importance of the Montana Mining Association, and that is why they are members—and some

even actively participate in committee and board meetings. Their input is valued.”

Mullaney notes that many vendors are not members of the association, “and it is our hope that all vendors will become a member of the MMA.”

Current MMA executive director Tom Hopgood summarizes thus: “Our vendors are indispensable. Without them, mining would not take place at all. They are valued members of our association.” ♦

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63rd Montana Legislature stands adjourned *Sine Die*

By Tom Hopgood and Tammy Johnson



Tom Hopgood.



Tammy Johnson.

The New Year ushered in brisk temperatures, biting winds, and short daylight hours—but long working hours—as the 2013 Montana Legislative Session conducted the swearing-in ceremony on January 7.

Montana's citizen legislature is a hardworking bunch of folks who devote significant hours and commitment to a marathon 90-day session, during which the body reviews and makes decisions on well over 1,000 pieces of legislation.

The MMA thanks all 150 members of the 2013 Montana Legislature and the legislative staff for their dedication and resolve.

While one might assume that specific pieces of legislation dealing directly with mining are the sole focus of those who advocate on behalf of this great industry, there are many pieces of legislation that must be watched and reviewed. The breadth of the issues is wide and includes such matters as local land-use processes, business equipment tax rates on not just mining equipment but also on inventories of equipment and supplies sold by MMA associate members, corporate tax structure and rates, tax abatements or reductions for pollution control equipment, water usage, quality and availability, eminent domain, workers' compensation, economic impact statements, safety training, environmental review, climate change—and the list goes on (and on, and on...).

The MMA and member companies diligently tracked over 70 specific bills throughout the session and reviewed over 2,000 introduced and un-introduced legislative requests.

The MMA had active and engaged legislative/environmental committees which steered the ship and provided great information and technical knowhow. The MMA legislative executive committee



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was nimble, responsive, and knowledgeable. Certain folks deserve to be singled out for a public thank you for their exceptional work throughout the process; those include John Beaudry, Stillwater Mining Co.; Mark Thompson, Barrick Golden Sunlight Mine; Doug Parker, Hydrometrics.; Terry Grotbo and Doug Rogness, Newfields; Greg Gannon, Holcim; Paul Lammers, Revett Minerals; K.D. Feeback of Gough, Shanahan, Johnson and Waterman; Ted Antonioli, Robin McCullough, and Gene Nelson. Without these individuals' willingness to work on the crafting of legislation, patient explanations, service to the committees and overall leadership, the MMA would not have fared as well as it did.

The Montana Mining Association's member producers, associates and individuals worked throughout the interim to identify its goals and objectives, which included:

- Protect gains made last session on permitting predictability and certainty and retain the clarification of MEPA as a procedural process.
- Protect the industry's ability to obtain and use water essential for exploration and development.
- Protect our ability to access and fully develop our ore bodies.
- Protect and enhance an overall climate conducive to conducting our business in Montana.

So how did the MMA fare? As is typical, there were high points and low points but overall, pretty well. We were able to protect the previous session's gains, did not see the erosion of our ability to permit operations, and the Montana Environmental Policy Act was not tinkered with. Some gains were made in overall business climate with the passage of several tax bills, which should have positive effects. Onerous propositions were defeated, and in some cases, the status quo was maintained.

FINAL DISPOSITION OF LEGISLATION IS UNKNOWN AS OF PUBLICATION OF THE 2013 MMA MAGAZINE.


The Montana Mining Association's Legislative Committee identified a few

areas of Montana law that did not serve the industry well and sought changes to existing law. One such area was the need to allow for the temporary leasing of small quantities of water to be used for short periods of time to primarily assist with exploration drilling. An amendment was prepared and offered to HB 37, a bill brought at the request of the Department of Natural Resources and Conservation and sponsored by Bill McChesney (D), Miles City, which

would allow a temporary change of use of a water right through a lease. The amendment sought to obtain the ability to change a point of diversion where the temporary lease was for a quantity not to exceed 35 gpm and/or 10 afy, provided the lessor obtained written waivers from intervening water-holders, the point of diversion was on the same surface water source, and was located as close as reasonably practical to the existing point of diversion.

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Unfortunately, the MMA amendment was soundly rejected. As holders of water rights, we respect and attempted to preserve the integrity of the system with our legislation. The association sought to acknowledge the ownership of the water, agree to pay for a temporary lease of water, but requested the ability to temporarily change the point of diversion, with no harm to any water right holder for very small amounts of water for short periods of time. This remains an important issue for our members and the MMA will continue the conversation during the interim with the appropriate committees and through dialogue with the DNRC and water-right holders. Perhaps there will be an opportunity to resolve this issue in a future legislative session. In spite of our amendment being rejected, the MMA continues to support HB 37. There is benefit to other natural resource industries and a small possibility of benefit to mining.

Discussions surrounding a second important issue for mining began dur-

ing the summer of 2012, but evolved substantially during the legislative session. The issue is whether or not an increase or decrease in the flow of state waters should remain regulated, and to what extent that regulation should occur under Montana's non-degradation statutes. Ultimately, after meeting with many interested parties and regulatory agencies, SB 347 developed and was introduced. SB 347 continued to evolve at every juncture, being amended in the Senate Natural Resource Committee, on the Senate floor, and in the House Natural Resource Committee. SB 347 provides that flow is not significant under Montana's non-degradation statutes and rules, provided that either a valid water right for beneficial use is held, or that the presumed change in flow does not significantly harm a fish population. The revisions to statute do not change laws and rules with regard to discharges.

Senator Chas Vincent (R) Libby is the sponsor of SB 347 and did a tremendous amount of work trying to bring

everyone together on this issue. SB 347 currently accomplishes much of what is necessary, but perhaps not all. It is anticipated that rule-making and other determinations of our regulatory agencies made in accordance with SB 347, should the legislation become law, will accomplish the fundamental objective of declaring that flow, in and of itself, is not a pollutant.

Upon the adjournment of the 63rd Montana Legislative Session, our work does not end. Several interim committees will take up important issues for Montana's mining industry. Further necessary rule-making for implementation of legislation requires attention and participation. Ensuring the present and future ability of the membership to operate in a responsible and profitable manner requires year-round diligence.

It has been a pleasure to serve the industry throughout the legislative session and we look forward to continued necessary engagement and attentiveness in the months to come. ♦

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Two young women receive MMA scholarships in tribute to Langley and Lawson

By Laura Tode



Michelle Loeffler, a sophomore studying metallurgical and materials engineering, is this year's recipient of the MMA Langley Scholarship.

Auva Speiser, freshman studying mining engineering, is this year's recipient of the MMA Lawson Scholarship.

Montana Tech in Butte announced the recipients of the 2013 Montana Mining Association memorial scholarships. This year's recipients are Michelle Loeffler, a sophomore studying metallurgical and materials engineering and Auva Speiser, a freshman studying mining engineering.

The scholarships were established in memory of Gary Langley and Don C. Lawson, both longtime members of the Montana Mining Association and advocates for the mining industry. Langley was one of the organization's early executive

directors who died in 2004 at the age of 57. Lawson helped to found the MMA after a 30-year career at the Montana Bureau of Mines and Geology. Lawson died in 2001 at the age of 76.

Both men were tireless advocates for the mining industry and helped to establish and fund the MMA memorial scholarship program for Montana Tech students.

Loeffler, the recipient of the Langley scholarship, grew up in Butte, so mining was always in the background. However, no one in her family worked in the indus-

try. She chose metallurgical and materials engineering as a degree because she had a knack for chemistry, and she's pursuing chemistry as a minor field of study.

"I was excited and grateful when I learned I got the scholarship," Loeffler says. "It makes it easier not to have to worry so much about paying for college."

Loeffler has already gained on-the-job experience with an internship at Freeport-McMoRan Copper and Gold in Silver City, New Mexico. Last summer, she worked at the company's Chino facility, an open-pit copper mine and processing plant, and she'll be returning to the mine for another internship this summer.

Speiser, a Missoula native, said she always had an interest in geology but after comparing careers in geology with mining careers, she was drawn to mining because the industry offered opportunities at both outdoor field work and inside desk work.

"I wanted a career that was a mix, and it was a good fit," Speiser says.

Speiser hopes her career in mining will also offer a chance to travel the world, and she is looking at applying to work at mines in Australia after graduation.

"For now, though, I'll stick to the United States," she added.

Although both Speiser and Loeffler are among only a handful of young women in their respective fields of study, they don't see their gender holding them back from a successful career in the mining industry.

"I haven't met any guys who've said, 'You're female so you can't do this,'" Speiser says.

Lawson would have been pleased to see the scholarships going to two students with high aspirations, says Robin McCulloch, a longtime colleague and friend of Lawson.

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"Often this scholarship is what gets a student started in the industry with an education they might not be able to afford," McCulloch says.

The scholarship fund was built a little at a time through raffles, fundraisers and donations. Now, two \$1,000 scholarships are given each year. When he was alive, Lawson was passionate about building the scholarship fund and making sure they went to deserving Montana youth.

"He recognized the shortfall of qualified professionals in the mining industry, especially in Montana, and he knew the kids here might not have the money they

need for college. He found the money to fund the scholarships, then went out and found the youths to match the money," McCulloch states.

The scholarships are awarded to Montana students based on financial need, academic performance, and enrollment in mining engineering, metallurgical and materials engineering, geological engineering, environmental engineering or geophysical engineering. The Lawson scholarship goes to a freshman and the Langley scholarship is awarded to a sophomore.

"We appreciate the support we have received over the years from the Montana

Mining Association through the Langley and Lawson scholarships," says Michael Barth, executive director of the Montana Tech Foundation. "Private support of students through scholarships helps to ensure we achieve our goal of accessible excellence. Beyond these scholarships, partnerships with industry and trade groups and associations help to create an environment that is supportive of responsible natural resource development. We are proud of our relationship with the Montana Mining Association and in the role we both play in providing extraordinary opportunities for our students." ♦



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MMA Committee Report

What takes an association from good to great? Connection. In his book *7 Measures of Success*, author Jim Collins sums it up like this: “Successful associations consistently [find] a way to connect their reason for being to their programs and services.” Bingo.

Following suit is the Montana Mining Association (MMA), a culture built firmly on connection. Paralleling Collins’ model almost flawlessly, the MMA has indeed fostered undeniable connection and commitment to their community and culture—a win-win for all.

Further, the MMA consistently demonstrates their commitment to members in everything they do, and builds their structures, processes and interactions—their entire culture, as Collins states—around assessing and fulfilling members’ needs and expectations. Perhaps this is one of the

reasons why today the association resides in the upper echelon of national associations. And yet, never content to boast, the Montana association retains that, in life, there is always room to grow and improve.

Equally critical to the sound operation of an association is communication. To that note, the MMA continually works with membership to represent member interests, while providing valuable services and a networking focal point to members. Managing special-interest groups within the membership, however, is perhaps their most pertinent form of communication, as it allows further exploration into various areas of the association. Such groups actively engage with community, while retaining absolute clarity of purpose and building upon the association’s strengths. To date, the MMA has established five such committees: membership, safety and

health, education, environmental, and legislative.

Five voices acting as one—this unity of focus permeates the entire organization. In fact, each of the committees work together to accurately drive the association’s agenda while, of course, seeking ways to enrich membership and raise the industry’s image. This year, the special interest groups have much to report, as 2013 kicks off with a bang.

MMA Safety and Health Committee

The Montana Mining Association Safety Committee is open to all members of the Montana Mining Association. The committee has a conference call on a monthly basis and conducts a quarterly meeting at one of the participating mine sites.

The purpose of the safety committee is to share safety information openly and



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honestly to help improve safety in Montana mining. Information regarding incidents, near misses, training availability, and regulatory issues are shared amongst committee members. This open dialogue provides insight into the latest safety ideas and regulatory issues throughout Montana. We are committed to high levels of performance and continuous improvement in safety on the job and in the overall health and welfare of our employees.

In 2012, several members completed the Certified Mine Safety Professional examination which was organized by the safety committee; this examination is scheduled again in 2013. We also organized a "Train the Trainer" class with the **Mine Safety Health Administration (MSHA)**, and are hoping this class will be made available again this year.

All mines within the MMA are encouraged to participate in the MMA Safety Committee. It is participation, sharing and networking that creates an environment of learning and education within the committee.

MMA Education Committee

Following the directive of the MMA Board, the MMA Education Committee took on four major projects over the last year.

As an enhancement to the website, the education committee was responsible for gathering stories for the history section of the site. From the fascinating history of the Silver Queen to the story of Clary McAdow, the amazing woman miner, the reader will be educated and entertained. Visit that sight at www.montanamining.org, and if you have a story to share, please contact the MMA office.

Overseeing the MMA Ambassador Program, the education committee initiated three ambassador training sessions. Fifty ambassadors are now presenting the history and future of mining in Montana, by way of PowerPoint presentations, to countless students, service groups, seniors and businesses.

The first-ever MMA essay contest, for Montana's eighth-grade students, was kicked off in February with the essay topic

"Why Are Minerals Important to Me?" The response from eighth-grade students throughout the state was tremendous (read the top three winning essays in this edition).

Finally, the education committee will be working throughout the summer with the Montana Historical Museum to assist in updating the mining footlocker, part of the "Hands on History Footlocker Program" administered by the museum.

MMA Environmental Committee

Given that this is a legislative session year, the MMA Environmental Committee has been very active with the MMA Legislative Committee. We have principally been focused on analyzing legislation related to water rights and exempt wells and legislative and administrative matters associated with water discharge permits.

The forefront of the environmental committee's efforts is working with MDEQ to resolve concerns related to the application of the Montana Clean Water Act's provisions for non-degradation as they are

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allied to nutrients. Non-degradation standards can easily drive effluent limits in water discharge permits well below the limits of treatability.

It was believed that the 2011 legislature

had resolved the problem created by ultra-low effluent limits for nutrients by passage of Senate Bill 367, which provided for variances from unachievable limits on total nitrogen and phosphorous. However, it was

later revealed that these variances would not apply to new or expanded discharges that were subject to a non-degradation analysis.

Many members of the environmental committee have been meeting with representatives from MDEQ to develop a means to provide relief to new mining operations that may become subject to these limits. This effort will continue and MDEQ has committed to cooperatively work toward a resolution.

The environmental committee had also been working with MDEQ and MDNRC to resolve conflicting regulations between water rights law and the application of the non-degradation standard to stream flow. This work group determined that an administrative solution was not achievable, and worked diligently with Senator Chas Vincent (R-Libby) to craft a legislative solution. Senate Bill 347 was developed in the very late stages of the 2013 legislative session, and was intended to provide a potential remedy to those new or expanding mining operations that may become subject to stringent limitations on changes to in stream flow rates.

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MMA Legislative Committee

Prior to the start of the legislative session, the focus of the MMA Legislative Committee was on legislators and candidates who are supportive of natural resource development. Work continues to support them throughout the legislative process.

Another important goal involves maintaining an open dialog and active participation with other natural resource industries and partners, such as the Treasure State Resource Industry Association, the Montana Petroleum Association, Montana Realtors, the Montana Chamber of Commerce, and others that deal with natural resource or land-use issues.

The MMA continues to provide educational opportunities for legislators and the general public to learn about how modern mining has evolved, and how it provides good-paying jobs and economic prosperity. Montana mining companies continue a strong commitment to sustainable practices, safety, social responsibility and excellence in environmental management.

The legislative committee has been meeting weekly since the start of the 2013 legislative session. Permitting, water and eminent domain issues were widely discussed going into the 2013 session. The debate thus far emphasizes the importance of maintaining an open dialog and active participation with other natural resource industries.

MMA Membership Committee

The membership committee has been very active this past year and would not have been able to complete some important milestones without the assistance of Laura Feist. Her hard work organizing meetings and doing a great deal of behind-the-scenes work has paid off. In addition, the committee provided plenty of good feedback to the directory and other projects, and that is appreciated. The membership directory has finally been completed and looks great. As you review this directory and find any ideas to improve, please let the MMA staff know. Thanks to all the producers and suppliers that have provided advertising dollars for the directory. It has been put to good use covering the cost of the directory.

Another project was the producer challenge. Producer employees can join the MMA at a discount and there was a challenge put out to the large producers to encourage their employees to join the MMA as producer employee members. The challenge has been great as we now have 124 producer employee members. This is less than five percent of producer employees, so there is more opportunity for growth in this area.

Our next project was to develop a form letter for large producers to send to their top 10 or 20 vendors that are not members of the MMA. The form letter has been developed and sent to those large producers. We hope that producers will take the time to edit the letter as they wish and send to their top 10 or 20 vendors that are not currently MMA members. This is a very important area in which to increase MMA memberships and we appreciate your assistance with this. ♦

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Five generations of mining in Montana – and counting

Antonioli family looks forward to working in this industry for many more generations



The Contact Mining Company Mill, located about a mile south of Philipsburg in part of the site of the old Bimetallic Mill. There are two big smokestacks just above the mill that went with the old Bimetallic Mill.



The Mayflower headframe, located southeast of Whitehall. Dave Rovig did some work there in recent years.

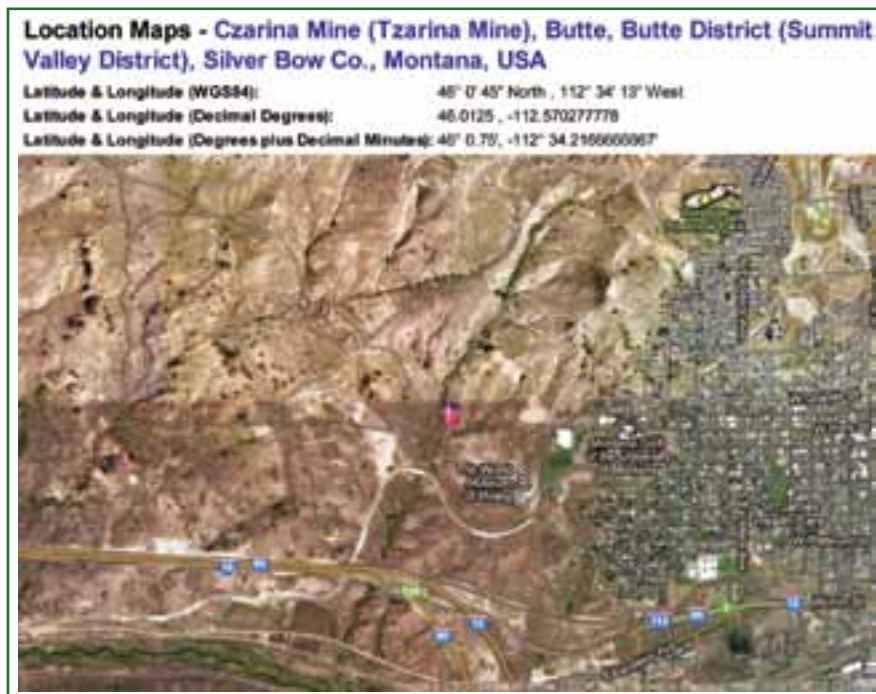


This image was actually captured from a 1950s movie Uncle Pete took.

Philip Antonioli is a student at Montana Tech, and when he goes out with his dad and uncle to stake mining claims, he represents the fifth generation of his family to be involved in Montana's mining industry. Philip's cousin, Chris Antonioli, is a Montana Tech graduate mining engineer. Chris's father, Tim Antonioli, and numerous aunts and uncles are also involved in milling, mineral exploration and mining in Montana. Chris's uncle, Ted Antonioli, reports that mining goes back to Chris's and Phil's great-great-grandfather, who worked for F. Augustus Heinze in the Meaderville smelter of the Montana Ore Purchasing Company.

"My grandmother and great-aunt knew a jingle singing the praises of Heinze, so it seems Heinze had an effective public-relations touch," says Ted's cousin, Peter Antonioli, who tells of their grandfather's work in Butte's Black Rock Mine, owned by the same interests who controlled Utah Copper. "Grandpa Pete led a strike to get the company to issue an extra candle so that the miners could see their lunch while they ate it. The miners won."

In the mid-1930s, silver and gold prices rose; that's when Pete Antonioli made his first foray into independent mining, by



The Czarina is a short distance northwest of the Orphan Girl/World Museum of Mining. The Czarina was one of the manganese mines Frank Antonioli, Uncle Pete, and Grandpa Pete leased and worked on.

leasing the Amy Silversmith in Walker-ville. He put two of his three sons, Frank and Bill, to work mining and hauling ore from the Ohio in the Tobacco Root Mountains. The Antoniolis have operated in Philipsburg as the "Contact Mining Company" since the 1940s; the mill is

called the Contact Mining Mill. In 1944, Pete leased the Scratch All Mine in Philipsburg, and came into a fine body of ore that allowed him to pay off the lease and purchase the mine. This led to the Antonioli family's long involvement with mining, which continues to the present day.



The mill under construction.

Shortages of critical and strategic minerals during WWII and the Korean War led to extensive programs to explore, develop, and stockpile metals such as manganese. Frank Antonioli worked for John Cole's manganese plant while he went to Montana Tech, studying mining engineering and metallurgy. In the 1950s, Frank worked with his father Pete and his older brother, also named Pete, developing and mining several manganese properties, such as the Czarina and Mapleton on Butte's West Side. The next venture for the family was the Mayflower mine near Whitehall, after Anaconda offered Pete Senior a lease on the mine. Here Pete Senior's "nose for ore" and some good luck led to a good ore body that for a brief time made the Mayflower mine the state's leading gold producer.

The 1960s and 1970s were a good era for Montana's smaller mining operators—including the Antoniolis—with the Anaconda smelter in constant need of quartz-rich material (both ore and tailings) for flux. Anaconda paid for a high percentage of the gold, silver and copper, and had no smelting charge as long as the ore was highly siliceous.

The high metal prices of the late '70s and early 1980s led Frank Antonioli to design a flotation mill to process the extensive mine dumps in Philipsburg. Building this mill was a family effort involving sons, nephews, and in-laws. The closure of the Anaconda smelter led the nearby Black Pine mine to consider processing options; they decided to use a portion of the capacity at the new Antonioli mill. They were the first of a

long series of customers at the Philipsburg mill, who have brought ore from as far away as Nevada to be processed in Philipsburg. For the last few years, the mill has been processing ore from the Drumlummon mine near Helena. The mill is one of the few custom mills in the Northwest, and has both flotation and gravity concentration circuits.

The Antoniolis hope and expect to be involved in exploration, mining and milling in Montana for the next several generations, at least!

NOTE: Many more Antonioli family members work within the Montana mining industry; however, due to space restrictions it was not possible to name each and every one. Suffice to say that mining runs deep in the Antonioli family. ♦



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It's been a busy year on the Black Butte Copper Project. During 2013, Tintina Resources Inc. engaged in a great deal of in-fill drilling focused on resource upgrading, engineering and environmental studies, and economic assessments, community relations, and permitting. The company has spent about \$18,000,000 since mid-September of 2010, and the results to date show that this money was very well spent.

We've upgraded both the Johnny Lee and the Lowry copper deposits by in-fill drilling this year, which resulted in a significant increase in copper grade and contained copper pounds. We now have an inventory of 15.7 million tonnes at a grade of 3.4 percent copper, or 1.2 billion pounds of copper. In the Johnny Lee Lower Zone, alone, the more tightly spaced drilling produced a jump in grade from 4.71 percent to 6.52 percent! This is truly high-grade copper! More widely spaced drilling has defined an additional 2.3 million tonnes at a grade of 2.8 percent, so we're looking at about 18 million tonnes.

When Tintina acquired Black Butte, historic drill results showed less than half the tonnes and only two-thirds the grade, and the Lowry was still just a couple of interesting drill hole intersections. The Lowry deposit, alone, is now over five million tonnes of 2.9 percent copper and reaches a thickness of 260 feet—nearly the height of the tallest building in Montana, the First Interstate building in Billings! Because of its thickness, the Lowry is a candidate for lower-cost underground bulk-mining methods. We've really come a long way.

In July of 2012, Tintina announced the positive results of a Preliminary Economic Assessment (PEA) focused on the Johnny Lee deposit. This kind of study gives a "high altitude" look at project economics and is an early hurdle for any modern mining project. Tintina completed this study on a previous and lower-grade resource estimate for the Johnny Lee deposit—not the upgraded version described above. The



Lowry drilling – November 2012.



Tintina's reclamation process.

study predicts an estimated capital expenditure of \$210.4 million to build the mine, which is very attractive in today's world of multi-billion-dollar capital estimates for many new mines. A big part of the reason for this low capital cost is Montana's available infrastructure—Black Butte Copper is alongside the highway, unlike many new projects, and power and rail are nearby.

The operation would use a conventional flotation circuit producing a single copper concentrate, would produce 47 million pounds of copper per year, and would achieve total production of 660

million pounds of copper. The PEA model was based on a production rate of 3,300 tonnes per day, which equates to a 14-year mine life. At a \$3.00 copper price, the pre-tax Internal Rate of Return (IRR) of the project would be 21.1 percent and the Net Present Value (NPV) would be \$242 million. This PEA was a copper-only study and assigns no economic value to the cobalt, silver, and gold that we know resides in the deposit. Nor did this study include the Lowry deposit, which could easily add several more years of production at these production rates.



Because additional drilling has resulted in a significantly improved copper grade for the Johnny Lee deposit since the PEA results, Tintina has decided to update the PEA using the new resource estimates. We expect the significant increase in copper grade could appreciably improve the economics of the operation. The updated PEA study results should be available by the end of second quarter 2013 and will help Tintina determine whether to proceed with a pre-feasibility or feasibility study.

So what else is next?

Tintina has submitted an application for construction of an exploration decline to the Montana Department of Environmental Quality. The planned decline is 4,900 feet long and accesses the footwall of the Johnny Lee Upper Zone from the south. This will provide an opportunity to bulk sample the deposit and continue drilling from underground. Tintina expects permission to start the decline sometime in 2013.

Tintina's highest priority is developing a mine, but now that resources are well-defined, it is also time to look forward, toward further expanding the resource base. Tintina's property has high potential for more copper resource, and additional exploration is in the planning stages.

Members of the community of White Sulphur Springs attended an open house to discuss the Black Butte project in February 2013. Over 125 people came by, and their enthusiasm for the new jobs and prosperity that a good-quality mining project at Black Butte might bring was very apparent. Our neighbors were pleased to see the special attention the company is giving toward maintaining high water quality and keeping a small footprint for the proposed mine operation.

We're very satisfied at the high-quality results of this past years work. With over a billion pounds of copper at a 3.4 percent, we have the unit value and scale the project needs to achieve attractive economics while allowing a design for the underground mining operation that easily meets our high environmental and social standards. ♦

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*Photo: Black Butte Copper Project, MT, USA
Doing this right the first time - Tintina Resources' reclaimed area.*

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Groundhog Mining & Milling

Montana company provides full range of mining services



Custom steel and timber sets installed at the Rescue Mine in Warren, Idaho.

By Gloria Taylor

Ask Nathan Hunt, projects manager for Groundhog Mining & Milling Co., LLC, what distinguishes his exploration and mining services company, and he is quick to point to the company's wide range of services, expertise and experience in the precious and industrial metals markets.

"We consider ourselves a full-tilt mine service company," declares Hunt.

The nine-year-old, family-owned and operated business provides a full range of technical, exploration, and mining services to companies throughout the Western United States and Alaska. Technical services include property evaluation, environmental management, mining engineering and planning, feasibility, MSHA compliance and permitting.

"For a smaller scale mine, anywhere from five to 50 people, we can take a project from concept to completion, starting with feasibility studies, then work into permitting and exploration. We aren't geologists, but we are fully qualified and equipped as a core drill-

ing contractor. Then, we can move into more of a development and production phase," says Hunt.

"Our main focus is our mine contracting division, as we specialize in the rehabilitation and development of new and historic underground mines," he continues.

The versatile company will set up and construct surface infrastructure such as labs, shops and mills and conduct or manage all excavation work.

Small when compared with many large contractors, Groundhog Mining & Milling is nevertheless very big in the realm of being affordable, professional and experienced. "We don't succeed in our work if the clients aren't happy, and we don't know of many of those!" emphasizes Hunt.

Client companies that want to explore, expand or develop their mineral interests can count on Groundhog Mining & Milling to provide project-scale capabilities in engineering, construction, mining, reclamation, and project management.

The company is equipped to conduct specific field services that include surveying, locating and staking claims, sampling, and environmental baseline programs.

Nathan, who owns the company with his father Delbert Hunt, is proud of the company's ability to mobilize quickly thanks to the highly qualified staff, which include experienced mining engineers and engineering manager Rick Dale (also a Montana mining native).

"We're very broad experience-wise in all facets of the work when it comes to the technical side of things."

Permitting can be a challenging part of setting up a mine site, and navigating through state and federal bureaucracy can be daunting. Groundhog Mining & Milling has worked with authorities for years to obtain permits, giving the company the experience to expedite this process.

Meantime, rehabilitating mine sites has also become a major and specialized area of work for the company, which it has done "100 percent safely" over the years.

Because of its solid work and reputation, Groundhog Mining & Milling has earned an exemplary position in the mining industry and with the agencies that regulate the sector. Mine Safety and Health is one such federal agency. The agency registers, monitors and enforces the safety of each mining company, and Hunt is proud of his company's outstanding safety record.

Extremely important to client companies is Groundhog Mining & Milling's ethical practices, including its commitment to confidentiality.

"We are not one of the good 'ol boys, in the sense that we don't take confidential

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information and tell everyone about it. In fact, we have been hired many times because of our confidentiality. We are honest, and we are proud of the work that we do,” says Hunt.

Hunt describes himself as a fourth-generation mining engineer and part of the Hand family, a “mining legacy” family in Montana.

The company also buys, sells and rebuilds all types of mine equipment including LHDs, jumbos, jacklegs and slushers. It carries a large inventory for sale or rent—and if it doesn’t have a piece of equipment, there is a “good chance” they can locate it within a reasonable time frame, says Hunt, who encourages inquiries from those in the industry.

Even more exciting is the fact that Groundhog Mining isn’t just a mining and exploration contractor. The mining company is developing its own projects in southwest Montana.

Groundhog Mining projects include:

- The Argenta Copper Porphyry, otherwise known as the “Hand Mine”, has historically been a high-grade lead and gold producer.
- The Groundhog Group Gold Project is currently in the exploration and permitting phases.
- Two other projects, one underground and one surface heap leach, are both nearing “production capable” status.

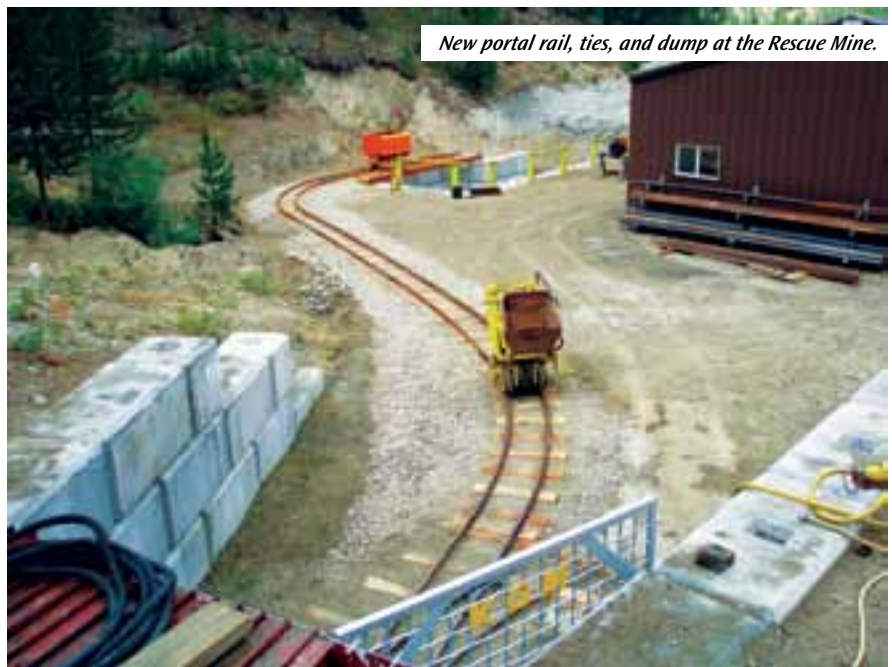
“We aren’t interested in pushing projects that are designed only to encourage investor money, but we are interested in promoting projects that have a high potential to be profitable ventures,” emphasizes Hunt.

“We always have good projects and are always looking to ‘joint venture’ or partner up with interested investors,” he adds.

For more information or to discuss projects further with Nathan Hunt or Rick Dale, please go to www.Groundhogmining.com for contact information. ♦



Timber repair at the Galena mine in Wallace, Idaho.



New portal rail, ties, and dump at the Rescue Mine.

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Barrick Golden Sunlight Mine welcomes new general manager

Golden Sunlight welcomed Dan Banghart into the position of general manager in October of 2012. Banghart previously served as mine superintendent at Golden Sunlight Mine from 1996 to 1998 and more recently, held a number of senior positions with Barrick's Cortez and Goldstrike operations in Nevada. He played an integral role in bringing the Cortez Hills operation into production and has earned a reputation as a solid manager. He has nearly 30 years of mining experience and a strong track record of leading safe and profitable mining operations.



I have enjoyed being back in Montana. I have been busy settling in at work and getting to know the community. While many years have passed since I was last here, it's been great to return to so many familiar faces. The fact that Golden Sunlight has retained so many employees for the long term tells me that this is a dedicated group that has made GSM a great place to work and southwestern Montana a great place to live. That dedication is also reflected in the site's more recent accomplishments.

Safety and Health

We made great strides in improving our safety record, an achievement we

celebrated in March, when we received Barrick's Excellence Award for Best Safety Performance. As of first quarter 2013, GSM has gone five and a half years, and 2.7 million employee hours, without a lost-time incident, and over a year without a medical aid treatment incident. We still have more work to do in order to achieve our goal of zero incidents. As with most things, safety starts and ends with leadership. I expect all of our employees to be leaders when it comes to ensuring safety and continuing to send all GSM employees and contractors home safe and healthy every day.

Environment

Golden Sunlight Mine was the recipient of the prestigious Bureau of Land Management (BLM) 2012 Mineral Environmental Award for our third-party ore processing and reclamation initiatives. Golden Sunlight Mine initiated the program to assist small miners to mill outside "ores" and to assist with legacy mine materials containing reasonable concentrations of precious metals. In presenting the award, the BLM stated: "The Golden Sunlight Mine has turned liabilities into environmental and economic benefit—greatly enhancing the quality of the environment, saving taxpayer dollars, and creating local jobs."

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These awards verify that Golden Sunlight is committed to responsible mining and is doing the right things. The community should take great pride in these accomplishments.

Through our comprehensive environmental management programs, we are committed to ensuring that environmental effects are being adequately addressed; that plans are in place to ensure that the environment is protected for future generations; and that the sustainability of nearby communities is safeguarded.

Golden Sunlight Mine is certified under the ISO 14001 Environmental Management System (EMS). ISO 14001 is the

internationally approved standard for environmental management systems. The prime driving force within ISO 14001 is continual improvement.

Any organization that subscribes to the principles contained within ISO 14001 must be able to provide evidence that it continually strives to reduce its environmental impact beyond that required by regulations. GSM is committed to the prevention of pollution, compliance with all regulatory and statutory requirements, and continual improvement of the EMS.

To further embrace its commitment, Barrick Golden Sunlight Mine was cer-

tified in 2011 in full compliance of the International Cyanide Management Code. This code focuses exclusively on the safe management of cyanide that is produced, transported, and used for the recovery of gold, and on cyanidation mill tailings and leach solutions. The code addresses production, transport, storage, and use of cyanide and the decommissioning of cyanide facilities. It also includes requirements related to financial assurance, accident prevention, emergency response, training, public reporting, stakeholder involvement and verification procedures.

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Community

We have also enjoyed a great partnership with our local stakeholders. I intend to continue to look for opportunities in which Golden Sunlight can support and strengthen the community.

Golden Sunlight Mine remains committed to helping their neighbors prepare for the transition to alternative industries through their engagement in the Community Transition Advisory Committee (CTAC) that provides

a constructive forum where corporate citizenship and sustainability planning are guided by local needs and perspectives.

GSM employees have developed a “Recycle for Student Athletes” program. GSM has donated the motors and electrical gear from a decommissioned electric shovel. Local Whitehall athletes, with oversight and assistance from GSM employees on their own time, stripped the equipment and separated the recyclable metals. Local recyclers paid \$60,000 for the scrap metal. All proceeds from the project are to go to build an athletic center at Whitehall School.

“Seeing the youths’ enthusiasm to work hard and earn their own facility made it all worth it,” says Marty Johnson, electrician at Golden Sunlight Mine.

Extending Mine Life

Since its beginnings in 1982, Golden Sunlight Mine has continued to add resources to extend the life of the mine. Currently, the Montana DEQ is conducting the environmental review necessary to grant permission for mining additional resources referred to as the North Area Pit and South Area Layback, which would extend the mine life into 2016.

Additional exploration is ongoing north of the Mineral Hill pit site with drilling activity in the Bonnie/Microwave area.

2013 will bring its own mix of success and challenge, so it is important that we remain intently focused on continuous improvement. As we work to deliver safe and profitable gold production, we cannot lose sight of our long-range goals—community partnership, environmental stewardship and most importantly, the safety and health of our people. I thank everyone again for the warm reception and look forward to getting to know you better in the coming months. ♦

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The Revett Foundation

Today's workers fund a future of positive impact

Revett Minerals, like many mining companies, operates in a stunningly beautiful landscape. The company's mine properties in northwestern Montana are nestled within an area dominated by the 2.5-million-acre Kootenai National Forest. The company's name comes from the "Revett" rock formation which spans one of North America's potentially richest mining districts. The hills, ridges and valleys that are sandwiched between snow-capped peaks have long provided the diverse habitat needed for species such as elk, moose, deer, grouse, wolves, cougars, and grizzly bears. The clean creeks, rivers and lakes are home to a multitude of aquatic species.

For thousands of years, the area was used by the Kootenai/Salish Indians for periodic regeneration of their food supplies and spiritual activities. Europeans in search of beaver traversed northwestern Montana, but the area had no community settlements until the first small mining operations were developed in the latter half of the 1800s. Loggers worked to supply timbers for the mines in the area but when the railroads sliced through the middle of Lincoln County in the late 1880s, forestry grew to become the dominant industry as



distant growing cities created markets for wood fiber.

As we enter the second decade of the new millennium, forest management on national forest land has been drastically reduced and mining has once again become an economic engine of hope for the families and communities in Lincoln and Sanders counties. From the nomadic days of Native Americans to the fur traders of the early 19th century and through nearly 150 years of mineral development and for-

est management, it has been the bounty and the beauty of the land that have provided the well-being of the people of the area. The area's inhabitants have a deep appreciation for the natural amenities that have supplied both a workplace and a playground for them and their families.

The presence of world-class mineral resources has made mining economically possible in northwest Montana—but it is the area's resource-based culture, coupled with the landscape, that make it a great

place for a mining business. Today we have strong state and federal regulatory processes that ensure mine operators meet or exceed the requirements necessary to protect our social, economic and environmental values. Revett and our workers are proud that, after more than 30 years since the Troy Mine commenced operation, there has been no effect on the water quality of nearby streams, nor any effect on wildlife habitat. In fact, through our work with Montana Department of Fish, Wildlife and Parks officials, we have become an integral part in the augmentation and recovery of grizzly bears in the region—with a great deal of these efforts taking place right on our doorstep.

Long-term plans for Revett include expansion through further exploration in and around our Troy mine and through development of our world-class Rock Creek Project. Revett's business plan for north-west Montana also includes a long-term commitment to the social, economic and environmental health of the area.

A significant part of this planning will be implementing the requirements of Montana's unique Hard-Rock Mining Impact Act (HRMIA). Enacted by the Montana Legislature in 1981, HRMIA is designed to assist impacted communities before, during and after the development of a large mining operation. Revett looks forward to working with communities in the area when we commence development of our Rock Creek project.

We believe that there are other ways that Revett can express our commitment to the communities in which we live and operate. In recent years, we have become involved in a wide variety of community support programs. Our ultimate goal, however, is to create and administer a broader program that will last beyond what we do today; a program that will benefit generations to come.

In 2012, Revett created The Revett Foundation ("the Foundation"). The goal of the Foundation is to help to ensure that positive contributions to the well-being of

northwestern Montana will occur not just during mining, but also long after our projects have been successfully reclaimed.

The Foundation is a separate entity to Revett, the company. The Revett Foundation will have a board and advisory committees which will include people from outside the company.

The main objectives of the Foundation are:


- Provide direct and ongoing support to the Cabinet Mountain region and extended communities. The main focus will continue to be health and education-related, but will include other aspects of community needs.
- Participate in public/private partnerships and work programs that may include trail upgrades and community restoration projects. We will also look at the possibility of partnering with other groups in improving select abandoned mine sites in the immediate region.
- Facilitate effective long-term stewardship of Revett's properties and provide



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Mining in Sanders County, Montana, circa 1908

Photo: Northwest Museum of Arts & Culture



Times have changed. So has mining.

Montana has made a lot of progress over the last 100 years. Mining has progressed, too.

In the old days, miners focused solely on recovering valuable ore and metals. In fact, the state motto is “Gold and Silver” and Montana is known as “The Treasure State.” But this historical single-minded approach is no longer acceptable to society or modern mining companies.

Today, the old ways are gone, replaced by modern technology, science, and environmental protection.

Modern mining projects are closely monitored by regulators and comply with thousands of pages of federal, state, and local regulations to ensure that the environment is protected. In addition, mining geologists and engineers utilize advances in science and technology that were unknown in the old days.

Key among those improvements is our ability to protect water quality.

Today’s mining projects are designed with multiple layers of environmental protections that must be approved before a single spade of dirt is turned.

For example, all of the water at The Rock Creek Project – whether natural ground water, processing water, or rainwater that has fallen on the tailing facility collected through an under drain system – will go through a dual water treatment process to ensure that it exceeds drinking water standards.

In addition, we will protect water quality by ensuring that the tailing created by processing the quartzite ore – actually just beach sand – remains within the designated storage area to be covered and landscaped to mirror the surrounding habitat both concurrently and at the conclusion of the Rock Creek Project.

To guarantee that this protection extends long after projects are completed, modern mines fund multimillion dollar bonds set by Montana’s Department of Environmental Quality and the U.S. Forest Service.

A lot has changed over the years, but one thing hasn’t changed: mining provides good paying jobs.

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a “best use” approach for land holdings during, and after, mining operations and reclamation. Protection and creation of prime fish and wildlife habitat will be key considerations.

There are many things that a foundation can do that a company cannot, and there are many ways to fund and support these programs. The Revett Foundation will initially be funded by the company, but we will also invite support from individuals and associated organizations. As programs evolve, the Foundation will look for ways to involve all of our employees and their charitable endeavors.

This is an exciting and positive step forward for Revett. Clearly, this step would not be possible if it wasn't for the efforts of our outstanding employees of today. These employees have a deep-seated, multi-generational love of their communities and the land that surrounds their homes and their workplaces. Through the Foundation, we will ensure that our employees' contributions toward their

community's environmental, social and economic well-being are sustained and will long outlive them and their current jobs.

We look forward to working with our community partners and employees in building and guiding the Foundation.

About Revett – *Revett Minerals was formed in 1999 to acquire the Troy Mine, which had been on six years of care and maintenance status, and the proposed Rock Creek project. Revett is now an established silver-copper producer. In late 2004, the Troy Mine was brought back into production and in 2012, produced 1.1 million ounces of silver and 7.5 million pounds of copper. The Rock Creek Supplemental Environmental Impact Statement process is nearing conclusion and the first phase of development is projected to begin in 2014. Both properties are located in northwestern Montana.* ♦



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Holland & Hart named 2013 ‘Law Firm of the Year’ for mining by *U.S. News – Best Lawyers*[®]

DENVER, November 2012 – Holland & Hart LLP was named the 2013 “Law Firm of the Year” for mining by *U.S. News & World Report* and *Best Lawyers*[®]. In addition, the firm earned national first-tier rankings in mining law, oil and gas law and technology law. Holland & Hart also received 93 metropolitan first-tier rankings across its footprint in the Mountain West and Washington, D.C.

Nearly 10,000 firms nationwide received rankings in the third year of “Best Law Firms.” A complete list of Holland & Hart’s rankings for 2012-13 can be found at <http://bestlawfirms.usnews.com/firms/holland-hart-llp/Rankings/7863/>.

“We are truly honored to be so highly regarded by our clients and our peers for the depth and breadth of legal services we provide across a wide range of practice areas,” said John Husband, firm chairman.

Earlier in 2012, 161 Holland & Hart attorneys were named to the 2012 edition of *Best Lawyers in America*[®] and 23 were

given the distinct honor of being named “Lawyer of the Year” for their practice areas in their respective markets.

The *U.S. News – Best Lawyers*[®] “Best Law Firms” rankings are based on a rigorous evaluation process that includes the collection of client and lawyer evaluations, peer review from leading attorneys in their field, and review of additional information provided by law firms as part of the formal submission process. To be eligible for a ranking, a law firm must have at least one lawyer who is included in *Best Lawyers* as part of the annual peer review assessment. The rankings in their entirety are posted online at <http://bestlawfirms.usnews.com>.

In addition, the firm earned national first-tier rankings in mining law, oil and gas law and technology law.



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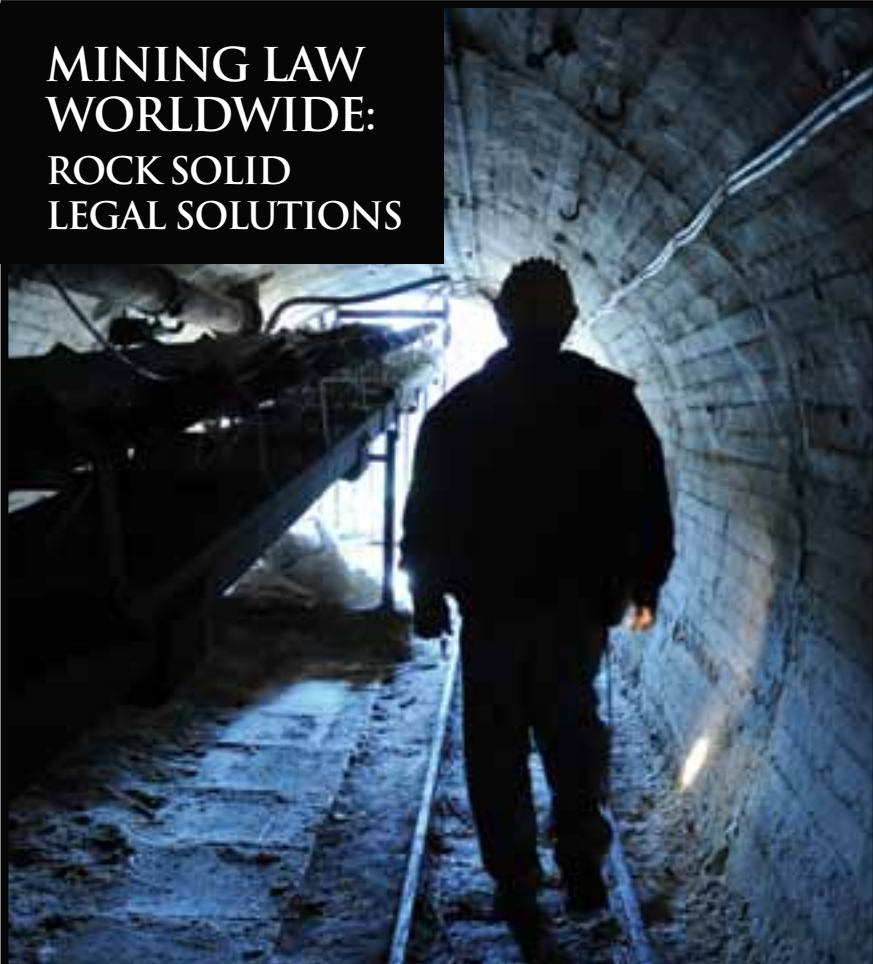
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By Tad Dale, VP Human Resources – Montana Resources



The mission of Montana Resources (MR) is: *to be a **SAFE**, low-cost producer of copper and molybdenum.*

Employees' Daily Commitment to Safety

Each meeting at Montana Resources (MR) begins with an emphasis on the core value of safety. Steve Walsh, MR's vice-president of operations, likes to quote Peter Kiewit of construction fame: "We can be happy with our performance, but we can never be satisfied." That is because safety is not a destination; it is a process. Each worker must think about performing their work tasks in a safe manner every minute of every hour of every day. This mindset has reaped great safety rewards that MR's employees are very proud of.

In 2012, the Continental Mine received a safety award for "Outstanding Dedication to Safe, Quality Production." This award was presented by The International Society of Mine Safety Professionals.

By the end of March 2013, an unprecedented 2.9 million man-hours were worked without an injury serious enough to cause a lost shift or lost-time injury. MR's next goal is to reach the four-year milestone in early July without a lost-time accident. It is achievable as individuals and as a team working together each day as "courageous leaders" in safety.

Production is the Benefactor of Safety

The Continental Mine in Butte is the largest surface mine in Montana. Each day, approximately 100,000 tons of material is moved out of the mine. Roughly half of this production is

ore and half is waste rock, for a stripping ratio of 1:1. The rock (ore and waste) is blasted and then removed with a fleet of 12 240-ton payload haul trucks and three electric shovels, each with a bucket capacity of 40 cubic yards or 90 tons every time the bucket is dumped. This allows the flexibility to mine different areas of the mine, which have different rock characteristics and ore grade, and at the same time provides the optimum blend of rock for the crushing, grinding, and flotation circuits. The end-products are copper and molybdenum concentrates that are then processed through filter presses and are ready for shipment. The copper concentrates leave the property in 100-ton gondola railroad cars and the molybdenum concentrate is bagged in 4,500-pound super sacks and transported by over-the-road semi-trucks.

In 2012, MR produced 73,000,000 pounds of copper, 9,700,000 pounds of molybdenum, and 643,000 ounces of silver. The state of Montana, Butte, and the surrounding area are impacted greatly by the economic benefit that comes from the Continental Mine. MR has purchased goods and services in the amount of \$25.9 million in the Butte area, and \$12.3 million in the rest of Montana. In 2012, MR paid over \$15 million in property and production taxes. Many, many jobs outside of the mine depend on the prosperity of the mining operation. The mining industry is certainly the basis of our high standard of living by providing the building blocks of our society.

Environmental Stewardship

Commonly, an open pit mine is active for the entire life of the pit, and only reclaimed when it becomes dormant. Mon-

tana Resources practices concurrent reclamation, reclaiming as soon as possible while mining operations continue. Soil is saved and stockpiled whenever it is available. Completed waste-rock dumps undergo surface shaping, being recontoured to prescribed slopes in a layer thickness determined by the slope profile. The result creates grassy rolling hills inhabited by deer and other wildlife. Montana Resources also maintains an active noxious weed control program on mine property.

Water is a necessary part of the Montana Resources mine operation. MR has in place a closed-circuit water system wherein all water used in the mine and concentrator is recycled through the process. Pulverized rock slurry emerging from the concentrator and thickener tanks is pumped to the Yankee Doodle Tailings Pond where the flour-sized by-product of the milling process settles out before the water is piped back to the mine operation. The closed-circuit and stormwater collection channels prevent any water from leaving the site.

What Lies Ahead

MR has conducted an extensive exploration drilling program over the past several years. The results have been very promising by adding minable ore reserves that will extend the mine's life well into the future. This provides financial security to our workers. In turn, the community benefits from MR's 350 employees' spendable income. Communication with and among our highly skilled workforce has created a safety culture that leads to an efficient and prosperous mining operation.

With guidance from the older miners, the next generation of miners has flourished at MR. Their love of the industry, and of southwestern Montana and all it has to offer, has provided a spirit of "can do" in the workplace. They are the heart and soul of Montana Resources as the tradition of safe mining becomes their legacy to the future. ♦



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Powerful mine dewatering

Electric and diesel centrifugal pump options

By Kristen Gurick, Godwin – a Xylem Brand

Mining applications are as diverse as construction or water and wastewater applications. Each jobsite has specific requirements and needs. Underground and open-pit mines have several layout and design obstacles. Regardless of the mine and its set-up, water is a mine's biggest enemy.

Getting water out—and keeping it out—is the primary focus of any mine plan. The deeper the mine, the more water that will be encountered and need to be removed. Once dewatering begins, mine planners can get back to what they do best.

Mine Dewatering

A pump company or dewatering solutions provider can partner with mine planners and mine engineers in the planning stages. A system analysis should be performed first; then pump selection can begin. Factors to consider in mine planning include portability, ease of maintenance and solids-handling.

Another consideration is pH. Pumps can be customized with durable materials of construction specifically designed for low pH and other corrosive liquids.

Pump systems are completely customizable, and the right one can only be selected after the operator or mine engineer understands the mine plan. Pump design, piping design and pump control can all be tailored to the mine plan. In addition to length of flow, elevation and discharge, consider layout drawings, hydraulic grade lines and pipe-wall thickness. Perform friction-loss calculations.

Also, consider present and future requirements. Mine design can change based on weather conditions, landscape vulnerability and market demands. A de-

watering pump company can help design the mine plan, so that mine planners and engineers can focus on mining. A reliable dewatering system allows them to continue working.

The power source is one component to consider for mine dewatering pump selection. When selecting a centrifugal pump to fit their needs, many mine operators select diesel-driven centrifugal pumps. As with any other application, operators have options. The initial set-up costs should be measured against the lifetime costs of pumping for the project. For a temporary job in a mine or quarry, diesel-driven pumps will typically be the most logical choice. Set-up costs are virtually zero. The pumps run on diesel fuel for the short duration of the project. If available near the mine, natural gas is also an option for these centrifugal pumps.

Hydraulic submersible pumps are another option for mine planning. These pumps feature a power pack fitted to a submerged pump. The pump ends usually sit at varying levels of submergence, and their power packs sit above-ground. They are ideal for abrasive fine sand, high specific gravity (like that found in slurries) and can offer a total dynamic head up to 600 feet. These hydraulic submersible pumps can be diesel-driven or electric, depending on system requirements.

Electric-driven Pumps

If a project is more long-running, consider electric-driven pumps. Electric submersible pumps have a solid history in mining applications. These pumps can handle moderately large flows (up to 2,500 gallons per minute) or extreme high heads (up to 750 feet).



In addition to these submersible pumps, electric-driven centrifugal pumps are ideal for both prolonged temporary pumping and permanent installations. Designed for long-lasting durability, these pumps were initially used in industrial and municipal applications. However, their benefits span many more applications. A permanently installed electric-driven centrifugal pump will provide reliable, continuous pumping and reduced operating and maintenance costs.

While not frequently used in mining applications, electric-driven centrifugal pumps are a viable option for a permanent installation or lengthy temporary pumping job. If the site location is not extremely remote, an electricity source can be found and power lines run to the jobsite. Accessing electricity can outweigh the lifetime costs of a diesel-driven pumping system if the time-frame is long enough. Costs for running electric-driven

pumps will eventually be the more economical choice, even factoring in all initial set-up costs.

For temporary jobs in which refueling is difficult, an electric pump is the ideal solution. Once power lines are established, pump accessibility is almost a nonissue. Lines can be run into underground mines and bolted to the ceiling. Mine planners may not consider this option, but once designed and implemented, electric-driven pumps require less access. They do not need refueling, and their motors require less servicing. These centrifugal pumps also reduce the carbon footprint of any job.

Case Study: Electric-driven Pumps

A gold mine had an environmental restriction that would no longer allow diesel-driven pumps, which had been operating at their site, provided by a rental company. The mine requested a solution for a portable pumping system that could use the voltage that was available at the tailings dam. The pumps needed to supply 7,500 gallons per minute (GPM) to the roaster facility (the location used to heat the ore and extract the gold) and 4,000 GPM to the autoclave system (similar to the roaster facility, but using pressure along with heat) at the mine.

A pump provider designed a system that used the electricity available on-site. The electro center—the house containing the switchgear, variable frequency drive (VFD) and all the pump controls—was on a portable, structural skid and housed within an enclosure. This unit was placed on the crest of the tailings dam. Using this solution, the company provided

three electric-driven, 12-inch centrifugal pumps, each capable of heads up to 390 feet and solids-handling capabilities up to three inches. These pumps provided the necessary flow rates and allowed the system to be moved up-gradient as the tailings levels rose.

Diesel-driven Pumps

Considering all the benefits of electric-driven pumps, diesel is still the right fit for many mining applications. If no on-site power can be made available, a permanent diesel- or natural gas-driven pump is a great option. Diesel-powered centrifugal pumps come equipped with a diesel engine for stand-alone operation. These pumps will work on any site, no matter how remote. Engines should meet the latest emissions regulations and tier compliance standards.

Standard models of centrifugal pumps are often used for high-volume flow (which can reach 15,000 GPM or more), average total dynamic heads and solids-handling capabilities. Advanced lines of centrifugal pumps are better suited to applications with high or extreme high heads, or those that are used as jetting pumps. The total dynamic head of these pumps, single-staged, can reach or exceed 600 feet. This means that, in a mining application, one of these high-head pumps can be sufficient to meet the pumping needs, or great heights can be achieved with just a few pumps staged together.

Safety should always be a consideration. When running diesel-driven centrifugal pumps in an underground mine, air should be vented in to balance the

diesel exhaust. This safety condition is eliminated with electric-driven pumps.

Case Study: Diesel-driven Pumps

A coal mine needed to dewater its mine floor after a 100-year rain event. All mine operations were stalled. The mine operators needed to get the process back online as quickly as possible. Given the amount of water, the pumps needed to supply 1,100 GPM with 760 feet of total dynamic head.


A solution was designed that required a six-man crew; 15,000 feet of high-density polyethylene (HDPE) pipe; two diesel-driven, eight-inch high-head centrifugal pumps; and on-site fusion machines. All equipment was on-site within 10 days of the flood event. The pipe was fused on location, and the mine was quickly operational again.

Conclusion

When water creeps into a mine, it becomes the most important aspect of mine planning. It needs to be dewatered as quickly as possible, but a design also needs to be developed that makes the most sense for the mine. Operators must consider available power sources for the most economical mine plan and reliable mine dewatering system.

Kristen Gurick is a marketing communications specialist for Godwin, a Xylem brand. She can be reached at kristen.gurick@xyleminc.com or 856-467-3636. www.godwinpumps.com.

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Montana expansion projects

Stillwater Mining Company has been involved in the implementation of sustainable practices since before actual mine development, through support of the “Hard Rock Economic Impact Plan” and the “Tax Base Sharing Plan” which essentially eliminated the old “boom and bust” cycle of mineral developments during the early 1900s.

Sustainability has continued into the operational phase with social and philanthropic programs which support important community development, and quality-of-life issues focusing on youth activities, educational programs, scholarships, emergency services and medical and health services. The safety and well-being of employees and the protection of the environment are over-riding core values for Stillwater Mining Company, have driven sustainability measures that help ensure employees return home safely, and also ensure that the operational and closure phase of the company’s mineral developments will maintain and protect the productivity and rural nature of the present environment for future generations to enjoy.

Of special note in 2012 was the continuing improvement in the company’s safety performance: our reportable incident rate per 200,000 hours worked declined to 3.12 in 2012 from 3.34 in 2011, a 6.6 percent improvement.

Montana Expansion Projects

Projecting beyond 2013, Stillwater further advised that it now expects first production from its Graham Creek project at the East Boulder Mine in late 2014, with the project expected to increase total company production by about 30,000 ounces annually from 2015 and thereafter. In addition, Stillwater is initiating development of the Far West project, a new-as-yet undeveloped mining area with attractive ore grades situated within the Stillwater Mine.

Once in operation, the Far West area is expected to increase the Stillwater Mine’s production by approximately 20,000 ounces initially in 2016, growing to approximately 45,000 ounces in 2017 and thereafter. With Graham Creek and Far West both online in 2017, estimated annual company production from the Montana operations should total approximately 575,000 ounces. Beyond 2017, when the Blitz project comes fully online, estimated annual company production from the Montana operations should total at least 600,000 ounces. Stillwater expects to gain more clarity on the ultimate production potential of the Blitz project as development there proceeds further.

The Graham Creek project’s 8,200-foot tunnel boring machine (TBM) excavation remains on track and will be finished in the first half of 2013. Once complete, it will be followed



Tunnel Boring Machine (TBM) head in the launch chamber for the blitz project.



by the installation of two ventilation raises to surface over the subsequent 18 months. During this time, Stillwater will continue to hire and train additional skilled miners required for the East Boulder Mine and Graham Creek operations. Through the end of 2012, the TBM has advanced about 6,500 feet. While not complete, significant definitional drilling has been performed at the Graham Creek project and minable ore has been identified. Ore grades in this area appear consistent with current grades in the existing portion of the East Boulder Mine. The cost of the Graham Creek project is estimated at \$13 million, of which approximately \$3.5 million has been charged to the project through the end of 2012.

Stillwater’s new Far West project was first identified in this year’s mining plan and is situated in an area of relatively high PGM grades between the 3,500 and 5,000 levels at the western end of the Stillwater Mine. Stillwater anticipates the Far West project will take about three years to fully develop, at an estimated cost of \$25 million. It represents an acceleration of incremental production made possible by Stillwater’s ongoing development of the Blitz project. Because the Far West project is situated within the existing envelope of the

Stillwater Mine, development efforts there will benefit from the existing major infrastructure of the mine. At least initially, some manpower may be diverted from the Blitz development into the Far West project in order to accelerate overall production growth at the Stillwater Mine, but if workforce attrition remains stable, the effect on the Blitz timeline should be minimal.

The Blitz project includes three principal elements: a TBM drive that ultimately will extend about 23,000 feet to the east from the existing Stillwater Mine infrastructure; a second underground drift parallel to the TBM drive and about 600 feet above it; and a proposed new surface portal and decline to be located about four miles to the east of the existing Stillwater

Mine facilities. The new surface portal will be conventionally driven and is intended to intercept the two primary Blitz tunnels, providing ventilation and emergency egress for the Blitz area. The TBM acquired for the Blitz project was fully commissioned during the fourth quarter of 2012 and to date, has advanced about 400 feet. Construction of the second conventional drift is also in progress and has advanced over 700 feet.

As these drives continue to advance, definitional and probe drilling will be performed to further enhance the understanding of the geology in this area. Total cost of the Blitz project is expected to be approximately \$197 million, of which approximately \$35.6 million has been charged to the project through the end of 2012. ♦



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For Ash Grove Cement, safety comes first

By Marjorie Smith



“Our goal is to have our workers going home to their families in as good shape—possibly better—than when they left,” says Lee Lundsford, safety manager at Ash Grove Cement’s Montana City operation.

That is not just a statement of company policy for Ash Grove: it’s a demonstrable accomplishment. The Montana operation has gone 12 years without a lost-time accident. “Or more precisely,” said Lundsford one day in mid-March, “4,483 days.” He and two other Ash Grove executives chatted with this *Montana Mining* journalist about their impressive safety record. “As of today, we’ve gone 479 days without a reportable accident,” Lundsford added.

Environmental manager Jeff Briggs, whose title had been environmental and safety manager until Lundsford took over the safety portfolio in January, explains that industrial accidents are classified as “lost time” when the injured person must take time off from work to recover, while reportable accidents mean a doctor was involved, if only to the extent of a prescription or a visit to a chiropractor. “It’s not considered ‘reportable’ if it is muscle strain that the worker treats himself with an ice pack or a heating pad,” Briggs explains.

The three managers agree that safety-consciousness is part of a corporation’s culture. Production superintendent Randy Waits



says, “The culture here changed when Ash Grove purchased the operation in 1986 and put an emphasis on safety and better tools.”

“Ash Grove’s Montana operation has 75 employees,” says Briggs, adding that while Ash Grove is the sixth-largest cement producer in the United States, it is the largest American-owned cement producer. Ash Grove is privately owned rather than being a publicly traded corporation.

As with cement plants around the world, Ash Grove’s Montana operation is located where its basic material is found: major outcroppings of limestone in the earth’s crust. In Montana City, Ash Grove digs the limestone in three quarries and processes it into cement.

Briggs says that in order to enhance safety, “We’ve made actual changes in the plant. We’re engineering safety into our

operation." Examples would include handrails, safer access to work areas, and improved personal protection equipment. Other engineered safety measures include better machines and better ventilation systems.

"First comes engineering control, before employee education," Briggs says. "But education is very important," Waits chimes in.

Briggs agrees. "I'd have to say that attitude is the most important aspect of Ash Grove's safety program." The men point out that time cards at the Montana City operation are a good symbol of the company's safety-first attitude. "Our time cards don't just record hours worked," says Waits. "We include space for any safety hazards observed during shift."

"Hazard awareness is a big educational push," emphasizes Lundsford. "That means getting information out to the workers."

Waits notes that dust—the perennial accompaniment to cement production—falls into both of his colleagues' bailiwicks. "Indoor dust is a safety concern," he says. "Outdoors, it's environmental." The basic safety concern, of course, is not breathing the cement dust, so the use of respirators and dust masks is mandatory.

Briggs concedes that environmental concerns have long dogged cement operations in Montana. In the mid-1990s, fuel for the cement kiln became a big concern. "I personally consider a cement kiln the best place to dispose of old tires rather than

loading up our landfills, but that option has been shut down by public opinion," he states. Ash Grove burns coal as well as petroleum coke, which comprises the solids left at the end of the oil refining process. Both fuels come from Montana.

Briggs also points with pride to the fact that Ash Grove is setting a standard for other Montana businesses. "We've had a couple of companies come to observe our safety program because we get such outstanding results. And there's crossover with non-industrial businesses—for instance, we've got a better safety record than Blue Cross Blue Shield of Montana, and they came to see what we're doing right. Once again, some of our success comes down to educating employees. If you're wearing high heels in an icy parking lot, that could result in a lost-time injury."

The men say that Ash Grove believes health is as valid a concern for a business as safety. "We have a very active wellness program," Briggs says. He points out that weight-loss and smoking-cessation can have safety implications as well as health effects.

Ash Grove doesn't try to quantify the economic impact of their safety program but the men agree that the industry average is that every lost-time injury costs a company \$45,000.

Clearly, for Ash Grove—and any other business—safety is a good investment. ♦



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Graymont is a family-owned company whose management team and employees are dedicated to meeting and exceeding our customers' needs for lime and limestone products. The company focuses on the production of high calcium lime; dolomitic lime; value-added lime-based products such as specialty hydrates and precipitated calcium carbonates; and the aggregate and pulverized stone business.

In North America, Graymont is the third-largest producer of lime. In the United States, subsidiary companies operate in Montana, Wisconsin, Michigan, Ohio, Pennsylvania, Washington, Oregon, Utah and Nevada, while serving markets in a much wider geographic area. In Canada, Graymont subsidiaries have operations from New Brunswick to British Columbia. In addition to Graymont's lime interests, Graymont Materials (located in upstate New York and the province of Quebec) provides con-

struction stone, sand and gravel, asphalt products and ready-mix concrete. Graymont also has a significant investment as a minor equity interest shareholder in Grupo Calidra, the largest lime producer in Mexico.

Having been in the lime business for over 50 years, Graymont operates facilities on sites that have been in operation for up to 200 years. The company is among the leaders in the industry in adding new, efficient plants and equipment and operates some of the most modern facilities on the continent.

Central to the company's corporate philosophy is a long-term approach to business, built upon a solid commitment to sustainable growth through the active participation in responsible environmental, workplace, and operating practices. At the same time, it is proud of its past accomplishments, which demonstrate Graymont's commitment to responsible conduct of the business.

In Montana, the Indian Creek plant is located near Townsend, just north of the Limestone Hills. Here, lime is produced in two coal/coke-fired preheater kilns. The plant is equipped with lime-sizing and storage facilities, allowing Graymont to produce and store a full range of bulk quicklime products, as well as a hydrator capable of producing 300 tons of hydrated lime per day. This plant supplies customers in Montana, as well as several other western states.

The quarry is located on the south side of Indian Creek. High-purity limestone from the quarry is trucked to the crushing plant, where it is sized and conveyed to a large storage pile adjacent to the preheater kilns. Bulk truck loading facilities are provided at the plant site, and rail loading is available from a 1,500-ton terminal located on the Montana Rail Link line in Townsend.

The management team at Indian Creek is comprised of the following in-




dividuals: Jason Ellis, plant manager; Tyson Sweat, plant supervisor; Mike Cartwright, maintenance supervisor; Jared Senn, quarry/quality supervisor; and Ben Mosher, process engineer.

Graymont continues to be of significant economic importance to the county, as it is one of the largest taxpayers in the county. In addition to providing many well-paying jobs, Graymont purchases many goods and services locally, within the community.

Many important lime markets are serviced by Graymont: agriculture; asphalt; steel; sugar; water treatment; building construction; lime application; mortar; plastering; restoration; whitewash; environmental remediation; flue gas desulfurization; food; glass; mining; precipitated calcium carbonate (PCC); pulp and paper; soda ash; and soil stabilization.

In addition to providing high-quality products for its customers, Graymont provides engineering and technical support to facilitate customer applications in the following areas.




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Product Application

With technical and sales personnel skilled in solving customer problems, employees work with customers and recommend the proper products to meet their specific needs. This may include support on FGD projects, steel blends of high calcium and dolomitic products, the usage of lime in asphalt, or how to apply building products.

Transportation

Having extensive expertise in transportation of products by truck, rail, or water, the company's emphasis is on building reliable, cost-efficient supply networks. An example of this commitment is the operation of a fleet of PCC delivery barges to support customers in the paper industry in the Northwest.

Material Handling

To ensure efficient and economical operations, Graymont reviews and inspects customer material-handling facilities and design criteria. If requested, Graymont is prepared to own and operate such facilities at the customer's site, including storage facilities. Graymont also provides portable slakers, silos, and unloading and material handling equipment for short-term projects. Several customers lease this equipment until their project has been completed.



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Laird Technologies' SIAMnet Diagnostic System and CANopen Remote Control System set new standards for the mining industry



As an industry leader in the design, manufacturing, installation and service of wireless automation and control solutions, Laird Technologies delivers a full line of cost-effective, reliable and rugged communication and remote control products. With expert engineers and manufacturing capabilities, Laird is always working to provide cutting-edge technology and new solutions for customers.

SAIMnet

Laird Technologies' SIAMnet is a network of coaxial cable, antennas and access points (Wi-Fi) which provides voice coverage and data communication for underground mines. Installed with virtually no interruptions in service, the SIAMnet System features applications that are operation critical in an underground mine, allowing a problem to be rapidly diagnosed and downtime to be minimized.

The SIAMnet Diagnostic System (SDS) monitors every SIAMnet amplifier and reports status information on a periodic basis. In the event that an amplifier is faulty or operates outside of the set parameters, the mine technician can see exactly which amplifier is causing the problem without traveling into the mine. By interrogating the system through the SIAMnet Diagnostic Manager (SDM), issues such as a power outage, damaged coaxial cable, low supply voltage or weak signal can be identified. If an amplifier reports abnormal conditions, an alarm is generated

locally and an email is sent to the contact list.

While monitoring information is available to all users, the configuration screens are password-protected and reserved for the mine technician. A webpage, with current system status, may be made accessible from any location worldwide by the mine network administrator. The mine technician can get online with the SDM, via a secure Internet connection, and troubleshoot the SIAMnet. When required, a service technician can be dispatched directly to the area; however, many issues may be resolved remotely.

The SDS is useful in calibrating a new SIAMnet network. Once installed, the amplifiers can be adjusted remotely to match the exact mine configuration. A perfectly configured SIAMnet optimizes the data rates while the voice communication audio quality remains exceptional. Amplifier configuration and alarm files may be kept for reference and further analysis. The SDS includes a basic spectrum analysis feature and can display the signal strength over the entire 800MHz band, as well as the cable modem band. Although it does not replace an expensive spectrum analyzer instrument, the SDM can identify RF noise issues and display signal strength in a graphical way. Should a thorough analysis of the SIAMnet be required, every amplifier has the possibility to generate signals over either band, which can be used for troubleshooting. These features will help maintain a

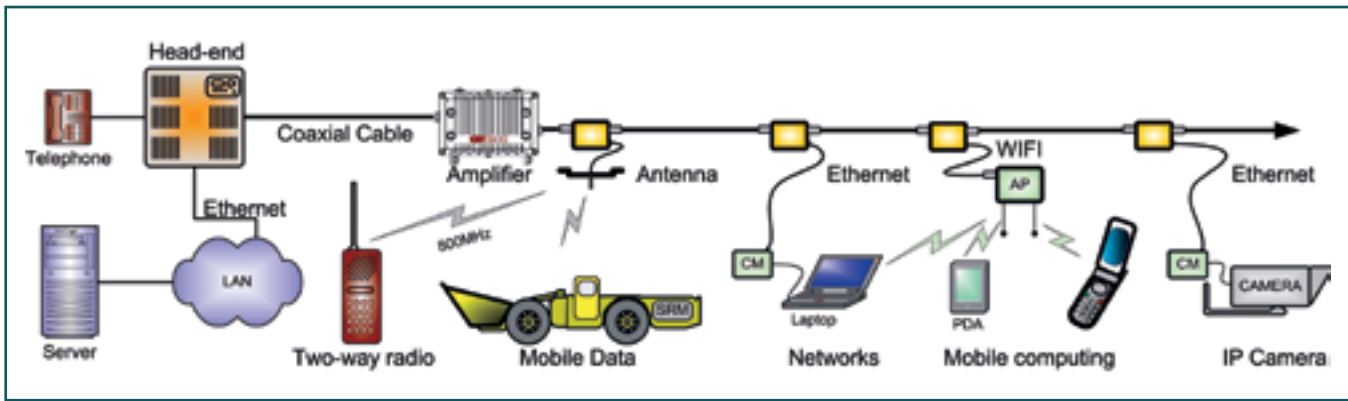
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The CANopen Remote Control is made with safety and productivity in mind and sets new standards for the industry. This generation of remote is part of the new CattronControl Dual Processor product family that exceeds the strictest regulation, including the new European machine directive EN 13849-1 Performance Level d. This system also complies with the Australian AS4240 standard (remote-control systems for mining equipment). A wide range of transmitters and receivers can be used in a variety of applications. Every transmitter and receiver is compatible to each other and can be configured to your specifications. With this flexibility, the possibilities are endless.

When connected to a CAN network of a vehicle's main computer or PLC, the Machine Control Unit (MCU) acts as a wireless gateway between the vehicle and the Operator Control Unit (OCU). All functions executed on the



OCU are transferred on the CAN Network and vehicle vital signs are transmitted back to the OCU.

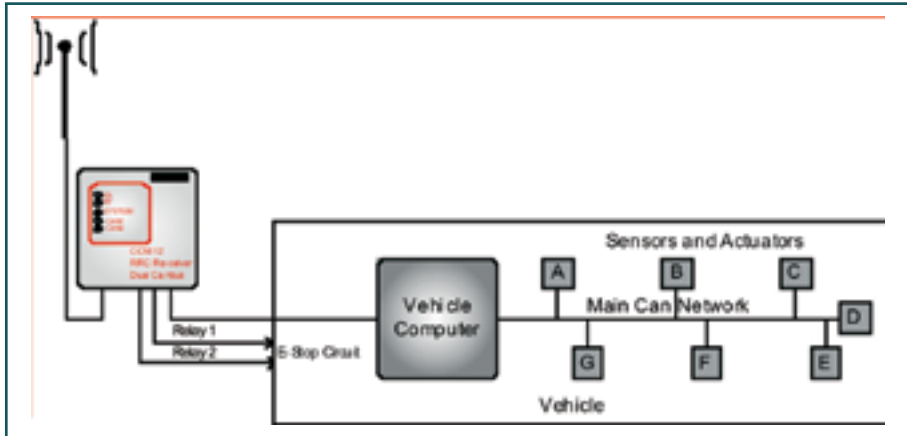
The system consists of two major components: the OCU held by the operator, and the MCU located on the vehicle to control. The system allows an operator to remotely control a CANopen vehicle through a RF link. The RF link provides two-way data transmission between the OCU and the MCU.

The system is compatible with several RF modules, each supporting a particular frequency band. RF channels can be pre-configured in Transkey configuration devices or selected by the operator.

The following frequencies are currently supported, allowing the system to be used anywhere in the world:

- 335 MHz
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- 447 MHz
- 450-470 MHz
- 868-869 MHz
- 903-927 MHz

About Laird Technologies – Laird Technologies’ wireless automation and control solutions have helped prevent serious injury while increasing efficiency and productivity by allowing the operator to move to a safer, more efficient location. With more than 65 years of experience in radio-frequency products, Laird Technologies is the largest global manufacturer of industrial radio remote controls. Applications include mining, locomotives, railcar movers, over-



head cranes, and a variety of material handling, mobile and agricultural equipment.

Laird Technologies is also an industry leader in the design and manufacturing of electromagnetic interference (EMI)

shielding, telematics, embedded wireless, thermal management and antenna solutions.

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Holcim: together for communities

As part of Holcim Ltd.'s worldwide centennial celebration, all Holcim Group companies were asked to participate in the M80 initiative, "Together for Communities". The goal of Together for Communities was to engage each of Holcim's 80,000 employees in one day of community volunteering for a cause on behalf of Holcim.

Community volunteering opportunities were focused on one of the following three categories: education, community and infrastructure. Additionally, projects needed to be defined as long-term and could be maintained over a number of years.

The Holcim (US) Trident plant chose to focus on the Three Forks City Parks renovation, which applied to both community and infrastructure categories. Holcim (US) Trident plant employees embraced the idea of renovating local city parks and in particular, the Tom Bertagnolli Memorial Park. The youth baseball park in Three Forks was dedicated 25 years ago in memory of Tom Bertagnolli, a Holcim US Trident employee. Bertagnolli was an avid supporter of the town's youth baseball programs. The park had not had recent upgrades or maintenance and was in need of some TLC. This project is sustainable, which allows the plant to continue with additional improvements there, as well as at other existing parks in Three Forks, during the coming years.

Part of the success of the project was involving the community and the city. In March 2012, plant manager John Goetz presented the idea to the Three Forks City Council and to the mayor of Three Forks. City officials not only approved the project, but also were instrumental in providing assistance and key services throughout the project's completion.

Another key element in the success of the Tom Bertagnolli Memorial Park was the ongoing involvement and participation of the Bertagnolli family. Holcim (US) Trident employees felt strongly that their input was needed in the design and development of the park's renovation. Local family members, as well as family members from out of state, came to view the final project, share memories of Tom and enjoy lunch with the employees of the Holcim (US) Trident plant.





The first site work began in April 2012 with the installation of the new bleachers just in time for the spring youth baseball season. The majority of the work was completed in August when an entire week was devoted to installing and replacing 900 feet of sidewalk, creating concrete pads for new benches, picnic tables and trash receptacles and to the refurbishment of existing playground equipment. Almost all Holcim (US) Trident employees participated in some capacity, either during the week-long project or the work performed prior to it. The employees didn't just contribute their 10 individual hours of volunteerism—the total number of volunteer hours logged on the park project was over 1,400 hours.

To further engage the community and the workforce, the plant served lunch each day during the week-long effort in August. A wide range of guests joined Holcim employees during the week, including other business owners, school administration and staff, city employees and interested citizens.

"The City of Three Forks is very appreciative for the generous donation of time and materials from Holcim," Three Forks Mayor Gene Townsend stated. "The much-needed improvements will make the park a much better place for all residents."

The Bertagnolli family sent similar expressions of appreciation and local residents living near Tom Bertagnolli Park have witnessed increased usage of the park. Holcim (US) Trident employees are proud of this project and look forward to continuing to volunteer within their community. ♦



Partner in the Community

At Holcim, we believe in being a partner with the communities in which we operate. Which is why the employees of the Holcim (US) Trident plant are deeply involved in the community through volunteer efforts. We are honored to be part of this community!

For more information please contact the Holcim plant at **406-285-3241**.

Perfecting Progress



Imerys: talc at a glance

Imerys is the recognized world-leading supplier of industrial minerals. Imerys designs, manufactures and sells high value-added mineral-based products that enable its customers to optimize their own products and production processes.

The most recent addition to the Imerys portfolio of 30 different minerals was talc. Imerys talc started more than 100 years ago as a cottage industry in the French Pyrenees. Today, it has grown to become the world's leading talc producer, employing 950 people on five continents and supplying around 15 percent of global demand from nine mines and 15 processing plants in Australia, Austria, Belgium, Canada, France, Italy, Japan, Spain and the United States. One of the largest Imerys talc mines and two of the largest Imerys talc mills are in southwest Montana. Nowadays, Imerys talcs are the highest-quality talc-based products on the market.

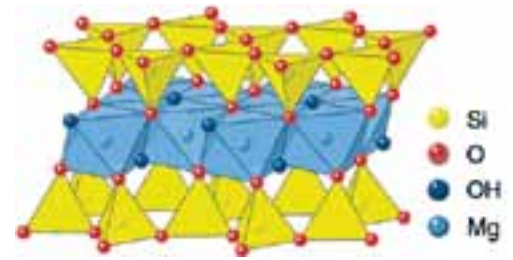
Talc: the Versatile Mineral

Talc is a hydrated magnesium silicate. All talcs are soft, lamellar, chemically inert, organophilic and water-repellent, but no two talcs are quite the same. Each ore body has its own geology, formed over millions of years. As a natural ore, talc is always found in combination with at least one other mineral, the

most common of which are chlorite, dolomite and magnesite.

All talcs are lamellar, but individual platelet

size can vary from one micron to over 100 microns. This platelet size determines how lamellar a talc is. Small crystals provide a compact, dense ore, known as microcrystalline. Large individual crystals, called macrocrystalline, form papery layers. Stacked on top of one another and held together by very weak bonds, these microscopic platelets slide apart at the slightest touch, giving talc its characteristic soft, "greasy" feel.



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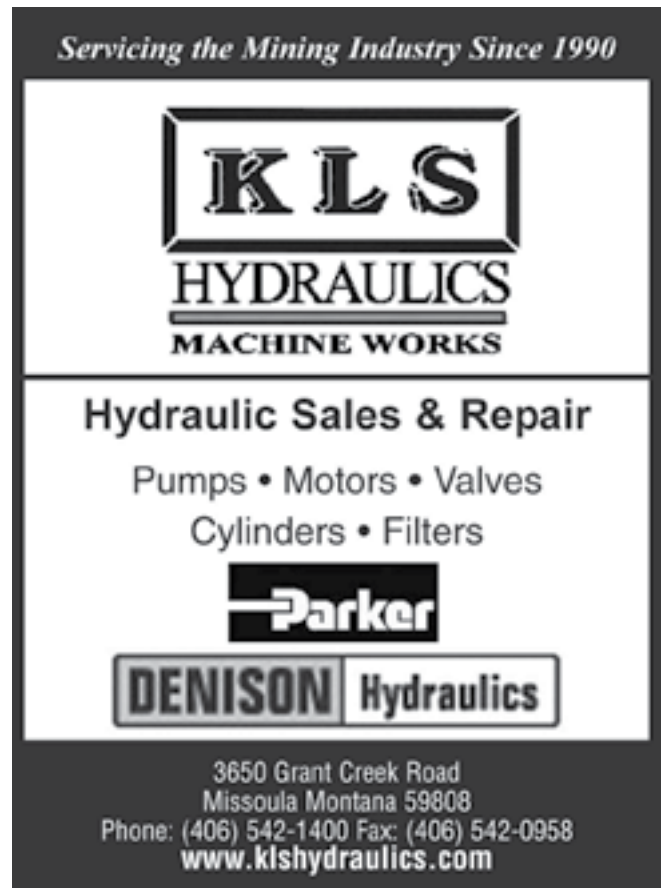
With over 100 years of talc expertise behind us, our specialists—many of whom come from the markets we serve—have harnessed talc's unique properties to bring added performance to a wide range of products and processes. As a natural substance, talc brings environmental benefits to many of these applications.



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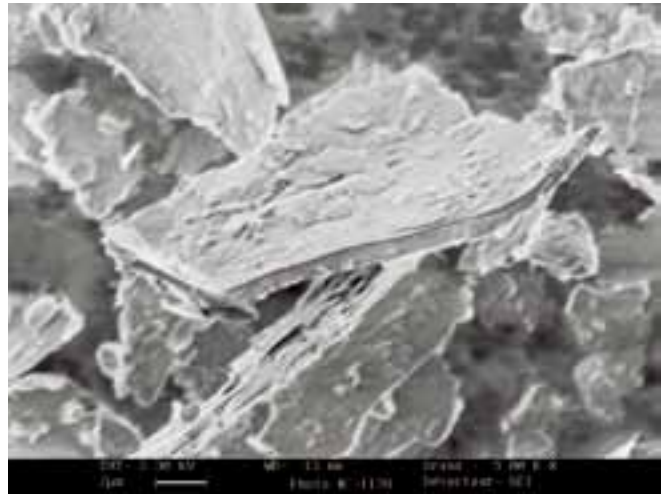
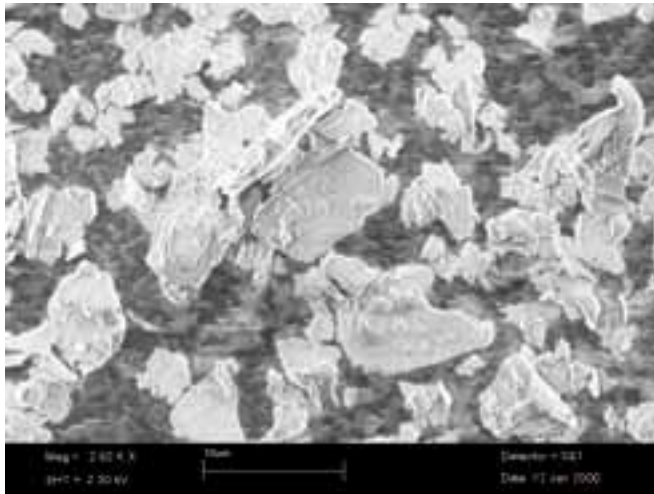
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In polymers, talc is used to improve the impact strength of polypropylene auto parts such as bumpers, dashboards and interior trim. In tires, talc is an eco-friendly partial replacement for carbon black. In both cases, using talc allows manufacturers to make lighter parts, making vehicles less fuel greedy and lowering CO₂ emissions.

Talc is also ideal for reinforcing modern biodegradable biopolymers and for wood-plastic composites, which are increasingly being used as a sustainable substitute for lumber in outdoor decking.

In paints and coatings, talc increases covering power, paint durability and longevity, lengthening the life-cycle of painted goods. It helps reduce emissions associated with solvent-based paints. As a natural, inert mineral, talc is ideal for use in organic paints and coatings.

In ceramics, talc is the principal ingredient in the cordierite structures used in today's automotive catalytic converters. In tile production, talc acts as an effective flux, enabling manufacturers to speed-up firing cycles and lower firing temperatures, thus reducing energy consumption.



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In agriculture and food, talc is a safe alternative to chemicals used for the UV and disease protection of fruit, such as apples and grapes. It is ideal for organic farming. In feed and fertilizer production, it prevents caking and improves processing.

Talc helps increase virgin olive oil yield by absorbing the emulsifier found in the olives. In food, talc is also used as an anti-stick coating agent in sweets and candies, dried foodstuffs, seasonings, chewing gum and cured meats.

In pharmaceuticals, talc's inert nature and high purity makes it ideal as a pharmaceutical excipient—the inactive substance used to stabilize or deliver active ingredients in drugs. It is also a valuable tablet processing aid.

In cosmetics and soap, talc is used as a body powder and is an ideal carrier for perfumes. In make-up, it provides silkiness in blushers and eye shadows; transparency in foundations, and sheen in powder-compacts. Talc also enhances the softness and lather of soaps.

Innovation: the Engine for Growth

On all its markets, our business's key success factor has been innovation. As well as developing new solutions for existing applications, our R&A teams work hard to find new applications for talc. Recent innovations include:



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Talc Demand and Outlook

Global production of talc stands at around seven million tons, mined from about 250 deposits scattered across the globe. China is the largest producer, with about 35 percent of global output. India and the U.S.A. follow at around 12 percent each. Finland produces around eight percent of global talc output,

while France produces six percent. The trend is toward further consolidation, particularly in China and other Asian countries.

Manufacturers are opting for more sophisticated mineral products so as to satisfy consumer demand for safer and more eco-friendly products. An increasingly stringent regulatory environment also favors the use of talc over less environmentally sound alternatives. Other drivers for talc include higher energy prices which push manufacturers to seek weight efficiencies and to opt for non-petroleum based products.

Generally, we expect to see strong growth for talc in emerging economies such as China, India, Latin America and Eastern Europe, with more moderate growth in mature economies such as North America and Western Europe. ♦

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Butte Silver Mines, Inc.

A new start for an old district

By Robin McCulloch

At the beginning of 2013, International Silver, Inc. opened the office of Butte Silver Mines, Inc. in uptown Butte, Montana. The company is focused on remaining reserves and unexplored targets in the Summit Valley Mining District (Butte) above the 800-foot level. The Anaconda Copper Mining Co. initiated development of these reserves in the mid-1950s with their Northwest Project. A shaft for men and materials was partially sunk at the Missoula and the surface infrastructure for the Ryan shaft was initiated, but never completed. The 1950s ended with closure of most silver-zinc mines on the Butte hill. Commodity prices were dismal and the company chose to focus on copper.

In the late 1980s, the properties were sold to Washington Corporation of Montana, which in turn sold them to Montana Mining Properties. The silver resource areas were sold to Butte Mining PLC., which then designated their wholly owned subsidiary, New Butte Mining, Inc., as the operating company. Exploration led to the definition of a viable reserve of 728,000 tons of 0.09 opt gold, 11.89 opt silver, 2.37 percent lead, 7.6 percent zinc and some copper credits. Resources of 4.6 million tons of similar grades were also identified. Production was initiated but low commodity prices, litigation, and the Superfund Project closed the mine in 1991.

International Silver Inc. has assembled leases and ownership in the district of more than 3,300 acres. Favorable exploration targets exist between the 400- and 800-foot levels, west of the Missoula shaft, and opportunities for resource definition abound to the south.

The company will permit a selective mechanized mining operation of approximately 1,500 tons per day utilizing froth flotation recovery.



Butte Silver mine manager Robin McCulloch and geologist Jill Sotendahl pose for a photo in front of the Badger Mine Hoist House and Gallous Frame, waiting to go to work.

All excavations will be backfilled with either development rock or paste fill to remove the chance of subsidence. They expect to employ somewhat more than 200 people after development. As many staff as possible will be hired locally. Surface operations will be confined to the disturbed areas east and west of town.

A reasonable operations schedule includes one to three years for permitting, one year for construction, and six months to a year for development and reserve expansion. The company goals are to be good neighbors in the community while producing minerals for the world. ♦



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First annual MMA Essay Contest a success

By Debbie Shea

The MMA Education Committee is proud to present the top three winners of our first annual essay contest for eighth-grade students throughout Montana. This year's essay topic was "Why Are Minerals Important to Me?" With over 275 entries, determining the three place winners was an overwhelming task. I thank the MMA Education Committee for their great work.

This age group is inquisitive, creative and so full of life and personality that, as a former eighth-grade teacher, I knew we would be in for a treat. Eighth-grade students from Lewistown, Denton, St. Francis in Billings, Columbus, Belgrade, Butte, Great Falls, Helena, Augusta, Foothills Community Christian School in Great Falls, Drummond, Kalispell, St. Mary's in Livingston, and home schools throughout the state submitted essays.

Teachers kindly sent notes with the entries. Columbus teacher Lorrie Henrie-Koski said, "Your contest opened many eyes as to how reliant we are on the earth's resources."

"My students were informed that even if they do not win the contest, the main objective was to write a professional paper in preparation for writing scholarships, as well as completing

research papers. I appreciate the opportunity from the Montana Mining Association in helping my students broaden their horizon on the purpose and importance of minerals," said June Magnuson, Team A eighth-grade teacher from Butte.

After much deliberation, the committee chose the following winners. The first-place winner will receive \$400; the second-place winner, \$250, and the third-place winner, \$100. Winners, and their parents, will be honored at the Montana Mining Association's Annual Banquet on Thursday, May 30, 2013. Thanks to all who participated; you made us all very proud of Montana youth.

- First Place: Josh Kraft, St. Francis, Billings
- Second Place: Siri Pederson, Lewistown
- Third Place: Kristen Piippo, Drummond

We have submitted their essays to the 2013 *Montana Mining* magazine for your reading pleasure. ♦

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Minerals in motion

Why minerals are important to me

Josh Kraft, Saint Francis Upper School

My Sunday morning starts very early. I wake up around seven o'clock and sit down to breakfast and a couple of vitamins. After this, I get all my under armor on, and hop in the car for an hour drive to Red Lodge. When I arrive, I pull my freshly waxed snowboard out of the back of the car and start my walk to the chairlift. I press "shuffle" on my iPod, and get lost in the music as I carve down the mountain, occasionally ascending into the air, only to come back down to the snow. The only break in my glorious day of melding with the mountain comes at lunch, when I refuel. This is my perfect day—and it is made possible by minerals.

The alarm clock that wakes me up in the morning is powered by rechargeable lithium batteries. I certainly wouldn't be on the road on time if not for lithium! When I brush my teeth, I use toothpaste containing silica, and sodium, and fluorite. I jump into the shower and wash my hair with shampoo containing sodium sulfate. I then put my foot powder on which contains talc. This helps keep my feet dry in my boots. In order to prevent sunburn on the hill, I apply sunscreen containing zinc.

My breakfast cereal is fortified with many minerals. I also take a multivitamin filled with minerals to help keep up my energy level throughout the day. In addition, I enjoy home-made biscuits made with baking powder containing calcite. The Ovaltine I add to my milk is rich in minerals, providing me with great sustenance! Minerals do a body good!

The drive to the hill would not be possible without minerals. The car battery includes minerals such as lead, copper, and aluminum. The car contains yards and yards of copper wiring, and the windshield is made with the help of calcite. Mica is used in the car's paint. Sulfur helps to vulcanize rubber, which is needed for tires. Many other auto parts include hematite and magnetite from iron ore. The trip down the highway is made much safer with the help of halite as a road de-icer ingredient. Salt is also used to help keep all of us on the road, and not in the ditch. The road to the hill from the highway is very bumpy and curvy, and gives me some stomach troubles, so I rely on antacids containing calcite to calm my stomach. When I arrive at the hill, I can call my friends on my cell phone. The cell phone is comprised of many minerals such as gold, lithium, and copper.

After contacting my friends, I can begin to gear up for the big day. The mineral calcite appears again in the optical lenses of my goggles. The snowboarding boots I wear are made with rubber that sulfur has helped to vulcanize. Silica is used to help make waterproof clothing sprays. My snowboarding coat and pants are both, thankfully, waterproof. My snowboard, named "Nicole", is a fine example of the importance of minerals. The mineral-rich plastic comprises the top and bottom layers of the board. Graphite is used to help make the inner layers. Mica

is used in Nicole's stellar paint job. My iPod is a necessity on the slopes. Many of the same minerals found in a cell phone are also used to manufacture and power my mighty music machine—lithium, copper, gold, silver, tin and zinc.

As I approach the chairlift, I notice the mercury in the thermometer is heading up to 40 degrees Fahrenheit. This day will be diamonds! In fact, the sky is a beautiful shade of cobalt blue. (The ride to the top is noisy today; they need to grease the lift with the help of graphite.) I am off the lift, and finally on the beautiful snow that I crave. When I launch across the sky, I can almost see the Stillwater Mine on the horizon, where they mine palladium and platinum. These minerals are used in the auto industry to make catalytic converters, which help reduce auto emissions.

When I break for lunch, I am fortunate enough to visit with some college boarders from Montana Tech. Their mining engineering class-loads seem very daunting, especially electrical circuits, mineralogy and petrology, and differential equations, along with mine operations and geomechanics. They are working very hard, but it will all be worth it, because job placement in their field is excellent!

As I head back out into the crispness of this perfect day, I am thankful for all of the minerals that have made it possible. ♦

Zinc this is clever?

Siri A. Pederson, Lewistown Junior High

“BEEP! BEEP! BEEP!” It’s 6:30 a.m. in the morning and my alarm clock is going off. *If only I could unplug it or cut the copper wire*, I thought, *but I need to get ready for school.*

I turn on my light and a second later, my room is as bright as when the sun is glaring down on my polished silver, gold and platinum medals from swim team. I shut my eyes in a flash due to the brightness; I turn and try to walk in the darkness to the bathroom. After tripping on the feldspar plant stand, I fall into the gypsum blockade, and then finally reach my destination. I splash some freezing cold water on my face, which wakes me up instantly and I almost shriek with shock.

I get my hair wet with more water that is getting warmed up slowly, and scrub a quarter-size of panthenol onto my head. I rinse the shampoo out with what now is burning hot water and quickly put in some conditioner with biotin in it. I rinse it out, dry off, and am getting ready to put all kinds of fancy minerals on to enhance the look of my face.

I turn on my music and then wash my face with sodium laureth sulfate, followed by putting kaolin all over my face. I do the usual routine of delicately putting on powdered calcite, mica, titanium dioxide, sodium carbonate and lastly, petrolatum. I’m having fun singing along to “Never Forget You” while finishing up my makeup, but I’m getting hungry.

I do a morning sprint into the kitchen to gobble up a potassium stick and eat a bowl of cream of

wheat, fortified with iron and calcium. I swirl in some sugar with my nickel spoon to make it taste better and then get a glass of orange juice. I take a vitamin to give my body a blast of extra magnesium, iodine and zinc. I skip to the bathroom again to put some sodium sulfate in my mouth so my teeth will sparkle like mica and smell like fresh mint. I look in my jewelry box and find my silver earrings and a matching silver necklace with a cobalt-blue inset. I snap on my quartz watch and also pull my shoes with barium and stibnite on the bottom of them onto my feet; after that, I’m off to school.

I drive up in my brother’s iron ore Volkswagen Bug, get out and see the janitor throwing halite all over the ground; I walk inside when the bell rings and I go to science. My feet step into the gypsum cave decorated with silver, gold, wood, a little bit of fluorite, and some rat poison with barium in it for those pesky rascals. I take my seat and get ready for the lab, which is a test to see who can make the best toy car. I start with the motor; my teacher gives me a lithium battery, two silver paperclips, two manganese blocks, and a copper wire. Before I know it, the five-minute bell rings, and so the class tests the motors and all of them turn out splendid. We clean up and sprint like we’re in the Olympics to be the first ones in line for lunch.

I sit down at my usual table and sprinkle some sodium chloride onto my green beans, which are filled with calcium, manganese, and so-

dium. I gobble up my favorite fruit (pineapple) to have my daily portion of manganese. I take a bite into the phosphorus, irony, zincy, and iodine fish that tastes amazing. I felt so full I put my tray away and finished the rest of the school day.

My mom picks me up after school to go to the doctor for a check-up to see how my titanium is doing. I go to the X-ray room and have a heap of beryllium, uranium, and barium on me while the doctors are taking pictures of my ankle. When I’m done, the doctor says that everything looks wonderful. My mom and I jump in her new 60-miles-to-the-gallon lithium car, run some errands, and finally head to our house. I walk into the garage and see my dad using tungsten to sharpen his blade so that he can trim-up some wood for his project while my brother and sister are playing with pyrite. I hear a big bang and run outside to find that my brothers are shooting off barium and stibnite to make colorful lights in the night-time sky; at the other end of the yard, my mom is finishing up spreading potash on the soil filled with perlite.

I walk inside and sprawl on my comfy bed, absolutely exhausted and just dreaming of soaking in a mineral spring we visited last winter. I set my alarm, hit the lights, and do a zombie walk to my bed. Ahhh.... This has been a long day, I zinc I should go to sleep... goodnight. ♦

Why are minerals important?

Kristen Piippo, Drummond School

Hello, my name is hydrous silicate of alumina. My friends call me Bentonite. I am also known as "The Mineral with One Thousand Uses". I am completely composed of minerals. Some of them are silica, aluminum, iron, sodium, magnesium, calcium, titanium, and potassium. I have found myself in almost everyone around the globe's home in one way or another. One of the people who seems to use me a lot is Kristen. I am found in hundreds of materials that she uses every day. Life for her would be very different without me around.

If people didn't have me, they would be missing many common household items such as cat litter. If they didn't have cat litter, they would have to keep their cats outside or find another material that is absorbent and good for controlling odors. If they didn't have me, Kristen would still have to change cloth diapers when she babysits. I am the material that is inside diapers to make them absorbent. I am capable of absorbing seven to 10 times my weight in water! This is by far the worst job I have to do!

One of my best qualities is that I can be used for detoxification. I am used all over the world for removing toxins from inside and outside the body. This sounds unpleasant, but most people love a detox at the spa. Because I attract toxins, I can also be used to treat bacterial food poisoning. When someone takes me in powder form, I suck up all the tox-

ins and leave the body undigested. Hopefully Kristen never has to use me for this purpose. Since I can remove toxins from outside the body as well, she also uses me every day in her hand-soaps and detergents.

Another thing about me that is useful is that I can seal up man-made ponds, lakes, and ditches. I am pretty sure I have seen Kristen fishing in one of the ponds that I sealed up. A lot of people use me to line landfills and prevent the toxins from the waste from polluting the surrounding ground. Kristen contributes to one of the landfills that I sealed up so she at least knows that her garbage is not polluting rivers and streams.

One of my main uses is in beauty products. Being an important part of moisturizers and lotions, if I was nonexistent, Kristen would not be able to keep her skin moist and soft. She slathers me on everyday for this purpose, and I know she would miss me. Because of my cleansing properties, I can be used for clearing away blemishes and brightening skin. I can also be used for hair care. When I am applied, I remove dandruff flakes and excess oils, leaving the hair clean and shiny. Most of Kristen's shampoos and soaps have at least a little bit of me in them. Every morning she lathers me up in her long hair and then washes me down her drain. Some makeup contains bits of me, as well, so I get to see first-hand everything that goes on in Kristen's day at school.

I also have quite a few medicinal purposes. I can be used as a remedy for swollen gums. I help by soothing pain and reducing inflammation. Maybe this is the reason I am found in Kristen's toothpaste. I can also neutralize the body's acidity, therefore reducing heartburn and stomach ulcers.

Kristen raises sheep over the summer so she gets to see even more of me. I can be found in the pellets that she feeds to her sheep. I am responsible for slowing the digestive systems of her sheep so they can better use the nutrients in their feed. I also make the pellets tougher and absorb the moisture so they do not clump together.

Everywhere that Kristen goes, she uses a car to get there. In order for her car to work, she has to get fuel which has to be drilled out of the ground. I am the material that is used to lubricate and cool the drill bit that retrieves the oil from the ground. Because of me, Kristen is able to go and visit her grandma and go other places to do things she enjoys. So, in a way, I am the source of many people's transportation.

Without all of these things, Kristen's life would be very different, indeed. Minerals have thousands of uses in her home and other people's homes, as well. I am only one of the many minerals that she will use over the course of her life. If we were all gone, I am pretty sure she would miss us a lot. We minerals are very important to people everywhere on earth. ♦

Your partnership in the Montana Mining Association can start today.

Membership starts at \$10 a year.

Visit the membership section on our website at www.montanamining.org or contact the Montana Mining Association office at 406.495.1444 or email us at info@montanamining.org



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- ▲ Sharing in best safety practices within the mining industry
- ▲ Get up to date industry information from the MMA website
- ▲ Attend the MMA Annual Meeting for social, educational, and networking opportunities, stop by our trade show too
- ▲ Receive Quarterly newsletters highlighting current events and updates on the work of the MMA
- ▲ Get noticed with our Membership Directory's efficient exposure of our member's businesses

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- ▲ Provides Scholarship funding for post-secondary education
- ▲ Encourages and provides many opportunities for volunteerism
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