



BMW Motorcycles in Coal Country, WY

By Jürgen Brune #104942

Being a coal miner and a BMW rider are both things I enjoy. What does that have to do with the BMW MOA? Our 2008 MOA International Rally is scheduled for July 17 - 20 in Gillette, in Wyoming's Powder River Basin. The PRB is the heart of coal country, and Gillette may be called the coal mining capital of the United States.

What's up with coal?

Few people know about the importance of coal in our country. Some of us may remember stoking a coal-fired stove to heat the house or cook meals. Those dusty days of schlepping buckets of coal up many flights of stairs from the storage bin in the cellar (been there, done that) and hauling the ashes out the back door are long gone.

The coal mined today is almost exclusively used to produce electricity in large power plants. Coal is ground into fine powder and then blown into a huge furnace or boiler where it burns to heat water and produce steam. The steam then runs a turbine coupled to an electric generator.

Every year, coal miners in the U.S. produce 1.1 billion tons of coal — the US coal production is only exceeded by one other country: China. About 52% of all electric power in our country is made from coal. In other words, every other light bulb, TV set, toaster, PC, washing machine and trusted BMW motorcycle battery tender runs with electricity generated by burning coal.

Coal is a booming business. The Department of Energy forecasts a 40% increase in production over the next 20 years, and most of the additional coal will be mined in the western United States. Coal-fired electric power plants generated almost 2 billion Megawatt hours (MWh) of electricity in 2006. 1,000 MW is enough power to supply 800,000 households or a larger city (depending a bit on local climate, heating and air conditioner use, etc.).

In the United States, about 37% of all



Above: Bucyrus model 495 electric shovel loading rock into a Cat 797B, 360-ton haul truck. The bucket has a volume of 85 cubic yards and can load 120 tons of rock in one pass, filling the truck with three scoops. (Photo: Foundation Coal Corp.)

Right: 360-ton haul truck. Note the operator's cab on top of the fender. (Photo: Foundation Coal Corp.)



electricity goes to residential use while the larger portion (63%) of electricity is used for commercial and industrial purposes such as factories, industrial plants, offices, building and facility lighting, heating and air cooling and telecommunications.

Powder River Basin coal was formed during the Paleocene period some 60 million years ago and is considered some of the "youngest" coal in our country compared to the bituminous coal in Pennsylvania and West Virginia, which is about 300 million years old. Wyoming coal also has a lower heating value of about 8,400 to 8,800 Btu/lb as compared to 12,000 to 14,000 Btu/lb for coal mined in the eastern U.S.

Coal developed from the remains of trees, ferns, and other plants growing in huge swamps that existed during the humid climates of former geologic ages. As older plants died, new forests formed on the remaining humus-rich soil. This process repeated for hundreds of thousands of years, forming a thick layer of decomposing plant waste consisting mostly of carbon, hydrogen and oxygen. Geologic and tectonic processes eventually caused the plant layer to be covered up with soil and rock and heated through volcanic activity from underneath. Coal is technically not considered a mineral.

but a combustible type of rock composed of different carbonaceous minerals and some other organic compounds, for example tar, pitch and oil. Along with petroleum and natural gas, coal is considered a "fossil fuel."

Wyoming, the largest coal producing state in the U.S., produced 446 million tons of coal in 2006, up 10% from 2005 (Source: EIA). Most of Wyoming's coal comes from some of the world's largest surface mines in the Powder River Basin that covers 12,000 square miles in north-eastern Wyoming.

To get access to the coal, it is usually necessary to "strip" away the overlying soils and rocks, the so-called overburden. In Wyoming, this often necessitates blasting to loosen the rock before it can be dug up.

Large stripping shovels load the broken overburden into haul trucks. Such stripping shovels typically use ropes or hydraulics to actuate the dipper, and dipper capacities of 100 to 130 tons that can be lifted 40 feet up to load the trucks. Trucks are equally gigantic: One of the biggest models, the Liebherr T282B, is 48 feet long, 29 feet wide and just over 24 feet

Right: BMW MOA Office Manager Tammy Leuthauser is dwarfed by a truck tire at the Eagle Butte Mine. (Photo: Vince Winkel)

Below: An electric shovel loads more coal into one of the huge trucks. (Photo: Vince Winkel)

tall. It weighs more than 200 tons empty and can carry a payload of 400 tons. It comes with a 16-cylinder, 90,000 cc diesel engine with 3700 hp.

On the level below the stripping operation, a fleet of big front-end loaders dig up the coal and load it into slightly smaller trucks with load carrying capacities of 100 to 150 tons payload each.

Typically, it takes three to five shovel loads to fill a truck. The trucks carry the coal to a crusher, from which it is

transported to a stockpile. The stockpile feeds the train loadout via a conveyor belt.

The coal is loaded from the mines into one-mile-long trains of 110 to 120 cars, each carrying about 100 tons, for a total train load of 11,000 to 12,000 tons.

The two largest mines in the Powder River Basin, the Black Thunder and the Antelope mines, each produce about 85 to 90 million tons of coal per year. Assuming that trains are loaded on 350 days per



year, this means they need to load 20 to 25 trains at each of these mines to ship a quarter million tons of coal each day.

Closest to Gillette, the Eagle Butte mine is located just a few miles north of town in the triangle between Highway 14/16 and Highway 59. You can easily locate a satellite image on Google Maps. The mine is operated by Foundation Coal Corporation. Two coal beds are mined, the "Roland" and the "Smith" seams. Together, these seams are 100 feet thick. Annual production is about 25 million tons of low-sulfur coal with a heating value of 8,400 Btu/pound. At current production levels, there is enough coal for about 15 more production years at this mine.

About Mining and Motorcycles

Besides coal mining, motorcycles have a lot more to do with mining than one may think. All things that we use or consume come from one of two original sources, a farm or a mine. >>



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Consider the BMW or another brand of motorcycle you ride: other than the (custom) leather seat, everything else comes from a mine or is made from a mined product. This even includes the rubber components (tires, handlebar grips, coolant hoses, alternator belt, fuel lines and perhaps a rubber bumper, and o-ring or gasket here and there). Latex harvested from rubber trees is vulcanized with mined products sulfur, limestone dust and carbon black to make elastic and durable rubber. Below is a list of the more important mined goods that are used in building a motorcycle:

- Aluminum (engine cases, cylinders, gearbox cases, wheel rims)
- Arsenic (electronics)
- Bromine (halogen lightbulbs)
- Cadmium (yellow paint pigment)
- Calcium carbonate, aka limestone (filler in rubber components)
- Carbon (rubber component, pigment, fuel vapor canister)
- Chromium (exhaust, hardened steel additive, keys, shiny parts)
- Copper (wiring, bronze bearing cages, starter and alternator)
- Crude oil (gasoline, plastic tupperware parts, lubricants, carbon black for rubber)
- Gallium (electronics, LED lights)
- Germanium (electronics)
- Gold (electronic components, contact surfaces)
- Iridium (spark plugs)
- Iron in the form of steel (engine parts, gears, frame, tank, exhaust, nuts and bolts, bearings, control cables)
- Lead (battery)

- Magnesium (valve covers)
- Manganese (steel additive)
- Molybdenum (lubricants, steel additive)
- Nickel (steel additive)
- Platinum (catalytic converter, spark plugs)
- Silicon (electronic semiconductors, headlight glass, lightbulbs)
- Silver (electronics, headlight reflectors)
- Sulfur (battery acid, rubber components)
- Tin (electronics solder, bronze bearing cases)
- Titanium (white pigment in paint, lightweight structural components)
- Tungsten (lightbulb filaments)
- Vanadium (steel hardening additive)
- Zinc (carburetor housings, throttle bodies, bearing cages, anti-corrosion paint coatings)
- Finally, mined materials (rocks, gravel, limestone, cement, bitumen) also build the roads we ride on, made of concrete or asphalt or even gravel.

Mines and Motorcycle Safety

Since I work in mine safety research, I also find interesting connections between my professional field and motorcycle safety.

Surface mines, especially abandoned ones, may look like great playgrounds for off-road motorcycling. Each year, one of the most difficult and grueling off-road motorcycle competitions, the Erzberg Rodeo, is held in the town of Eisenerz (meaning iron ore) in the Austrian Alps. Erzberg simply means ore mountain, and if you search Google™ Maps for "Eisenerz, Austria" or look at the many "Erzberg" video clips on Youtube™ you can get a

glimpse of what this off-road contest is all about (of course, BMW motorcycles, including the HP2 Supermoto, are part of the competition and usually found in the front of the field).

Entering an abandoned mine, gravel pit or quarry for off-road fun, however, can be quite dangerous. Not only can it get you in trouble for trespassing, but also there are a number of much more serious hazards that could get you hurt or even killed.

Here are some more interesting parallels between mining safety and motorcycle safety:

Miners must be highly visible, especially when working underground or at night: they wear cap lights (in underground mines) and reflective stickers on their helmets and reflective stripes on their coveralls. Visibility-conscious motorcyclists also wear reflective stripes on their clothes and reflectors in addition to lights on their bikes.

Miners, like safety-conscious motorcycle riders, wear personal protective equipment and gear: head protection, eye protection, hearing protection, gloves, protective clothing, knee pads and protective footwear.

In the mine, any mobile piece of equipment has an implied "right of way" – if you ignore that, you may get hurt. Miner or motorcyclist, the perspective is the same. The other guy is always bigger than you, and irrespective of right-of-way rules, the person operating the smaller vehicle is most vulnerable.

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About the author:

Jürgen Brune is a mining engineer in Spokane, WA where he conducts research to improve the safety and health of miners. He enjoys riding his 2004 R1150GS or his 2004 K1200RS to work most every day (unless there is snow on the road) and tours the Pacific Northwest on weekends. He is a member of the Inland Northwest BMW Riders in Spokane.