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Overview of CBM Issues in the Powder River Basin

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Am going to give you an overview of the coalbed methane issues in the Powder Basin. First, I’d like to give specific thanks to Paul Rau, who’s a research specialist with the Wyoming Geographic Information Science Center at the University of Wyoming, and also to Dennis Feeney, who’s also a research scientist in the Department of Agriculture and Applied Economics at the University of Wyoming. They helped me put this presentation together. And also to the Wyoming State Geologic Survey, who allowed me to pilfer some of their data.

I’d like to orient everybody as to where the Powder River Basin is. The state of Wyoming is the other square state located north of the other square state of Colorado. And the Powder River Basin area is bordered on the west by the Big Horn Mountains and on the east a little bit by the start of the Black Hills. The town of Gillette is basically the focal point and the hub for a lot of development in the state of Wyoming. It’s located in Campbell County, Wyoming. Lots of coal there, which means lots of coalbed methane.

The terrain of the Powder River Basin is very flat; it’s grassland prairie. The climate is very dry. The average annual precipitation is about 14 inches. The average wind speed in this area is about 15 miles per hour, so it blows. You can see development starting to push more towards the West and starting in the Sheridan area.

My slides are going to take us on a little journey. [The animation shown at the conference is not available here]. I’m going to take you through a computer-generated 3D fly over of the part of the Powder River Basin where coalbed methane development is at its heaviest [slides not available here]. We’re going to start northeast of the town of Gillette and move south down Highway 59 here. And we’re going to make a right and go to the west at this intersection, and go north back up along Highway 50. It’s over a 100 mile journey. There are some coalbed methane wells within the boundaries of the coal mine, and there we’ll move into the town of Gillette. There’s even some wells within the city of Gillette as well. We’re heading south on Highway 59. Well spacing started out at 40 acres and I think new wells are going in at 80 acre spacing. So around Gillette, primarily, 40-acre spacing was that rule at that time, I think. Now we’re coming up to the town of Wright, Wyoming. There are a lot of proposed wells for this area. Now we’re heading to the west. Not much development out here yet. There are some proposed wells, but not a lot going on in this part. You can see quite a few pipelines to the south here and some proposed wells and some compressor stations; quite a few, actually. Now, at this junction, we’re going to turn back to the north. A lot of proposed wells are off to the west. We’re going up Highway 50 now, finishing on a loop. I looked on the 2000 census data and figured out, at least at this point in time, there’s one coalbed methane well for each household in Campbell County. So everybody can claim one, or each household can anyway. We’re coming back around as we come into the town of Gillette. That gives you an aerial perspective of kind of what the terrain is like for the area and how heavy the development is in that particular part of the state.

I’m going to briefly talk about some of the issues with coalbed methane development in the Powder River Basin. These include water issues, air quality, land, effects on wildlife and vegetation, agricultural, and socioeconomic impacts. We heard yesterday that probably one of the main conflicts that has evolved with the coalbed methane project is that of split estate. This is a land ownership map of the state of Wyoming. Again, the Powder River Basin is up in this area. The kind of tan color indicates land owned by the BLM. Green is Forest Service, blue is Yellowstone National Park and Grand Teton National Park. The Wind River Indian reservation here, and state land is the very light turquoise color. There are sections of state land scattered throughout. The white indicates private land, at least for surface ownership. You can see the eastern part of the state is primarily private land. But in contrast, this is just a close-up of the Powder River Basin, Sheridan beings over here and this
Coalbed methane is basically a coin with two sides. There are good things about it, and there are some bad things about it. And I think depending on whom you talk to and what you’re talking about, you can think of things for both cases. For water issues, we heard a lot about this yesterday and we’ll probably hear more about it today. In some areas of the basin, the produced water is a good source of stock water and even potable water for the town of Gillette. Water discharged to the surface, which most of it is in Wyoming, can create wetland habitat for wildlife. It’s also a good source of irrigation water if the water and soil conditions permit that.

Some of the downsides are state disputes over the discharge of poor quality water into interstate streams. Case in point, the Powder River; we’ll talk more about that as well. There were some conflicts between the states of Wyoming and Montana on water quality issues with the Powder River. There’s been concern over depletion of groundwater aquifers due to the removal of water. There are issues with soil and stream bank erosion due to discharge into streams that generally don’t see that much water. Again, the Powder River being an arid area, the ground isn’t used to that much water, so it’s susceptible to erosion. Poor water quality may require the producer to do some treatment before discharge, so that’s an added expense to them. High sodic water combined with certain soil types can inhibit vegetative growth.

We heard some about air quality yesterday too, and that coalbed methane is a clean fuel. It does burn cleaner than other types of fossil fuels, such as coals and oils. I would say that coalbed methane is probably a cleaner fuel down at the end of the pipeline, but on the production side there are some air quality impacts. It’s a clean fuel at its destination but not where it’s generated usually. Some of the negative effects are, and, again, the arid climate plays into this quite a bit, you see fugitive particulate emissions from vehicle traffic, vehicles traveling quickly at high speeds on unpaved roads. There’s wind dust. Any time a land is disturbed, it will kick up dust without a problem. You’ll see nitrogen oxide emissions and formaldehyde emissions from gas—fired compressor engines. You’ll see the nitrogen oxide and sulfur dioxide from temporary diesel—fired generators, which are used at sites before electricity or wires are brought into the site for power. All the activity brings in more vehicles, a lot of them diesel—fired. All of these factors together can result in an impact regionally on visibility in the area.

The upside of coalbed methane development here is that it’s not as evasive as other forms of mineral extraction, and not, probably as invasive as conventional oil and gas development because well pads don’t need to be as big. The water produced can increase the fertility in the area. But again, on the downside, and some of these are repetitive, but it goes to show you that these are some of the key issues. If the poorer quality waters that are higher in salt are put on certain kinds of soil, it can bind it up for vegetative growth. You’ll see topsoil loss where the land is disturbed up in this area, and there are just visual land and scenic impacts. I’ve heard some people say that the prairie has been turned into a light industrial zone. That’s the scene they have to look at now.

For wildlife and the vegetation, some of the produced water can create wetland habitat. Some people have thought since the water production decreases as the play moves on, what may have been a wetland habitat will eventually dry up again and then there won’t be, so it’s probably a temporary wetland. And coalbed methane development, once the well is in, there’s not a lot of attention that needs to be paid to it. And I think the wildlife tends to come back into the area once everything
Lance Cook, Wyoming State Geologist

Good morning. Thank you for the opportunity to be here. I’m going to talk more about the subsurface than anything else and try and give you an idea of what the geology and the production characteristics of the coalbed methane reservoirs in Wyoming are like. And I’ll do a little bit of comparison and contrast with what’s been described in the San Juan Basin from yesterday. So we’ll talk about where coalbed methane may occur in the state of Wyoming. We’ll take a look a little bit at some of the Powder River Basin geology and the production characteristics. And we’ll talk a little bit about this strange gas reservoir that seems to occur in conjunction with an aquifer.

This is a slide showing coalbed methane potential around the state of Wyoming. The Powder River Basin, as you see here, is a large area. This is coalbed methane production shallower than 5,000 feet. The coalbed methane areas with beds greater than 5,000 feet are shown here. And the areas with unknown coalbed methane potential are in these areas here.