Committee on Resources,

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Witness Statement

Before the Subcommittee on Energy and Mineral Resources of the
Committee on Resources of the House of Representatives
Topic: The Orderly Development of Coalbed Methane Resources
from Public Lands – Experience from Coalbed Methane Development in Colorado
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The Orderly Development of Coalbed Methane Resources from Public Lands – Experience from Coalbed Methane Development in Colorado

History and Status of Coalbed Methane Development in Colorado

Coalbed Methane (CBM) was first successfully and economically developed in Southwest Colorado in the San Juan Basin in the late1980's and in South Central Colorado in the Raton Basin in the mid 1990's. Statewide CBM production steadily increased from 27 billion cubic feet per year (Bcf/Yr) in 1990 to 417 Bcf/yr in 2000 (see Figure 1).

After over a decade of continuous growth CBM production in the Colorado portion of the more mature San Juan Basin grew at 3% per year in the year 2000. In the more rapidly developing Colorado portion of the Raton Basin CBM production in the year 2000 increased at 25% per year.

In addition to its CBM production in the year 2000 Colorado also produced an additional 336 Bcf of conventional natural gas yielding a total of 753 Bcf of gas production in the year 2000. This is equivalent to a daily rate of over 2 Bcf of total gas production per day.

Coalbed methane in the Piceance Basin of Northwest Colorado remains in the exploration and demonstration project phases. While vast quantities of CBM have been documented to be present in the Piceance Basin, commercial CBM production has yet to be established there. (The Piceance Basin also holds very substantial reserves of conventional natural gas in the tight sands of the Williams Fork Formation which are currently being actively and successfully developed. Continued access to federal lands in the Piceance Basin will be essential to fully develop the enormous potential of conventional natural gas there.)

Since Colorado CBM production has been long established in the San Juan Basin, the remainder of my testimony will focus on some of the unique conditions existing there and the experience we have gained in regulating CBM development there. Ownership of the Colorado portion of the San Juan Basin includes Southern Ute Tribal, private, BLM, Forest Service, and State lands.

Methane Gas in Groundwater in the Colorado portion of the San Juan Basin

The Colorado portion of the San Juan Basin includes portions of La Plata and Archuleta Counties. There are numerous historic records of naturally occurring methane gas in both surface water and groundwater in these counties dating back to the 1800's, long before CBM development began.

In the early and mid 1990s the Colorado Oil and Gas Conservation Commission (COGCC) and the Bureau of Land Management (BLM) worked together to acquire and analyze hundreds of water well samples from domestic water wells in the San Juan Basin portion of La Plata County.

Biogenic and Thermogenic Methane Gas

Methane gas can be classified as either biogenic (i.e. originating from the metabolism of organic material by certain types of organisms known as "methanogenic" bacteria) or thermogenic (i.e. originating from the thermal "cracking" of organic debris as it is buried deep below the earth's surface by geologic processes). Coalbed methane produced from the Fruitland Formation in the La Plata County was extensively sampled and analyzed and consistently shown to be of thermogenic origin. Since most of the methane gas in groundwater from La Plata County water wells tested to be of biogenic origin, the methane gas in those water wells was established to be from naturally occurring processes entirely unrelated to CBM development. An approximately 15 mile wide east-west trending region of La Plata County that begins about 5 miles east of Durango and includes the towns of Gem Village and Bayfield has substantial quantities of naturally-occurring biogenic gas in groundwater.

Ironically, many of the residents who regularly testify about the alleged impacts of coalbed methane to groundwater in La Plata County consistently fail to disclose that the methane in their water wells has been tested to be of biogenic origin. This water well methane is unrelated to the Fruitland Formation CBM which is of thermogenic origin. Their testimony sometimes also conveniently omits the fact that methane gas was documented to exist in the groundwater near their homes long before CBM development began.

Methane in groundwater also occurs naturally from thermogenic sources in other portions of La Plata County. We have extensively sampled and analyzed methane gas from groundwater and both CBM and deeper conventional gas wells in an approximately 10 mile long north-south trending region that begins about 9 miles south of Durango and includes the towns of Sunnyside and Bondad. This area corresponds with a major geologic feature along the Animas River which is expected to have allowed the upward migration of methane from deeper geologic formations over time.

Our groundwater sampling and analysis showed that methane in water wells from this area occurs over a broad range of thermogenic values, some of which are equivalent to gas from the Fruitland Formation, some of which are equivalent to gas from deeper conventional natural gas producing formations, and finally some of which were more thermally mature than any produced gas and is expected to originate from deeper formations that have not been developed for natural gas production.

While much of the methane in groundwater in the Sunnyside-Bondad area is probably naturally occurring, the COGCC implemented a "bradenhead testing program" in the early 1990's to eliminate the potential migration of shallower Fruitland CBM into deeper old conventional wellbores and upward into groundwater.

In the early years of implementation bradenhead testing resulted in the repair or plugging of over 200 older conventional wellbores in the La Plata County. Bradenhead tests are repeated regularly, and any wells that fail the test are repaired or plugged.

In recent years we have experienced only a handful of bradenhead test failures each year which have been promptly addressed. The potential of groundwater contamination from CBM development has been essentially eliminated in Colorado. Methane contamination from naturally occurring sources has been documented historically before CBM development began and will continue long after CBM development is completed.

The "3M" Project

In the late 1990's we initiated the "3M Project" in the Colorado Portion of the San Juan Basin. The 3 M's stand for: geologic Mapping of the Fruitland Formation outcrop; reservoir computer simulation Modeling of the Fruitland CBM reservoir; and Monitoring of the Fruitland Formation outcrop for potential changes in hydrostatic level or methane seepage. Geologic mapping of the outcrop and reservoir computer modeling have been completed. Some of the monitoring wells have been completed and the remainder are expected to be completed by yearend.

The "3M" Reservoir Computer Simulation Model

The "3M" reservoir computer simulation model covers the Fruitland Formation over the entire Colorado portion of the San Juan Basin and is the largest of its kind. The model established a good history match with CBM production and reservoir pressure to date and has been used to predict the effects of future CBM development. The "3M" model has demonstrated that a small portion of the San Juan Basin known as the "Fairway" near the eastern edge of the Colorado portion of the basin can be adequately developed at one well per 320 acres. It also showed that at least one well per 160 acres was needed to adequately develop CBM in the remainder of the Colorado portion of the San Juan Basin.

In order to evaluate potential impacts of increased well density, the "3M' model was run to calculate methane seepage at the outcrop for both 320 and 160 acre well density. The results showed a slight reduction in outcrop methane seepage as well density was increased to one well per 160 acres. The "3M" model can be used to evaluate a broad range of future alternatives and potential impacts.

The "3M" Outcrop Monitoring Wells

The "3M" outcrop monitoring wells allow monitoring of both hydrostatic pressure and methane seepage. These wells will be monitored for several years after they are completed later this year. While we don't expect any adverse impacts attributable to CBM development, these monitoring wells would allow potential impacts to be detected at an early stage. The reservoir computer simulation model described above could then be used to evaluate potential mitigation alternatives.

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