

An Overview

What is Coalbed Methane gas?

Simply stated, coalbed methane (CBM) is primarily methane gas trapped within coal seams. When plant material is converted into coal, methane gas is created. This gas is bonded to the coal surface by pressure from overlying rock, soil and the surrounding water table. CBM can be extracted from coal seams and used for energy.

If you don't own the coal rights under your property, you don't own the CBM and you are not entitled to any royalties for CBM produced under your property.



The Western Pennsylvania Watershed Program

Where is Coalbed Methane found?

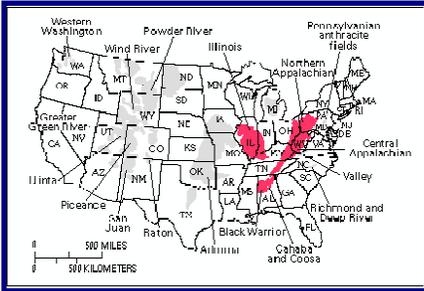


Figure 1: Adapted from the United States Geological Survey

CBM is found within coal seams. Our CBM basin is known as the Appalachian Basin. The Appalachian Basin is the 2nd largest basin in the United States with an estimated 61 trillion cubic feet of gas and includes coal producing regions in Pennsylvania, Ohio, West Virginia, Virginia, Kentucky, Tennessee, Alabama and a portion of the Maryland panhandle. It is estimated that Pennsylvania CBM reserves total approximately 2,654 billion cubic feet.

How is Coalbed Methane removed?

In order to efficiently produce CBM, a well must be drilled. A casing is placed inside the newly drilled well bore hole and highly pressurized water (fracking fluid) is forced into the coal seam, causing the coal to fracture and allowing the methane to escape. Once these steps are complete, the fracking fluid and groundwater within the coal seams is pumped to the surface. Eventually, after this pressure has been released, the previously trapped methane gas can begin to flow through the well to the surface.

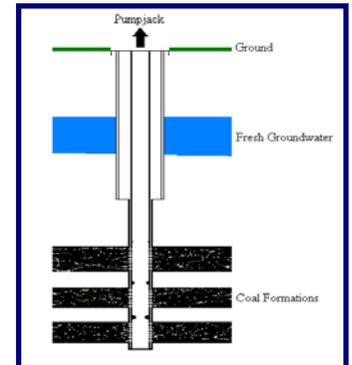


Figure 2: Adapted from the Pennsylvania Department of Environmental Protection

What are the different types of Coalbed Methane wells?

There are several types of CBM wells including:

- ◆ Vertical well producing from one coal seam
- ◆ Vertical well producing from several coal seams
- ◆ Vertical well drilled into one coal seam with a series of horizontal bores extending out through the coal, all producing from the same seam
- ◆ Vertical well drilled through multiple coal seams with laterals completed in and producing from these seams
- ◆ Former gob gas vents converted to CBM production

How is Coalbed Methane captured or collected for use?

Once CBM production begins, the gas is collected and flows into a system of underground piping which eventually carries the CBM to an energy producing facility.

How much land does a typical Coalbed Methane well site occupy?

A CBM well site typically impacts an area of land approximately 150 feet x 150 feet or about 0.5 acre. This amount **does not** include the necessary access roads and pipelines.

What is the difference between conventional gas wells and Coalbed Methane wells?

The differences are in the depth of the well and the regular use of a pumpjack.

CBM wells are not as deep as conventional gas wells and since the surrounding groundwater must be released in order for CBM to flow, a pumpjack, similar to what is seen on oil wells is used to remove the water. CBM wells generally average between 1,000 feet to 1,500 feet deep although they can be shallower (800 feet). Conventional gas wells generally average between 3,000 feet to 5,000 feet deep.



Photograph 1: Pumpjack



What happens to the fluids used and encountered during Coalbed Methane drilling?

Drilling fluids (encountered during drilling operations) may be spread onto the surrounding land if they meet pH and specific conductivity criteria and are not contaminated with any other substance. Fracing fluids are collected in a lined sump and hauled away for reuse or proper disposal. No fluids may be discharged directly to a stream.

What is done with the groundwater pumped from Coalbed Methane wells?

Groundwater removed from a CBM well, also known as production fluid, is typically collected in a tank and then hauled to a permitted treatment facility or carried through a pipeline to a permitted treatment facility. After collection of the water at a permitted treatment facility, the production fluid is subjected to pH adjustments and aeration if necessary and settling. Once the water has been treated, it can then be discharged to the waters of the Commonwealth. A CBM water treatment facility can only discharge treated water after applying for and receiving NPDES and Water Quality Management Part II (construction) Permits issued by PADEP. These permits set requirements for the levels of pollutants that the discharge water may include and allow for the construction of the treatment facility.

Some of the pollutants with limits under an NPDES Permit include: iron, oil and grease, total suspended solids (TSS) and pH. In addition, levels of alkalinity, acidity, total dissolved solids (TDS) and chlorides are monitored.

What are the steps of Coalbed Methane gas development?

There are generally 4 steps to CBM development.

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|-----------------------|---------------------|
| 1. Exploration | 3. Production |
| 2. Field Organization | 4. Site Abandonment |

Exploration consists of a company searching for gas deposits and determining if any deposits they find are economically viable. This step may include exploratory drilling along with an analysis of any drilling data. Before exploration can begin, the company must legally own or have leased the mineral rights or must have permission from the mineral owner to conduct the exploratory tests.

Field organization occurs if a company determines that a gas deposit is economically viable. This step is primarily administrative and includes permit acquirement from PADEP. At this time, the law defines the number of wells that can be placed in a specific area.

Production includes installation of a well, CBM and water extraction and regular well maintenance.

Site abandonment occurs when the well is no longer economically viable. This stage includes plugging the well, removal of the pumpjack and restoration of the site. Access roads may be left in place if the surface owner wishes or if the road was in existence before the well was developed. Otherwise, access roads should be a part of the restoration process.

Are Coalbed Methane developers required to obtain permits from the Pennsylvania Department of Environmental Protection (PADEP)?

YES. CBM wells are subject to the same requirements by law and regulation as are imposed on conventional gas wells. The laws imposing these requirements include the Oil & Gas Act (Act 223), Chapter 78 (regulations promulgated under Act 223) and the Coal & Gas Coordination Act (Act 214).

In order to drill a CBM well in Pennsylvania, the operator needs to obtain a drilling permit from PADEP's Bureau of Oil & Gas Management. The operator also needs to prepare an Erosion and Sedimentation Control Plan (E & S Plan) and depending on the site conditions and activities may need various other permits and/or approvals.

Operators must implement, update as necessary and keep in compliance their E & S Plans, maintain and keep functional controls in place and **permanently** restore the site after the well is completed.

After completion, the CBM operator is required to submit a well record and completion report to the Bureau of Oil & Gas Management. This is a matter of public record and may be reviewed by anyone interested.

PADEP's Oil & Gas
Management Program

Southwest Regional Office
400 Waterfront Drive,
Pittsburgh, PA 15222
(412) 442-4000

Whom do I contact if I suspect that Coalbed Methane wells are leaking methane or other contaminants into my private water supply?

You should contact **PADEP's Oil & Gas Management Program** if you suspect that your private water supply has been contaminated or diminished by CBM activities.