

**WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS**

**GENERAL WATER POLLUTION CONTROL PERMIT
Permit Number: GP-WV-1-07**

**FACT SHEET, RATIONALE AND INFORMATION FOR
GENERAL PERMIT FOR THE LAND APPLICATION OF WATER PRODUCED
FROM COALBED METHANE WELLS
December 2009**

The Office of Oil and Gas within the Department of Environmental Protection oversees and regulates coalbed methane wells and is proposing the renewal of this general permit. This fact sheet explains this general permit for the land application of treated or untreated water produced from coalbed methane wells.

Based on the data collected within the past two (2) years, and the absence of evident environmental impacts associated to the land application of Coalbed Methane wastewater under the coverage of this permit; the Office of Oil and Gas (“OOG”) considers that the duration of the General Water Pollution Control Permit GP-WV-1-07 can be extended for a limited period of five (5) years. During this time, the information gathered about its performance and the effects discharges may have in soil, vegetation and groundwater will inform the OOG in its decision on whether to renew this permit and, if renewal is deemed appropriate, any modifications that are warranted to this permit.

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| 1. NAME AND ADDRESS OF APPLICANT: | An applicant is any operator who produces water from coalbed methane wells and agrees to be regulated under the terms of this General Permit. |
| 2. GENERAL PERMIT NO.: | GP-WV-1-07 |
| 3. COUNTY: | Every County in West Virginia |
| 4. RECEIVING LAND: | Any land in West Virginia described in the site application/registration form (WW-8). |
| 5. PUBLIC COMMENT PERIOD: | N/A |
| 6. DESCRIPTION OF DISCHARGES | |

Coalbed methane well operators produce water in the process of releasing the methane from the coal seams. Water is pumped from the coal seams in order to lower the water pressure in the seams, thereby releasing the methane. The water that is pumped from the coal seams is typically collected in tanks in the general vicinity of the coalbed methane well or

hauled by truck and/or pipeline to a central treatment facility. The volume and quality of water produced from these operations vary greatly from location to location. This water may be treated to reduce the concentrations of metals and other contaminants as necessary to make the water suitable for land application. In some instances the produced water is of such quality that it does not require treatment before land application. Any water that is land applied must meet the discharge limitations contained in this general permit.

7. BACKGROUND

Coalbed methane wells are defined as wells drilled into coal seams that produce the methane trapped in those coal seams. The number of coalbed methane wells operating in West Virginia is expected to increase over the duration of this general permit. Operators will have the opportunity to permit existing wells under this general permit and renew it for currently covered wells. Every new well for which an operator intends to land apply produced water will have to apply for coverage under this permit.

The purpose of this general permit is to establish a simple, efficient and economic method for the disposal and regulation of produced water from coalbed methane production in a manner that is fully protective of the environment. The new parameters and conditions introduced in this permit renewal, as well as the extension in time from 2 to 5 years are based on the review and analysis of the information received from the operators in compliance with the permit conditions. This renewal will allow the collection of more detailed information regarding the environmental effects (if any) in groundwater, vegetation and soils. It will also be used as the raw material for assessing the effectiveness of different treatment systems and land application techniques; in order to establish well supported reasoning for leaving or modifying the requirements included in the current permit.

Upon approval of an application for site registration, this permit will allow coalbed methane well owners/operators to acquire, construct, install, modify, and operate a system to land apply treated or untreated produced water from coalbed methane wells. The system will discharge water via an approved plan that is submitted as a part of the registration packet required to obtain coverage under the general permit.

8. RATIONALE FOR PROPOSED DISCHARGE LIMITATIONS, MONITORING, AND TREATMENT

Permit applicants will be required to submit a complete site registration application to the OOG. The application must contain all information required by the OOG. Approved applications will permit the coalbed methane well operator to land apply produced water in accordance with the requirements of the general permit.

This general permit requires the monitoring of produced water discharges for both quantity and quality. The samples taken must be representative of the discharges for land application; the methods used must comply with the standards for sampling and analyzing

wastewater covered by the permit. The quantity of water discharged from each system shall be measured or calculated on a daily basis.

Also, monitoring of resources exposed and possibly exposed to the discharge (soils, vegetation and groundwater) of such produced waters, as well as resources in control areas, shall be provided in accordance to the conditions set forth in the General Permit.

It is recognized that the costs associated with the transport and disposal of produced water from CBM wells can be prohibitive of the development of the state's natural gas resources. Therefore, the general permit was developed in order to provide an economic but environmentally sound method for the disposal of produced water. The discharge limits of this permit are based on maximum contaminant levels for surface waters, groundwater, and/or drinking water standards identified in the U.S. Environmental Protection Agency (USEPA) National Primary and Secondary Drinking Water Regulations. For Barium, Mercury and Selenium, the three parameters for which there are primary drinking water standards (legally enforceable standards) the limits shown in section B of the general permit cannot be exceeded. However, for Chlorides, Sulfates, Iron, Manganese, Aluminum, and Total Dissolved Solids, (those parameters for which the USEPA has established secondary drinking water standards which are non-enforceable guidelines regulating contaminants that may cause cosmetic effects) the discharge limits may be exceeded to the levels shown in Section B of the General Permit. However, in order for an entity that is covered under the general permit to exceed the discharge limits, they must develop a groundwater monitoring system in compliance with the conditions specified in H.12 - General Permit GP-WV-1-07; that will ensure that the groundwater is not being adversely affected. Such monitoring plan must be submitted with the site registration application and be approved by the OOG. Given the requirement for groundwater monitoring, limits for the following parameters found in Section B of the General Permit can be exceeded to the concentration listed below. The maximum limits for those parameters are as follows:

Chlorides: 1000 mg/l. Given the amount of rainfall in West Virginia and the propensity for chlorides to move through the soil, it is safe to assume that neither vegetation nor groundwater will be adversely affected at this level.

Iron: 5 mg/l. Iron will accumulate in soils, thereby limiting migration to the groundwater. Muskingham is a typical soil located in the CBM production areas of southern West Virginia. Testing of soils at numerous locations in Wyoming and Raleigh Counties has shown naturally occurring levels of iron in amounts approximating 470,000 pounds per acre. Based on a relatively high discharge of 500 bbls./day of produced water at 5 mg/l iron, 320 pounds of iron will be discharged over a 1 year period. This is an increase of .068% iron in the soil, an increase so small that it would not be detectable in laboratory analyses. Soils in other areas of the state where CBM production is being conducted would be expected to have comparable levels of naturally occurring Iron.

Manganese: 3.3 mg/l. Manganese will accumulate in soils, thereby limiting migration to the groundwater. Gilpin soil series is a typical soil located in the coalbed methane production areas of southern West Virginia. Testing of Gilpin soils at numerous

locations has shown naturally occurring levels of manganese in amounts approximating 8,648 pounds per acre. Based on a relatively high discharge of 500 bbls./day of produced water at 3.3 mg/l manganese, 211 pounds of manganese will be discharged over a one-year period. This is a maximum increase of 2.4% manganese in the soil, an increase that should have no negative effect on the soil, groundwater or vegetation. Soils in other areas of the state where coalbed methane production is being conducted would be expected to have comparable levels of naturally occurring manganese. Manganese tends to be associated with iron in soils, following a ratio between the two.

Aluminum: 2.5 mg/l. Aluminum will accumulate in soils, thereby limiting migration to the groundwater. Aluminum, after silicon, is the second most abundant cation at the earth's surface and is particularly abundant in clay and clay loam soils. The solubility of aluminum in natural waters is low. In soil waters, its solubility is increased by even small amounts of naturally occurring organic acids. Given the low concentration of Aluminum that the permissible discharge water will be carrying, relative to the aluminum-rich clay minerals that dominate the composition of all West Virginia upland soils, the effects of its introduction can be anticipated to be negligible. For instance, the Muskingum soil series is a typical soil located in the coalbed methane areas of southern West Virginia. Testing of Muskingum soils at numerous locations has shown naturally occurring levels of Aluminum in amounts approximating 107,000 pounds per acre. Based on a relatively high discharge of 500 bbls./day of produced water at 2.5 mg/l aluminum, 160 pounds of aluminum will be discharged over a one year period. This is an increase of .15% aluminum in the soil, an increase so small that it would not be detectable in laboratory analyses. Soils in other areas of West Virginia where coalbed methane production is being conducted would be expected to have comparable levels of naturally occurring aluminum.

Sulfates: 1000 mg/l. The concentration of sulfates in the produced water at this level has not been shown to be harmful to the soils or vegetation. With the amount of dilution that will take place, and the requirement for groundwater monitoring, there should be no negative effect on the groundwater.

Total Dissolved Solids: Monitor only. When taking the cumulative concentrations for all parameters for which effluent guidelines have been established, and the concentrations of all other constituents contained in the produced water, some produced water would exceed the 1000 mg/l limit for TDS. Given the buffering capacity of the soil and the levels of precipitation in West Virginia, raising the maximum limit to monitor only should have no adverse impact. Additionally, the operator will still be required to perform groundwater monitoring for any effluent that exceeds 1000 mg/l TDS.

Barium: 2 mg/l. The concentration of Barium below this level will protect groundwater from being adversely impacted and from being potentially used as a drinking water source. This limit meets EPA's primary drinking water standards.

Calcium, Magnesium, Potassium, sodium: Monitoring for these elements are now required by the permit because the DEP is planning to perform SAR and Conductivity studies on soils in order to better understand the effects the discharged water may have. Monitoring

calcium, magnesium, potassium, sodium and barium are required under the new permit because these parameters will provide key information for such studies

Volume: The permit does not allow for ponding or runoff into surface water, therefore the flow volume may be limited based on soil permeability, to be determined on a site specific basis, using the county soil surveys prepared by the Natural Resources Conservation Service. Volume limitations will be site specific and based upon soil permeability, area of the discharge, and slope of the site where discharge is to occur.

9. OTHER REQUIREMENTS

Taking background samples is now a requirement for all new facilities covered under this general permit. As stated on the permit, operator must take samples of surface waters, and soils in the vicinity of the planned land application (See GP-WV-1-07 H.11). This will not only allow for the collection of additional data, but will also serve to determine the soil quality and surface water quality prior to initiation of operations.

This general permit does not relieve the operator of any duty to report spills or accidental discharges. All spills or accidental discharges that threaten human health or the environment shall be reported to the WVDEP spill report telephone line immediately. The operator must notify the OOG by telephone on the next business day. A written submission addressing, among other things, the spill, its causes, and the steps that have been taken to reduce, eliminate and prevent recurrence of the problem shall be submitted within five days of the accident or spill.

The permit prohibits any discharge that will flow directly to a surface water body that is not part of the treatment process itself. The land application area boundary shall not be placed within 1000 feet of a domestic water supply. No discharge will be allowed for land application over areas with Karst topography

To assure that the activities under this permit do not alter the quality of the soil or vegetation, the operator must submit with the site registration application, a plan for sampling the soil where the produced water will be or has been land applied. This sampling plan must be approved by the OOG for coverage under the general permit and the results must be provided to DEP according to requirement F.3 in the General Permit. If this sampling shows that land application of produced water is threatening the soil, vegetation, or groundwater quality, then the operator must cease operations and submit a new site registration application designed to alleviate the threat.

In addition to the soil and vegetation monitoring areas described in the application, a control area with the purpose of baseline comparison must be marked and included in the vegetation and soil studies. This area must be within the limits of the area covered by this facility, cannot be used for discharge of water and has to have similar characteristics (topographical features, soil types and vegetation types) to the areas used for discharge.

The operators may use the county soil surveys available from the Natural Resources Conservation Service to determine the appropriate soil permeability factor for the site to be land applied. The soil permeability factor shall be included in the site registration application. This information should be utilized in determining the method of land application to be utilized.

No substances other than water removed from wells and water treatment chemicals may be discharged. The produced water discharge shall not include floating solids, visible foam, or free oil in other than trace amounts. No operator shall land apply the discharged water at a rate that will produce ponding or erosion. The land application rate shall not cause an adverse impact to the surface waters of the state.

10. ANTIDEGRADATION ISSUES

This general permit does not allow the land application of produced water to adversely impact the surface waters of the state. Water quality protection should be provided for the designated uses of the streams and waters near the land application sites.