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
February 2015

The West Virginia Department of Environmental Protection (DEP), Office of Oil and Gas oversees and regulates coalbed methane (CBM) wells and is proposing the renewal of this general permit for the land application of water produced from CBM wells. General Water Pollution Control Permit GP-WV-1-07 expired December 31, 2014 and has been administratively extended through July 31, 2015 pending renewal. This fact sheet explains the draft renewal general permit for the land application of treated or untreated water produced from CBM wells.

Based on data collected since the inception of this permit and the absence of evident environmental impacts associated with the land application of CBM wastewater under the coverage of this permit, the Office of Oil and Gas (OOG) considers that the duration of general permit GP-WV-1-07 can be extended for a limited period of five (5) years.

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:	February 20, 2015 – March 23, 2015

6. DESCRIPTION OF DISCHARGES

CBM wells produce water in the process of releasing methane from coal seams. Water is pumped from coal seams in order to lower the water pressure in the formation, thereby releasing the methane. The water that is pumped from the coal seams is typically collected in tanks in the general vicinity of the CBM well or hauled by truck and/or pipeline to a treatment facility. The volume and quality of the water produced from these

operations varies by location, and may or may not require treatment to reduce the concentrations of metals and other contaminants to make the water suitable for land application. Any water that is land applied must meet the discharge limitations contained in this general permit.

7. BACKGROUND

The purpose of this general permit is to establish a simple, efficient and economic method for the regulation and disposal of produced water from CBM production in a manner that is fully protective of the environment. Upon approval of an application for site registration, this general permit will allow CBM well owners and operators to acquire, construct, install, modify and operate a system to land apply treated or untreated produced water from CBM 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.

Every new well for which an operator intends to land apply produced water will have to request coverage under this permit. Operators will have the opportunity to permit existing wells under this general permit and renew it for currently covered wells. Continued coverage under this general permit will require the regular collection and reporting of information regarding the environmental effects (if any) in groundwater, surface water, vegetation and soils.

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

This general permit requires regular monitoring and reporting of produced water discharges for both quantity and quality. The samples collected must be representative of the discharges for land application, and must comply with the standards for sampling and analyzing wastewater covered by the permit. The quantity of water discharged from each system must be measured or calculated on a daily basis. Monitoring of resources exposed or potentially 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.

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, the limits shown in Section B of the general permit cannot be exceeded:

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.

Mercury: 2 µg/l. The concentration of mercury 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.

Selenium: 0.05 mg/l. The concentration of selenium 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.

For chlorides, sulfates, iron, manganese, aluminum and total dissolved solids, those parameters for which the USEPA has established secondary drinking water standards for contaminants that may cause cosmetic effects, the discharge limits may be exceeded to the higher limits established in Section B of the general permit. In order for an entity that is covered under the general permit to exceed the lower permit discharge limit for any parameter, they must develop a groundwater monitoring system in compliance with the conditions specified in Section H.12 of the general permit to 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, permit limits for the following parameters found in Section B of the general permit can be exceeded to the maximum concentration listed below. The maximum limits for those parameters are as follows:

Chlorides: 1,000 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.

Sulfates: 1,000 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.

Iron: 5.0 mg/l. Iron will accumulate in soils, thereby limiting migration to the groundwater. Muskingum 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 high discharge estimate of 500 bbls/day of produced water at 5.0 mg/l iron, 320 pounds of iron will be discharged over a 1 year period. This is an increase of 0.068% 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 CBM 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 high discharge estimate 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 CBM 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 most abundant metal in the earth's crust and is particularly prevalent 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 CBM 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 high discharge estimate 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 0.15% 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 CBM production is being conducted would be expected to have comparable levels of naturally occurring aluminum.

Total Dissolved Solids: Monitor only. Given the buffering capacity of the soil and the levels of precipitation in West Virginia, establishing the maximum limit to monitor only should have no adverse impact. Note that the operator will still be required to perform groundwater monitoring for any effluent that exceeds 1,000 mg/l TDS.

The permit also requires analysis and reporting of parameters for which no USEPA primary or secondary drinking water standards exist: calcium, magnesium, potassium and sodium. Monitoring for these elements is required by the general permit because the DEP is planning to perform soil-adsorption and conductivity studies in order to better understand the effects discharged water may have.

The permit also requires reporting of water volume discharged to land. Because the permit does not allow for ponding or runoff into surface water, 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 (NRCS). Volume limitations, if established, 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 a requirement for all new facilities covered under this general permit. As stated in the general permit (Section H.11), the operator must collect samples of surface waters and soils outside the application boundary, but within the vicinity of, the planned land application area. This area must have similar characteristics (topographical features, soil types and vegetation types) and be marked and included in the vegetation and soil studies. 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 DEP 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 1,000 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 Section F.3 of 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.

The operators may use the county soil surveys available from the NRCS 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.