

Wyoming Department of Environmental Quality  
Water Quality Division  
WYPDES Program

STATEMENT OF BASIS  
NEW

APPLICANT NAME: Williams Production RMT Company

MAILING ADDRESS: 300 North Works Avenue  
Gillette, WY 82716

FACILITY LOCATION: CDU Spellman II (Option 2), which is located in the SWSW of Section 7, the SWNE of Section 15, the NENW of Section 22, the SENW, SWNE and NESE of Section 18, NWNE of Section 20, the NWSE of Section 21, the NWNW of Section 28, the NENE of Section 33, the SWNW of Section 34, and the SWSW of Section 27, all in Township 53 North, Range 75 West, in Campbell County. The produced water will be discharged to several on-channel reservoirs (class 3B), located in ephemeral tributaries (class 3B) of Middle Prong Wild Horse Creek (class 3B), which is tributary to Wild Horse Creek (class 3B), which is tributary to the Powder River (class 2ABWW). The permit establishes two irrigation monitoring points (IMP1, IMP2), located as described in Table 1, Part I.B.13 of the following permit. The permit also establishes a total maximum daily flow limit of 1.34 MGD, and requires that the produced water being discharged by this facility originate in the Smith, Anderson, Gates and/or Werner coal seams.

NUMBER: WY0054585

*This permit was revised following its public notice period to include Part I.C.2, relating to requirements for bonding of on-channel reservoirs at this facility.*

**General Facility Description**

This facility is a typical coal bed methane production facility in which groundwater is pumped from a coal bearing formation resulting in the release of methane from the coal bed. The permit authorizes the discharge to the surface of groundwater produced in this way provided the effluent quality is in compliance with effluent limits that are established by this permit. In developing effluent limits, all federal and state regulations and standards have been considered and the most stringent requirements incorporated into the permit. The EPA Effluent Guidelines and Standards for Oil and Gas Extraction Point Source Category (Part 435, Subpart E) predate the development of coal bed methane extraction technology; however the technology is similar enough to conventional gas extraction that, in the professional judgment of the WDEQ, this effluent limit guideline is appropriately applied to coal bed methane gas production. This permit does not cover activities associated with discharges of drilling fluids, acids, stimulation waters or other fluids derived from the drilling or completion of the wells.

The permittee has chosen option 2 of the coal bed methane permitting options. Under this permitting option, the produced water is immediately discharged to a class 2 or 3 receiving stream which is eventually tributary to a class 2AB perennial water of the state. The permit establishes effluent limits for the end of pipe, which



are protective of all the designated uses defined in Chapter 1 of Wyoming Water Quality Rules and Regulations. This may include drinking water, game and non-game fish, fish consumption, aquatic life other than fish, recreation, agriculture, wildlife, industry and scenic value. In addition, the permit establishes two irrigation monitoring points (IMP1 and IMP2 listed in Table 1 of the permit below). The irrigation monitoring points are designated monitoring locations prior to the first downstream point of irrigation diversion/use on Middle Prong Wild Horse Creek from the permitted facility. An IMP differs from an irrigation compliance point (ICP) in that the IMP does not establish effluent limits. IMP sampling is for data-gathering purposes only.

The Wyoming DEQ has determined through review of the permit application and available scientific information that effluent discharged from this facility is unlikely to reach the Powder River. The applicant has submitted a water budget which demonstrates that all of the CBM effluent produced at this facility can be contained within the immediate downstream channels and receiving reservoirs. This CBM facility is located approximately 20 stream miles from the Powder River. The permit establishes a tributary monitoring station on Wild Horse Creek (TRIB1) which will serve to monitor any CBM flows from this facility to the Powder River.

### Effluent Limits

Permit effluent limits are based on federal and state regulations and are effective as of the date of issuance. The daily maximum effluent flow limit for this facility is 1.34 million gallons per day (MGD). The permit requires that the pH must remain within 6.5 and 9.0 standard units. Effluent limits for total dissolved solids (5,000 mg/l), specific conductance (7500 micromhos/cm), and sulfates (3,000 mg/l) are included to protect for stock and wildlife watering. These limits are based upon Wyoming Water Quality Rules and Regulations, Chapter 2 and apply to discharges from all permitted outfalls.

The permit also establishes a dissolved manganese limit of 630 µg/l, a dissolved copper limit of 6 µg/l, and a chlorides limit of 150 mg/l. These limits are based on chronic aquatic life standards for class 2AB waters as established in the *Wyoming Water Quality Rules and Regulations, Chapter 1*. The permit also establishes a total barium limit of 1800 µg/l and a total arsenic limit of 7 µg/l, which are based on Water Quality Criteria as established in the *Wyoming Water Quality Rules and Regulations, Chapter 1*, for Human Health values. The limits established in this permit for metals and chlorides reflect the application of the antidegradation provisions required under the *Wyoming Water Quality Rules and Regulations, Chapter 1*.

In addition, the permit establishes a dissolved iron limit of 1000 µg/l, which is based upon chronic aquatic life standards for class 3B waters greater than one mile from the confluence of a class 2 water, and reflects the application of standards required under *Chapter 1 of the Wyoming Water Quality Rules and Regulations*. All limits described in this section are intended to protect for the above listed designated uses, on both the immediate receiving water and the perennial mainstem, and apply at the end of pipe.

### Irrigation Use Protection

In order to monitor and regulate coal bed methane discharge for compliance with Chapter 1, Section 20 of the Wyoming Water Quality Rules and Regulations (protection of agricultural water supply), effluent limits for sodium adsorption ratio (SAR) and specific conductance (EC) are included in this permit. The Wyoming DEQ has determined that an SAR effluent limit of 24 and a specific conductance effluent limit of 6,100 micromhos/cm are appropriate for protection of agriculture use in the Middle Prong Wild Horse Creek drainage. These effluent limits for EC and SAR were derived using information obtained in the application for this permit (*Section 20 Compliance Analysis for Discharges by the Williams Cedar Draw Project to the Middle Prong Wild Horse Creek Drainage*, KC Harvey, LLC, February 2006). The specific conductance limit of 6,100 micromhos/cm is derived through evaluation of the average root zone salinity in the downstream irrigated hay meadows (Spellman Ranch in Sections 31 and 32 of Township 54 North, Range 75



West). As indicated in the above referenced report, the average root zone salinity within the downstream irrigated area was measured at 11,012 micromhos/cm, with a 95 % confidence interval of +/- 1,853 micromhos/cm (based on the 20 samples analyzed). This means that while the sampled population indicates a mean root zone salinity of 11,012 micromhos/cm, the actual mean root zone salinity for the whole field likely falls within the range of 9,159 to 12,865 micromhos/cm. For the purpose of introducing a margin of conservatism to the calculation of irrigation effluent limits for this permit, the lower value (9,159 micromhos/cm) was assumed to be the actual mean root zone salinity for the downstream irrigated field. In calculating an effluent limit for EC that will maintain a mean root zone salinity of 9,159 micromhos/cm in the downstream irrigated field, USDA recommends dividing the soil EC by 1.5 to estimate allowable salinity in the applied water (*Agricultural Salinity and Drainage, Hanson et al., 1999 revision*). This results in a specific conductance effluent limit of 6,100 micromhos/cm at the outfall.

The SAR limit of 24 was derived by analyzing the relationship between background sodium adsorption ratio (SAR) levels and exchangeable sodium percentage (ESP) levels within the downstream irrigated soils. The mean background SAR of the downstream irrigated soils was measured at 19. The mean background ESP of the downstream irrigated soils was measured at 9.0%. With regard to sodicity, the general goal in protecting irrigated soils is to maintain ESP levels at or below 15% (*Agricultural Salinity Assessment and Management, American Society of Civil Engineers, 1996*). For the various analyzed soil samples, the correlation between background SAR and ESP was found to be  $ESP = 1.0619 \times SAR^{0.777}$ , with a correlation value of  $R^2 = 0.90$ . Therefore, in order to maintain ESP levels at or below 15% in these irrigated soils, SAR of the irrigated soils should be maintained at or below 30. Again, for the purpose of introducing a margin of conservatism, the permit limits SAR to 24, rather than 30. Continued irrigation with water containing an SAR level of 24 would theoretically increase the ESP of the downstream irrigated soils from 9% to around 12%, which is well below the accepted 15% maximum ESP threshold necessary for maintaining soil permeability.

The above described effluent limits for specific conductance and sodium adsorption ratio are established at each outfall authorized under this permit, and are effective year-round.

### Monitoring and Reporting Requirements

The permit requires daily monitoring on South Windmill Draw and Black Bill Draw (tributaries to Middle Prong Wild Horse Creek) below the outfalls in order to determine whether effluent discharged from the outfalls reaches the established irrigation monitoring points (IMP1, IMP2 listed in Table 1 of the permit below). Daily monitoring is necessary because the permit establishes different sampling and analysis requirements based on whether the effluent reaches the irrigation monitoring point. Once effluent flow at the irrigation monitoring point has been documented within a sampling month, then weekly monitoring of flow at the IMP is required for the remainder of that calendar month. At the beginning of each calendar month, the monitoring frequency will revert to daily until such time as effluent flow occurs at the irrigation monitoring point and a sample is collected to represent effluent quality for irrigation monitoring point constituents. Results are to be reported twice-yearly and if no effluent from this facility reaches the irrigation monitoring point during an entire sampling month, then "no discharge" is to be reported for the IMP that month. The IMP is not a compliance point. It is intended only as a location to gather downstream water quality data.

The permit also requires sampling at a designated tributary water quality monitoring station located on the receiving stream – Wild Horse Creek, and at mainstem water quality monitoring station locations on the Powder River upstream and downstream of the Wild Horse Creek - Powder River confluence. Water quality monitoring stations on the Powder River will be located in the main channel of the Powder River outside of the mixing zone of Wild Horse Creek and the Powder River. Effluent samples at the designated water quality monitoring stations must be collected on a monthly basis and are to be reported semiannually. Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations: designated water quality monitoring stations identified as TRIB1, UPR, and DPR in Table 1, Part I.B. 13 of the permit below. Established water quality monitoring stations on the mainstem are to be located outside the mixing zone with the tributary and the mainstem. Monthly water quality samples are to be collected at all



three water quality monitoring stations when effluent from this CBM facility reaches the TRIB1 station on Wild Horse Creek. If flow occurs at the TRIB1 station during a given monthly monitoring period, but this CBM facility did not contribute to that flow, the permittee will report "did not contribute" in the discharge monitoring reports for that monthly monitoring period. Under such circumstances, sampling is not required at the three water quality monitoring stations, and it will be the responsibility of the permittee to demonstrate that the effluent from this facility did not contribute to the flow occurring at the TRIB1 station. If no flow at all occurs at the TRIB1 station for an entire monthly monitoring period, then "no flow" is to be reported and samples need not be collected at the three water quality monitoring stations for that monthly monitoring period.

At the designated water quality monitoring stations, monitoring will be required for calcium, magnesium, sodium, sodium adsorption ratio and specific conductance. Information gathered from the water quality monitoring stations may result in modification of the permit to protect existing uses on the tributary and mainstem.

Results are to be reported twice-yearly and if no discharge occurs at the outfall then "no discharge" is to be reported. The permit also requires that an initial monitoring of the effluent be conducted within the first 60 days of discharge and the results submitted to WDEQ and the U.S. Environmental Protection Agency within 120 days of the commencement of discharge.

#### Other Permit Requirements

There shall be no discharge of floating solids or visible foam in other than trace amounts, nor shall the discharge cause formation of visible deposits of iron, hydrocarbons or any other constituent on the bottom or shoreline of the receiving water. In addition, erosion control measures will be implemented to prevent significant damage to or erosion of the receiving water channel at the point of discharge.

The discharge of wastewater and the effluent limits that are established in this permit have been reviewed to ensure that the levels of water quality necessary to protect the designated uses of the receiving waters are maintained and protected. An antidegradation review has been conducted and verifies that the permit conditions, including the effluent limitations established, provide a level of protection to the receiving water consistent with the antidegradation provisions of Wyoming surface water quality standards.

Self monitoring of effluent quality and quantity is required on a regular basis with reporting of results semiannually. The permit is scheduled to expire on December 31, 2008. This expiration date was determined through review of the watershed permitting schedule which the WDEQ is implementing in order to synchronize the permitting and expiration of facilities within the same watershed. This holistic approach will provide for more efficient permitting of point-source discharges.

Jason Thomas  
Water Quality Division  
Department of Environmental Quality  
Drafted: March 13, 2006

AUTHORIZATION TO DISCHARGE UNDER THE  
WYOMING POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, (hereinafter referred to as "the Act"), and the Wyoming Environmental Quality Act,

Williams Production RMT Company

is authorized to discharge from the wastewater treatment facilities serving the

CDU Spellman II (Option 2)

which is located in the

SWSW of Section 7, the SWNE of Section 15, the NENW of Section 22, the SENW, SWNE and NESE of Section 18, NWNE of Section 20, the NWSE of Section 21, the NWNW of Section 28, the NENE of Section 33, the SWNW of Section 34, and the SWSW of Section 27, all in Township 53 North, Range 75 West, in Campbell County

to receiving waters named

several on-channel reservoirs (class 3B), located in ephemeral tributaries (class 3B) of Middle Prong Wild Horse Creek (class 3B), which is tributary to Wild Horse Creek (class 3B), which is tributary to the Powder River (class 2ABWW)

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II and III hereof.

This permit renewal shall become effective on the date of signature by the Director of the Department of Environmental Quality.

This permit and the authorization to discharge shall expire December 31, 2008, at midnight.

  
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John F. Wagner  
Administrator - Water Quality

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Date 11/3/06

  
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John V. Corra  
Director - Department of Environmental Quality

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Date 11/6/06

