

**Wyoming Department of Environmental Quality  
Water Quality Division  
WYPDES Program**

STATEMENT OF BASIS

Major Modification

APPLICANT NAME: Pennaco Energy, Inc.

MAILING ADDRESS: 3601 Southern Drive  
Gillette, WY 82718

FACILITY LOCATION: Middle Prong Federal, located in the SWSE of Section 14, the SESE of Section 24, the NENE of Section 25, the NWSE of Section 13, Township 54 North, Range 76 West; and the SWNE, NWSW of Section 20, the NWNW of Section 28, the NESE, NENE of Section 29, the SESE of Section 30, the NENE, NESE of Section 32, the NESW and NWSE, Section 7, the NESW and SWSE, Section 8, the SWNE, SENW, and NWSE, Section 17, the NWNE, SWSE, SESW, and NESW, Section 18, the SWSE and NWSE, Section 28, the NESE and NENE, Section 29, the SESE, Section 30, and the NENE and NESE, Section 32, Township 54 North, Range 75 West, Campbell County. The produced water will be discharged to various named on-channel reservoirs (3B), located on various unnamed, ephemeral tributaries (3B) of the Middle Prong (3B) and North Prong (3B), Wild Horse Creek (3B). Wild Horse Creek (3B) is tributary to the Powder River (2ABWW). The permit establishes four irrigation monitoring points (IMP1-IMP4), 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 1.21 MGD, and requires that the produced water being discharged by this facility originate in one or more of the following formations: the Anderson, Canyon, Smith, and/or Wall coal seams.

NUMBER: WY0052361

*This permit was revised following its public notice period in order to add clarification to part I.A.1.c, relating to irrigation water quality at IMP locations:*

***Upon approval of this major modification, the terms of permit WY0052361 are hereby modified as follows:***

- 1. Fourteen outfalls (001-012 and 026-027) are added to this permit.***
- 2. The receiving drainage of outfall 020 is corrected from North Prong Wild Horse Creek to Middle Prong Wild Horse Creek.***
- 3. Outfalls 001-012 and 020 discharge to an unnamed, ephemeral tributary of Middle Prong Wild Horse Creek. Irrigation has been documented on Middle Prong Wild Horse Creek downstream of this facility. Therefore, for the above outfalls, this modification establishes effluent limits and monitoring requirements that are protective of the downstream irrigation. The permittee must meet a specific conductance limit of 6100  $\mu$ hos/cm and an SAR limit of 24 at the end-of-pipe for these outfalls. This renewal also adds four irrigation monitoring points (IMP1-IMP4) to this permit.***
- 4. Eight (8) wells are removed and 3 wells are added, for a total of 40 wells at this facility.***

5. *In accordance with current WDEQ rules and regulations, the effluent limit and monitoring requirements for total petroleum hydrocarbons (TPH) are removed from this permit.*
6. *The pH effluent limit is updated to 6.5-9.0 standard units.*
7. *The effluent limit and routine monitoring requirement for radium<sup>226</sup> is removed from this permit in accordance with the WDEQ's current distance-based permitting approach for this constituent.*
8. *Effluent limits and routine monitoring requirements for sulfates and manganese are removed from this permit in accordance with current WDEQ policy.*
9. *The chlorides effluent limit is updated to 150 mg/l.*

***With the exception of items explicitly delineated in the major modification, all terms and conditions of permit WY0052361, including Parts II and III of the original permit, shall remain unchanged and in full force and effect.***

### **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. The guideline limits oil and grease effluent concentrations to less than 35 mg/l and requires that discharges of produced water be used for agricultural production and/or wildlife propagation. 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 four irrigation monitoring points (IMP1-IMP4) 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.

The Wyoming DEQ has determined through review of the permit application and available scientific information that effluent discharged from this facility will be put to agricultural and/or wildlife use and is unlikely to reach the Powder River. The permittee has submitted certified statements that demonstrate discharged effluent will be put to use for livestock and wildlife watering. Although some of the discharge will

be used by wildlife and livestock, a portion of the flow may also be lost due to reservoir and stream channel infiltration. Review of the permit application reveals that there are approximately 20 miles of stream channel that can be utilized for stream channel infiltration and evaporation losses between the outfalls and the Powder River. The maximum total effluent flow rate from this facility is estimated at 1.87 cfs (or 1.21 MGD).

Discharges from the reservoirs being utilized as part of the water management plan for this facility are not permitted except during precipitation events that cause the reservoirs to fill and overtop. The permittee has committed that effluent shall not reach the Powder River. However, in the event that such a situation occurs, this permit establishes a monitoring station on the receiving stream prior to the confluence with the Powder River. This station will function to monitor any effluent flows 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 pH must remain within 6.5 and 9.0 standard units. Effluent limits for total dissolved solids (5,000 mg/l) and specific conductance (7500 micromhos/cm) 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. In addition, the permit establishes a total barium limit of 1800 µg/l, a total arsenic limit of 7 µg/l, and a chlorides limit of 150 mg/l. These limits are based on chronic aquatic life standards for class 2AB waters which are intended to protect for the above listed designated uses and reflect the application of the antidegradation provisions required under Chapter 1 of the Wyoming Water Quality Rules and Regulations. 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. The water balances submitted by the permittee were based upon a maximum daily flow of 1.21 million gallons per day (MGD) from this facility, and water quality representative of groundwater originating from the Smith, Wall, Canyon, and/or Anderson coal seams in the immediate geographic area. Therefore, the permit establishes a total maximum daily flow limit of 1.21 MGD, to be calculated as the sum of all discharge from all permitted outfalls, and requires that the produced water being discharged by this facility originate in one or more of the following formations: the Smith, Wall, Canyon, and/or Anderson coal seams.

This permit originally established a total radium<sup>226</sup> limit of 1 pCi/l, a sulfate limit of 3000 mg/l, a total petroleum hydrocarbons (TPH) limit of 10 mg/l and a dissolved manganese limit of 650 µg/l at the end of pipe. Based upon water quality data collected by WDEQ since the time this permit was originally issued, a permitting approach for establishing total radium limits in coal bed methane permits has been developed. This approach is based upon the distance of the outfall from a class 2 water. The removal of the originally-established total radium<sup>226</sup> limit is based on this permitting approach. In addition, review of discharge monitoring report data for this facility and other CBM facilities in Northeast Wyoming indicates that the maximum reported concentrations for total petroleum hydrocarbons (TPH), dissolved manganese and sulfate in the discharge were well below the water quality standards of 10 mg/l for TPH and 3000 mg/l for sulfates established in *Chapter 1 of the Wyoming Water Quality Rules and Regulations*, and well below the originally established effluent limit of 650 µg/l for dissolved manganese. Therefore, WDEQ has removed the effluent limits and monitoring requirements for TPH, dissolved manganese and sulfate in this permit. Based on evaluation of the available data, it is WDEQ's determination that removing the total radium<sup>226</sup>, sulfate, dissolved manganese and total petroleum hydrocarbons limits from this permit conforms to the anti-backsliding requirements established in *Section 402(o).2.B.i of the Clean Water Act*.

### **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 for outfalls 001-012 and 020. 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 WYPDES permit WY0054585 (*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 effluent limits for specific conductance and sodium adsorption ratio described above are established at outfalls 001-012 and 020 only, and are effective year-round. Outfalls 013-019 and 021-027 are located in the North Prong Wild Horse Creek drainage and do not require effluent limits protective of downstream irrigation as irrigation has not been identified on North Prong Wild Horse Creek downstream of this facility.

### **Monitoring and Reporting Requirements**

The permit requires daily monitoring on the ephemeral tributaries below the outfalls in order to determine whether effluent discharged from the outfalls reaches any of the established irrigation monitoring points (IMP1 – IMP4 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.

Data collected at locations IMP1 – IMP4 will be evaluated by WDEQ on an ongoing basis in order to determine if effluent from this facility conforms to the following chemical relationship at the IMP locations:

$$\text{SAR} < 7.10 \times \text{EC} - 2.48$$

(where "SAR" represents sodium adsorption ratio, and "EC" represents specific conductance of the IMP sample in dS/m).

In the event that effluent from this facility is contributing to flow at any of the stations IMP1 – IMP4, and the SAR of the IMP sample does not conform to the above relationship during four or more sampling months in any calendar year, WDEQ may re-open the permit to adjust the outfall effluent limits for SAR accordingly.

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.

The designated water quality monitoring stations are located on the tributary (Wild Horse Creek) in the SWSW, Section 15, Township 54 North, Range 77 West, and on the mainstem (Powder River) in the SWSE, Section 16, Township 54 North, Range 77 West, and in the NWSE, Section 34, Township 55 North, Range 77 West, upstream and downstream (respectively) of the Wild Horse Creek – Powder River confluence, in the main channel of the Powder River. Established water quality monitoring stations on the mainstem are to be located outside the mixing zone of the tributary with the 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.

Reservoir and/or discharge water is to be released at a rate which does not cause significant erosion to the channel or receiving lands.

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, which is reflective of the WDEQ's efforts towards watershed permitting and similar expiration dates for all permits within a specific drainage, which will allow for basin-wide analysis upon renewal of the permits in the drainage.

Kathy Shreve  
Water Quality Division  
Department of Environmental Quality  
Drafted: October 7, 2004

Jennifer Zygmunt—Major Modification  
Water Quality Division  
Department of Environmental Quality  
Drafted: July 18, 2006

Revised: May 25, 2007

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,

Pennaco Energy, Inc.,

is authorized to discharge from the wastewater treatment facilities serving the

Middle Prong Federal,

which is located in the

the SWSE of Section 14, the SESE of Section 24, the NENE of Section 25, the NWSE of Section 13, Township 54 North, Range 76 West; and the SWNE, NWSW of Section 20, the NWNW of Section 28, the NESE, NENE of Section 29, the SESE of Section 30, the NENE, NESE of Section 32, the NESW and NWSE, Section 7, the NESW and SWSE, Section 8, the SWNE, SENW, and NWSE, Section 17, the NWNE, SWSE, SESW, and NESW, Section 18, the SWSE and NWSE, Section 28, the NESE and NENE, Section 29, the SESE, Section 30, and the NENE and NESE, Section 32, Township 54 North, Range 75 West, Campbell County


to receiving waters named

various named on-channel reservoirs (3B), located on various unnamed, ephemeral tributaries (3B) of the Middle Prong (3B) and North Prong (3B), Wild Horse Creek (3B). Wild Horse Creek (3B) is tributary to the Powder River (2ABWW),

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

This permit major modification shall become effective on the date of signature by the Director of the Department of Environmental Quality. **With the exception of items explicitly delineated in the major modification, all terms and conditions of permit WY0052361, including Parts II and III of the original permit, shall remain unchanged and in full force and effect.**

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

  
\_\_\_\_\_  
John F. Wagner  
Administrator - Water Quality

5-31-7  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
John V. Corra  
Director - Department of Environmental Quality

6/1/07  
\_\_\_\_\_  
Date

PART IA. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Effective immediately and lasting through December 31, 2008, the quality of effluent discharged by the permittee shall, at a minimum, meet the limitations set forth below. The permittee is authorized to discharge from outfall(s) serial numbers 001 – 027.

- Such discharges shall be limited as specified below:

Effluent Limits

<u>Effluent Characteristic</u>	<u>Daily Maximum</u> <u>Outfalls 013-019, 021-027</u>	<u>Daily Maximum</u> <u>Outfalls 001-012, 020</u>
Chlorides, mg/l	150	150
Dissolved Iron, µg/l	1000	1000
pH, standard units	6.5 – 9.0	6.5 – 9.0
Specific Conductance, micromhos/cm	7500	6100
Sodium Adsorption Ratio, calculated as unadjusted ratio		24
Total Arsenic, µg/l	7	7
Total Barium, µg/l	1800	1800
Total Dissolved Solids, mg/l	5000	5000
Total Flow, MGD*	1.21*	1.21*

\*Total flow is to be calculated as the sum of all discharge from all permitted outfalls (001-027). The permit requires that the produced water being discharged by this facility originate in the Smith, Wall, Canyon, and/or Anderson coal seams.

The pH shall not be less than 6.5 standard units nor greater than 9.0 standard units in any single grab sample.

The permittee may, if so desired, discharge effluent from any authorized well to any permitted outfall, as long as all permit limits and requirements can be met. This facility, as modified, consists of 27 outfalls and 40 wells.

Information gathered from the water quality monitoring stations may result in modification of the permit to protect existing uses on the tributary and the mainstem.

There shall be no discharge of floating solids or visible foam in other than trace amounts, nor shall the discharge cause formation of a visible sheen or visible hydrocarbon deposits on the bottom or shoreline of the receiving water.

Discharges from the reservoirs being utilized to contain CBM produced water as part of the water management plan for this facility are not allowed except in the event stormwater runoff causes the reservoirs to fill and overtop.

All waters shall be discharged in a manner to prevent erosion, scouring, or damage to stream banks, stream beds, ditches, or other waters of the state at the point of discharge. In addition, there shall be no deposition of substances in quantities which could result in significant aesthetic degradation, or degradation of habitat for aquatic life, plant life or wildlife; or which could adversely affect public water supplies or those intended for agricultural or industrial use.

**a.**            Monitoring of the initial discharge

Within 60 days of commencement of discharge, a sample shall be collected from each outfall and analyzed for the constituents specified below, at the required detection limits. Within 120 days of commencement of discharge, a summary report on the produced water must be submitted to the Wyoming Department of Environmental Quality and the U.S. EPA Region 8 at the addresses listed below. This summary report must include the results and detection limits for each of the constituents listed below. In addition, the report must include written notification of the established location of the discharge point (refer to Part I.B.11). This notification must include a confirmation that the location of the established discharge point(s) is within 1,510 feet of the location of the identified discharge point(s), is within the same drainage, and discharges to the same landowner's property as identified on the original application form. The legal description and location in decimal degrees of the established discharge point(s) must also be provided. After receiving the monitoring results for the initial discharge, the effluent limits and monitoring requirements established in this permit may be modified.

<u>Parameter*</u> (See notes following the table on chemical states)	<u>Required Detection Limits and Required Units</u>
Alkalinity, Total	1 mg/l as CaCO <sub>3</sub>
Aluminum, Dissolved	50 µg/l
Arsenic, Total	1 µg/l
Barium, Total	100 µg/l
Bicarbonate	10 mg/l
Cadmium, Dissolved	5 µg/l
Calcium, Dissolved	50 µg/l, report as mg/l
Chlorides	5 mg/l
Copper, Dissolved	10 µg/l
Dissolved Solids, Total	5 mg/l
Hardness, Total	10 mg/l as CaCO <sub>3</sub>
Iron, Dissolved	50 µg/l
Lead, Dissolved	2 µg/l
Magnesium, Dissolved	100 µg/l, report as mg/l
Manganese, Dissolved	50 µg/l
Mercury, Dissolved	1 µg/l
pH	to 0.1 pH unit

<u>Parameter*</u> (See notes following the table on chemical states)	<u>Required Detection Limits and Required Units</u>
Radium 226, Total	0.2 pCi/l
Selenium, Total Recoverable	5 µg/l
Sodium Adsorption Ratio	Calculated as unadjusted ratio
Sodium, Dissolved	100 µg/l, report as mg/l
Specific Conductance	5 micromhos/cm
Sulfates	10 mg/l
Zinc, Dissolved	50 µg/l

**TOTAL:** Value is expressed in terms of total recoverable metal in the water column.

NOTE: Except for aquatic life values for metals and where otherwise indicated, the values given refer to the total recoverable (dissolved plus suspended) amount for each substance. For the aquatic life values for metals, the values refer to the dissolved amount.

**DISSOLVED:** Value is based on the dissolved amount which is the amount that will pass through a 0.45 µm membrane filter prior to acidification to pH 1.5 - 2.0 with nitric acid.

Initial monitoring reports are to be sent to the following addresses:

Planning and Targeting Program, 8ENF-PT  
 Office of Enforcement, Compliance, and Environmental Justice  
 U.S. EPA Region 8  
 999 18th St., Suite 300  
 Denver, CO 80202-2466

and

Wyoming Department of Environmental Quality  
 Water Quality Division  
 Herschler Building, 4 West  
 122 West 25th Street  
 Cheyenne, WY 82002

**b. Routine monitoring End of Pipe – 001-027**

For the duration of the permit, at a minimum, samples for the constituents described below shall be collected at the indicated frequencies. The first routine monitoring for the time frame during which the monitoring of initial discharge occurs will, at a minimum, consist of flow measurements for the duration of the six-month monitoring time frame. Monitoring will be based on semi-annual time frames, from January through June, and from July through December.

<u>Parameter</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Bicarbonate (mg/l)	Once every six months	Grab
Dissolved Calcium (mg/l)	Monthly	Grab

<u>Parameter</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Chloride (mg/l)	Annually	Grab
Dissolved Iron (µg/l)	Annually	Grab
Dissolved Magnesium (mg/l)	Monthly	Grab
pH (standard units)	Once Every Six Months	Grab
Dissolved Sodium (mg/l)	Monthly	Grab
Sodium Adsorption Ratio (unadjusted)	Monthly	Calculated
Specific Conductance (micromohs/cm)	Monthly	Grab
Total Alkalinity (mg/l)	Once Every Six Months	Grab
Total Arsenic (µg/l)	Annually	Grab
Total Barium (µg/l)	Annually	Grab
Total Flow – (MGD)	Monthly	Continuous

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the outfall of the final treatment unit which is located out of the natural drainage and prior to admixture with diluent waters.

c. Irrigation Monitoring Points (IMP1-IMP4)

For the duration of the permit, at a minimum, samples for the constituents described below shall be collected at the indicated frequencies when water discharged from the outfalls reaches the irrigation monitoring point. Monitoring will be based on monthly time frames and reported semi-annually.

<u>Parameter</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Dissolved Calcium, mg/l	Monthly	Grab
Dissolved Magnesium, mg/l	Monthly	Grab
Dissolved Sodium, mg/l	Monthly	Grab
Sodium Adsorption Ratio, unitless	Monthly	Calculated
Specific Conductance, µmhos/cm	Monthly	Grab
Bicarbonate, mg/l as CaCO <sub>3</sub>	Monthly	Grab
Flow, MGD	Monthly	Instantaneous

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): at the irrigation monitoring points which are located as described in Table 1 of the permit below.

The permit requires daily monitoring on the ephemeral tributaries below the outfalls in order to determine whether effluent discharged from the outfalls reaches any of the established irrigation monitoring points (IMP1 – IMP4 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.

Data collected at locations IMP1 – IMP4 will be evaluated by WDEQ on an ongoing basis in order to determine if effluent from this facility conforms to the following chemical relationship at the IMP locations:

$$SAR < 7.10 \times EC - 2.48$$

(where "SAR" represents sodium adsorption ratio, and "EC" represents specific conductance of the IMP sample in dS/m).

In the event that effluent from this facility is contributing to flow at any of the stations IMP1 – IMP4, and the SAR of the IMP sample does not conform to the above relationship during four or more sampling months in any calendar year, WDEQ may re-open the permit to adjust the outfall effluent limits for SAR accordingly.

**d. Water Quality Monitoring Stations TRIB1, UPR, DPR**

For the duration of the permit, at a minimum, samples for the constituents described below shall be collected at the indicated frequencies. Monitoring will be based on monthly time frames, and reported semiannually.

<u>Parameter</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Dissolved Calcium (mg/l)	Monthly	Grab
Dissolved Magnesium (mg/l)	Monthly	Grab
Dissolved Sodium (mg/l)	Monthly	Grab
Sodium Adsorption Ratio (calculated as unadjusted ratio)	Monthly	Calculated

Specific Conductance (micromohs/cm)	Monthly	Grab
Flow* (MGD)	Monthly	Instantaneous

\*The permittee is only required to monitor and report flow at the tributary monitoring station on Wild Horse Creek (TRIB1). The permittee is not required to monitor or report flow data at the mainstem water quality monitoring stations (UPR and DPR), see Table 1 at the end of Part I for location descriptions.

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 (located at the end of Part I). 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 absorption 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.

## B. MONITORING AND REPORTING

### 1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and approval by the permit issuing authority.

### 2. Reporting

Results of initial monitoring, including the date the discharge began, shall be summarized on a Monitoring Report Form for Monitoring of Initial Discharge and submitted to the state water pollution control agency at the address below postmarked no later than 120 days after the commencement of discharge.

Results of routine end of pipe, irrigation monitoring point, and water quality station monitoring during the previous six (6) months shall be summarized and reported semiannually on a Discharge Monitoring Report Form (DMR). If the discharge is intermittent, the date the discharge began and ended must be included. The information submitted on the first semiannual DMR shall contain a summary of flow measurements and any additional monitoring conducted subsequent to the submittal of the initial monitoring report. When required, whole effluent toxicity (biomonitoring) results must be reported on the most recent version of EPA Region VIII's Guidance for Whole Effluent Reporting. Monitoring reports must be submitted to the state water pollution control agency at the following address

postmarked no later than the 15th day of the second month following the completed reporting period. The first report following issuance of this modification is due on August 15, 2007.

Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the Signatory Requirements contained in Part II.A.11.

Wyoming Department of Environmental Quality  
Water Quality Division  
Herschler Building, 4 West  
122 West 25th Street  
Cheyenne, WY 82002  
Telephone: (307) 777-7781

If no discharge occurs during the reporting period, "no discharge" shall be reported. If discharge is intermittent during the reporting period, sampling shall be done while the facility is discharging.

3. Definitions

- a. The "monthly average" shall be determined by calculating the arithmetic mean (geometric mean in the case of fecal coliform) of all composite and/or grab samples collected during a calendar month.
- b. The "weekly average" shall be determined by calculating the arithmetic mean (geometric mean in the case of fecal coliform) of all composite and/or grab samples collected during any week.
- c. The "daily maximum" shall be determined by the analysis of a single grab or composite sample.
- d. "MGD", for monitoring requirements, is defined as million gallons per day.
- e. "Net" value, if noted under Effluent Characteristics, is calculated on the basis of the net increase of the individual parameter over the quantity of that same parameter present in the intake water measured prior to any contamination or use in the process of this facility. Any contaminants contained in any intake water obtained from underground wells shall not be adjusted for as described above and, therefore, shall be considered as process input to the final effluent. Limitations in which "net" is not noted are calculated on the basis of gross measurements of each parameter in the discharge, irrespective of the quantity of those parameters in the intake waters.
- f. A "composite" sample, for monitoring requirements, is defined as a minimum of four grab samples collected at equally spaced two hour intervals and proportioned according to flow.
- g. An "instantaneous" measurement for monitoring requirements is defined as a single reading, measurement, or observation.
- h. A "pollutant" is any substance or substances which, if allowed to enter surface waters of the state, causes or threatens to cause pollution as defined in the Wyoming Environmental Quality Act, Section 35-11-103.
- i. "Total Flow" is the total volume of water discharged, measured on a continuous basis and reported as a total volume for each month during a reporting period. The accuracy of flow measurement must comply with Part III.A.1.

4. Test Procedures

Test procedures for the analysis of pollutants, collection of samples, sample containers, sample preservation, and holding times, shall conform to regulations published pursuant to 40 CFR, Part 136, unless other test procedures have been specified in this permit.

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. The exact place, date and time of sampling;
- b. The dates and times the analyses were performed;
- c. The person(s) who performed the analyses and collected the samples;
- d. The analytical techniques or methods used; and
- e. The results of all required analyses including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine the results.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form. Such increased frequency shall also be indicated.

7. Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the administrator at any time. Data collected on site, copies of Discharge Monitoring Reports and a copy of this NPDES permit must be maintained on site during the duration of activity at the permitted location.

8. Penalties for Tampering

The Act provides that any person who falsifies, tampers with or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two years per violation, or both.

9. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

10. Facility Identification

All facilities discharging produced water shall be clearly identified with an all-weather sign posted at each outfall and flow monitoring locations (points of compliance). This sign shall, as a minimum, convey the following information:

- a. The name of the company, corporation, person(s) who holds the discharge permit, and the NPDES permit number;
- b. The contact name and phone number of the person responsible for the records associated with the permit;
- c. The name of the facility (lease, well number, etc.) and the outfall number as identified by the discharge permit.

11. Identification and Establishment of Discharge Points

According to 40 CFR 122.21(k)(1), the permittee shall identify the expected location of each discharge point on the appropriate NPDES permit application form. The location of the discharge point must be identified to within an accuracy of 15 seconds. This equates to a distance of 1,510 feet.

Public notice is not required if the location of the established discharge point is within 1,510 feet of the location of the discharge point originally identified on the permit application. In addition, the discharge must be within the same drainage and must discharge to the same landowner's property as identified on the original application form. If the three previously stated requirements are not satisfied, modification of the discharge point location(s) constitutes a major modification of the permit as defined in Part I.B.12. The permittee shall provide written notification of the establishment of each discharge point in accordance with Part I.A.2.a above.

12. Location of Discharge Points and Irrigation Compliance Points

As of the date of permit issuance, authorized points of discharge were as follows:

SEE TABLE 1 FOR A LIST OF OUTFALL LOCATIONS

13. Location of water quality monitoring stations

As of the date of issuance, authorized water quality monitoring stations were as follows:

SEE TABLE 1 FOR A LIST OF WATER QUALITY STATIONS

Requests for modification of the above list will be processed as follows. If the requested modification satisfies the definition of a minor permit modification as defined in 40 CFR 122.63 modifications will not be required to be advertised in a public notice. A minor modification constitutes a correction of a typographical error, increase in monitoring and/or reporting, revision to an interim compliance schedule date, change in ownership, revision

of a construction schedule for a new source discharger, deletion of permitted outfalls, and/or the incorporation of an approved local pretreatment program.

A request for a minor modification must be initiated by the permittee by completing the form titled National Pollutant Discharge Elimination System Permit Modification Application For Coal Bed Methane. Incomplete application forms will be returned to the applicant.

The outfalls listed in Table 1 (located at the end of Part I) may be moved from the established location without submittal of a permit modification application provided all of the following conditions are satisfied:

1. The new outfall location is within 2640 feet of the established outfall location.
2. The new outfall location is within the same drainage or immediate permitted receiving waterbody.
3. There is no change in the affected landowners.
4. Notification of the change in outfall location must be provided to the NPDES Permits Section on a form provided by the WQD Administrator within 10 days of the outfall location change. The form must be provided in duplicate and legible maps showing the previous and new outfall location must be attached to the form.

Moving an outfall location without satisfying the four above listed conditions will be considered a violation of this permit and subject to full enforcement authority of the WQD.

An outfall relocation as described above will not be allowed if the new outfall location is less than one mile from the confluence of a Class 2 waterbody and the dissolved iron limits established in the permit for the outfall are based upon Class 3 standards.

**TABLE 1: OUTFALL AND WATER QUALITY MONITORING STATION LOCATION INFORMATION, WY0052361**

Discharge Point # (Outfall)	Immediate Receiving Steam	Distance from outfall to mainstem (stream miles)	Quarter / Quarter	Section	Township	Range	Latitude	Longitude	Reservoir Name	Groundwater approval required before discharge?
001	UET to Middle Prong Wild Horse Creek	16.05	SWSE	14	54	76	44.65203953	-105.9654164	New Pasture	YES
002	UET to Middle Prong Wild Horse Creek	23.15	SWNE	20	54	75	44.64644512	-105.9054378	Mesa #1	YES
003	UET to Middle Prong Wild Horse Creek	22.25	NWSW	20	54	75	44.64436	-105.9174098	Mesa Top	YES
004	UET to Middle Prong Wild Horse Creek	17.33	SESE	24	54	76	44.63754203	-105.9431998	County Rd. #2	YES
005	UET to Middle Prong Wild Horse Creek	17.03	NENE	25	54	76	44.6336603	-105.9444859	County Rd. #1	YES
006	UET to Middle Prong Wild Horse Creek	22.20	NWNW	28	54	75	44.63578737	-105.8972913	Horse Pasture	YES
007	UET to Middle Prong Wild Horse Creek	22.25	NWNW	28	54	75	44.63594832	-105.8962851	Windmill 1	YES
008	UET to Middle Prong Wild Horse Creek	21.80	NESE	29	54	75	44.62974928	-105.9026695	Cactus Patch	YES
009	UET to Middle Prong Wild Horse Creek	22.28	NENE	29	54	75	44.63681892	-105.9000557	Little BLM	YES
010	UET to Middle Prong Wild Horse Creek	19.60	SESE	30	54	75	44.62516293	-105.920095	Stud Pasture	YES
011	UET to Middle Prong Wild Horse Creek	21.14	NENE	32	54	75	44.62058941	-105.9009268	Calf Pasture	YES
012	UET to Middle Prong Wild Horse Creek	20.76	NESE	32	54	75	44.61283385	-105.9014748	Oasis	YES
013	UET to N. Prong Wild Horse Creek	17.76	NESW	7	54	75	44.67027693	-105.9331337	Baby	YES
014	UET to N. Prong Wild Horse Creek	16.90	NWSE	7	54	75	44.67170669	-105.9289177	Seven	YES
015	UET to N. Prong Wild Horse Creek	18.57	NESW	8	54	75	44.6729038	-105.9099373	Medley	YES
016	UET to N. Prong Wild Horse Creek	17.99	SWSE	8	54	75	44.66674041	-105.9072548	South Pine Misty	YES
017	UET to N. Prong Wild Horse Creek	15.81	NWSE	13	54	76	44.65763823	-105.9483309	Mizer	YES
018	UET to N. Prong Wild Horse Creek	18.31	SWNE	17	54	75	44.66027161	-105.90448	Mesa #2	YES
019	UET to N. Prong Wild Horse Creek	18.03	NWSE	17	54	75	44.65918402	-105.9076667	Mesa #3	YES
020	UET to Middle Prong Wild Horse Creek	22.94	NWSE	28	54	75	44.62898364	-105.8866349	R11	YES
021	UET to N. Prong Wild Horse Creek	17.80	SESW	17	54	75	44.65965263	-105.9121265	Old Wagon	YES
022	UET to N. Prong Wild Horse Creek	17.17	NWNE	18	54	75	44.66545927	-105.9255508	Broken Jaw	YES
023	UET to N. Prong Wild Horse Creek	16.99	SWSE	18	54	75	44.65260103	-105.925876	Early Summer	YES
024	UET to N. Prong Wild Horse Creek	16.57	SESW	18	54	75	44.65397951	-105.9323804	Red Hill Crossing	YES
025	UET to N. Prong Wild Horse Creek	16.57	NESW	18	54	75	44.65679713	-105.9301931	Pine Cut	YES
026	UET to N. Prong Wild Horse Creek	19.04	NWSE	18	54	75	44.653728	-105.921764	Whale	YES
027	UET to N. Windmill Draw	24.85	SWSE	28	54	75	44.630883	-105.894236	Hunting	YES

TABLE 1: OUTFALL AND WATER QUALITY MONITORING STATION LOCATION INFORMATION, WY0052361										
Discharge Point # (Outfall)	Immediate Receiving Steam	Distance from outfall to mainstem (stream miles)	Quarter / Quarter	Section	Township	Range	Latitude	Longitude	Reservoir Name	Groundwater approval required before discharge?
<b>WATER QUALITY MONITORING STATION LOCATION INFORMATION</b>										
IMP1	UET to Middle Prong Wild Horse Creek		NENE	31	54	75	44.621542	-105.922611	--	--
IMP2	UET to Middle Prong Wild Horse Creek		SWNW	32	54	75	44.619022	-105.919319	--	--
IMP3	N. Windmill Draw		NESE	32	54	75	44.614564	-105.908725	--	--
IMP4	UET to Middle Prong Wild Horse Creek		SESE	32	54	75	44.612153	-105.902189	--	--
DPR	Powder River	--	NWSE	34	55	77	44.69714	-106.11194	--	--
TRIB-1	Wild Horse Creek	--	SESE	16	54	77	44.65046	-106.12157	--	--
UPR	Powder River	--	SWSE	16	54	77	44.64997	-106.12785	--	--

*UET - Unnamed, ephemeral tributary*

**C. RESERVOIR / IMPOUNDMENT REQUIREMENTS**

**1. Groundwater Monitoring Beneath Impoundments**

Table 1 of the permit above identifies which outfalls (if any) are designed to discharge into impoundments that are subject to groundwater monitoring requirements established in the latest version of the Water Quality Division guideline “*Compliance Monitoring for Groundwater Protection Beneath Unlined Coalbed Methane Produced Water Impoundments.*” These specified outfalls are not authorized to discharge until a written groundwater compliance approval has been granted by the Groundwater Pollution Control Program of the Water Quality Division. A groundwater compliance approval will consist of either a final approved groundwater compliance monitoring plan, or written authorization for an exemption thereof. Once an impoundment has been granted a written groundwater compliance approval, the contributing outfall(s) to that reservoir may commence discharge.

Any discharge into an impoundment which has not been granted the required groundwater compliance approval will constitute a violation of this permit, and may result in enforcement action from the Water Quality Division to include a notice of violation, revocation of the discharge permit, or other appropriate enforcement action.