

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: AC Ranch N and E, Option 2, which is located in the SWSW, Section 27, the NWNE, SENE, NWNW, NESW, NWSE, and SWSW, Section 28, and the NWSW, Section 35, Township 57 North, Range 83 West, Sheridan County. The produced water will be discharged to various named, on-channel reservoirs (3B) located on various unnamed tributaries (3B) of Dutch Creek (3B), Johnston Draw (3B), and Prairie Dog Creek (2AB). Dutch Creek and Johnston Draw are tributary to the Tongue River (2AB), via Prairie Dog Creek (2AB). The permit establishes an irrigation compliance point, located in the NESE, Section 34, Township 57 North, Range 83 West, on Dutch Creek (3B), upstream of the nearest downstream irrigation diversion. The permit establishes a total maximum daily flow limit of 3.8 MGD, and requires that the produced water being discharged from this facility originate in one of the following formations: the Dietz1, Dietz3, Monarch, and/or the Carney coal seams.

NUMBER: WY0051977

*The terms of permit WY0051977 are hereby modified as follows:*

- 1. Two outfalls, 009 and 010, and their respective on-channel reservoirs "Slim" and "Cole," are added to this permit.*
- 2. In accordance with current WDEQ policy, the effluent limit and monitoring requirements for total petroleum hydrocarbons (TPH) are removed from this permit.*
- 3. The radium<sup>226</sup> effluent limit is updated to reflect current WDEQ permitting approaches.*
- 4. The legal description of the irrigation compliance point (ICP) is corrected to the NESE of Section 34, Township 57 North, Range 83 West.*
- 5. The locations of water quality monitoring stations TRIB1, TRIB2, DPDC, and DTR are corrected.*
- 6. A tributary monitoring station (TRIB3) on "Slim Creek" is added to this permit.*
- 7. Ten wells are removed from this permit.*

*With the exception of items explicitly delineated in this major modification, all terms and conditions of WY0051977, including Parts II and III of the original permit, shall remain unchanged and in full force and effect.*

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 judgement 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 to enhance 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. The permittee has submitted documentation verifying that there is irrigation occurring downstream of this facility on the class 3 streams (Dutch Creek) prior to Prairie Dog Creek, the closest class 2 water. In order to monitor and protect irrigation water quality, this permit establishes an irrigation compliance point. The irrigation compliance point is a designated monitoring location prior to the first downstream point of irrigation diversion/use in Dutch Creek from the permitted facility. Effluent limits associated with the irrigation compliance points - SAR = 6 and EC = 2000 micromhos/cm - were determined from a combination of one or more of the following: technical information submitted by the applicant, published scientific literature, credible water quality data that has been through formally adopted quality control/quality assurance review, and best professional judgement. These limits satisfy provisions under Chapter 1, Section 20 (protection of agricultural water supply) of the Wyoming Water Quality Rules and Regulations.

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 Tongue River except during storm events. During storm events, the effluent will be diluted by the stormwater runoff. The permittee has collected stormwater flow and quality data during the year prior to submittal of their original permit application to the WDEQ from the streams in this area. The information collected included water quality and flow data from the ephemeral streams proposed for discharge, collection of evaporation/infiltration data in the streams and on-channel reservoirs proposed for discharge, and anecdotal information from long-time residents of the area. This information, along with established information available from the USGS, was utilized in the mixing analyses and water budgets performed by the permittee.

The results of these analyses indicate minimal to no impacts to Dutch Creek, Prairie Dog Creek, and/or Tongue River water quality should the reservoirs overtop and spill in response to a storm event. The data submitted in support of the permit application indicates that although these discharges will result in increases in SAR (from SARs ranging from 1 to 2.3 to SARs ranging from 2.3 to 5) and EC (from ECs ranging from 1035 to 2078  $\mu\text{mhos/cm}$  to ECs ranging from 1324 to 2099  $\mu\text{mhos/cm}$ ) to Prairie Dog Creek, these increases will be infrequent (lowest reoccurrence interval is 1.08 years) and temporary (approximately 3 hours in duration), due to the sporadic and short term nature of storm events in the project area. Although the discharges may potentially temporarily cause increases in Prairie Dog Creek and Tongue River SAR and specific conductance concentrations, the resultant water quality is suitable for irrigation. Especially considering the temporary and sporadic nature of the potential increases in SAR and EC, the potential for

decreases in crop production as a result of the proposed discharge is considered to be very minimal, as decreases in crop production due to sodicity and salinity are the result of long-term, consistent application of saline and/or sodic irrigation water.

The analyses also demonstrate that, based on monthly average SAR and EC calculated utilizing USGS data recorded from the Tongue River station near Decker, Montana, discharges from the reservoirs being utilized to contain CBM produced water will result in at most, a 10 micromoh/cm increase in EC, and a 0.04 increase in SAR in Tongue River water quality for no longer than 28 hours at any one time. Average increases in SAR and EC modeled utilizing stormwater runoff flows and quality for various sizes of storm events are described in the table below:

All values reported as difference between recorded average ambient and estimated water quality upon discharge.								
2YR/24HR EVENT			5YR/24HR EVENT			10YR/24HR EVENT		
Month	EC (Increase above ambient)	SAR (Increase above ambient)	Month	EC (Increase above ambient)	SAR (Increase above ambient)	Month	EC (Increase above ambient)	SAR (Increase above ambient)
January	6	0.02	January	8	0.03	January	8	0.04
February	8	0.02	February	10	0.04	February	10	0.04
March	5	0.01	March	6	0.03	March	7	0.03
April	5	0.01	April	6	0.02	April	7	0.02
May	4	0.01	May	6	0.02	May	7	0.02
June	2	0.01	June	4	0.01	June	5	0.01
July	4	0.01	July	7	0.02	July	7	0.02
August	6	0.02	August	7	0.03	August	7	0.03
September	4	0.01	September	6	0.02	September	7	0.02
October	5	0.02	October	7	0.03	October	7	0.03
November	6	0.02	November	9	0.03	November	9	0.03
December	7	0.02	December	8	0.03	December	9	0.03
Average difference	5.27	0.015	Average difference	7.07	0.03	Average difference	7.42	0.03

However, in order to provide a measure of safety, the permittee has proposed an extensive network of monitoring locations on Dutch Creek, Prairie Dog Creek, and the Tongue River. These stations will serve to monitor any impacts that this facility may have on water quality in Prairie Dog Creek, Dutch Creek, and the Tongue River. Monitoring data collected at these stations during the life of the permit may result in the permit being reopened and new limits being established.

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 stream channel infiltration. Information gathered from Western Land Services, Sheridan Wyoming (April 19, 2001) and Hydrologic Consultants, Inc. (2001) indicate a mean channel infiltration loss rate for ephemeral drainages in the Tongue River at 0.1 cfs per mile of stream channel. Review of the permit application reveals that there are approximately 7 miles of stream channel that can be utilized for stream channel infiltration and evaporation losses between the outfalls and the Prairie Dog Creek. The maximum total effluent flow rate from this facility is estimated at 5.91 cfs. In addition, the wells being authorized for discharge at this facility will also be authorized for discharge under other WYPDES permits to allow the permittee to maximize their water management abilities. The permittee has submitted documentation verifying that, when considering the permittee's total reservoir storage for the entire plan of

development in the Prairie Dog Creek area, there is sufficient reservoir storage to contain all CBM discharge under "dry" operating conditions. The permittee has committed that effluent shall not reach the Prairie Dog Creek except during storm events. However, in the event that discharge does reach Prairie Dog Creek or the Tongue River, this permit establishes a series of monitoring stations on Dutch Creek, Prairie Dog Creek, and the Tongue River. These stations will function to monitor any effluent flows to Prairie Dog Creek or the Tongue River.

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), specific conductance (7,500 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 discharge from any permitted outfall. The permit also establishes a dissolved manganese limit of 50 µg/l, and a chlorides limit of 46 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 1.4 µg/l. These limits 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*. For outfalls 001 and 010 only, the permit establishes a dissolved iron limit of 104 µg/l (outfalls are less than one stream mile from a class 2 water). In addition, representative water quality data submitted by the permittee indicates that this facility has the potential to exceed the established dissolved zinc limit for discharges in this drainage. Therefore, the permit establishes a dissolved zinc limit of 33 µg/l, this limit applies to discharge from any permitted outfall. 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 for outfalls 002 through 009, 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. Impact estimates from this discharge were based upon a maximum daily flow of 3.8 million gallons per day (MGD) from this facility, and water quality representative of water quality from the Dietz1, Dietz3, Monarch, and Carney coal seams in the surrounding geographical area, therefore, the permit establishes a maximum daily flow limit of 3.8 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 Dietz1, Dietz3, Monarch, and/or Carney coal seams.

This permit originally established a total radium<sup>226</sup> limit of 1 pCi/l and a total petroleum hydrocarbons (TPH) limit of 10 mg/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 modification of the originally-established total radium<sup>226</sup> limit is based on this permitting approach. Distance-based effluent limits for total radium<sup>226</sup> are outlined by outfall in Part I.1.b of this permit. 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) in the discharge were well below the water quality standard of 10 mg/l established in Chapter 1 of the Wyoming Water Quality Rules and Regulations. Therefore, WDEQ has removed the effluent limit and monitoring requirement for TPH in this permit. Based on evaluation of the available data, it is WDEQ's determination that modifying the total radium<sup>226</sup> limit and removing the total petroleum hydrocarbons limit from this permit conforms to the anti-backsliding requirements established in Section 402(o).2.B.i of the Clean Water Act.

In order to monitor and regulate coal bed methane discharge for compliance with Chapter 1, Section 20 (protection of agricultural water supply), effluent limits for sodium adsorption ratio (SAR) and specific conductance are included in this permit. The Wyoming DEQ has determined that an SAR of 6 and a specific conductance of 2000 micromhos/cm are intended to be protective of agriculture use in the Dutch Creek drainage. The specific conductance limit of 2000 micromhos/cm is based on the threshold value for alfalfa which is considered to be the most salt sensitive plant irrigated in northeastern Wyoming (USDA George E. Brown Jr. Salinity Laboratory, Salt Tolerance Database, Grasses and Forage Crops). There was no data available to characterize EC tolerance of alfalfa specific to the Dutch Creek drainage. The SAR limit of 6 was determined to not reduce the rate of infiltration of irrigated soils in the Dutch Creek drainage, given the specific conductance threshold referenced above as ascertained from Figure 3 (page 44) of Agricultural Salinity and Drainage, Hanson et al., 1999 revision. An SAR limit of 6 and specific conductance limit of 2000 micromhos/cm will also maintain the baseline C3-S1 irrigation suitability category for the Prairie Dog Creek drainage (see Figure 25, of Diagnosis and Improvement of Saline and Alkali Soils, US Dept. of Agricultural Handbook No. 60, 1954). Monitoring will be required for flow volume, calcium, magnesium, sodium, bicarbonate, sodium adsorption ratio and specific conductance when flow is present at the irrigation compliance point(s) at any time during the year. The irrigation compliance point is located in the NESE, Section 34, Township 57 North, Range 83 West, on Dutch Creek, prior to the first downstream irrigation diversion.

The permit requires daily monitoring on Dutch Creek to determine whether water discharged from the outfalls reaches the established irrigation compliance point. Daily monitoring is necessary because the permit establishes different sampling and analysis requirements based on whether the effluent reaches the irrigation compliance point. Once flow at the irrigation compliance point has been documented within a sampling month, then weekly monitoring of flow is required for the month. At the beginning of each calendar month, the frequency will revert to daily. Effluent samples must be collected on a weekly basis if flow persists at the irrigation compliance point for 24 hours or more. Results are to be reported twice-yearly and if no flow occurs then "no discharge" is to be reported. Should the permittee be able to substantively document that this facility did not contribute to flows at the ICP at any time during the monitoring period in question, the permittee may report "did not contribute" on the discharge monitoring reports for the monitoring period in question, and is not required to collect samples at the irrigation compliance point for the monitoring period in question. In such cases, it is the responsibility of the permittee to demonstrate that the effluent from this facility did not contribute to the flow occurring at the irrigation compliance point.

The permit also requires sampling at designated tributary water quality monitoring stations located on the class 3 tributaries – Johnston Draw and the unnamed, ephemeral tributary, and the class 2AB mainstems – Prairie Dog Creek and the Tongue River. The tributary water quality monitoring stations are located in the NESW, SWSW, NENW, Section 34, Township 57 North, Range 83 West, on Johnston Draw, "Johnston Draw North", and "Slim Creek", respectively. Water quality monitoring stations on Prairie Dog Creek are located upstream and downstream of the facility (respectively), in the main channel of Prairie Dog Creek in the NESW, Section 4, Township 56 North, Range 83 West, and in the NWNW, Section 15, Township 57 North, Range 83 West.. The Tongue River water quality monitoring stations are located upstream and downstream (respectively) of the Prairie Dog Creek – Tongue River confluence, in the main channel of the Tongue River, outside of the mixing zone of Prairie Dog Creek and the Tongue River, in the SESW, Section 23, Township 58 North, Range 83 West, and in the SENE, Section 23, Township 58 North, Range 83 West. Effluent samples at the designated water quality monitoring stations must be collected on a monthly basis and are to be reported semiannually. 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 four water quality monitoring stations when effluent from this CBM facility contributes to flow in Prairie Dog Creek. If flow occurs at a tributary water quality monitoring 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 four 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 tributary water quality monitoring station. If no flow at all occurs at a tributary water quality monitoring station for an entire monthly monitoring period, then "no flow" is to be reported and samples need not be collected at the four 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.

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.

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.

Reservoir and/or discharge water is to be released at a rate which does not cause significant erosion to the channel or receiving lands. The permittee has committed to containment of all CBM effluent within a series of on-channel reservoirs. The permittee is required to contain all effluent within the reservoirs, and may not discharge except during periods of time in which stormwater runoff enters the reservoir, causing it to overflow and spill. Should the reservoirs discharge, the permittee will be required to substantiate that the discharge was due to the influx of stormwater runoff.

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 April 30, 2009. This expiration date is the same for other previously-permitted facilities in the Prairie Dog Creek watershed utilizing the same water management strategy as this facility. Having all permits in the drainage expire at the same time will allow for basin-wide analysis of impacts due to these discharges upon renewal of these permits, and will allow the WDEQ to adopt a more holistic, watershed-based permitting approach.

Kathy Shreve  
Water Quality Division  
Department of Environmental Quality  
Drafted: August 17, 2004

Jennifer Zygmunt—Major Modification  
Water Quality Division  
Department of Environmental Quality  
Drafted: July 7, 2005

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

AC Ranch N and E, Option 2,

which is located in the

the SWSW, Section 27, the NWNW, SENE, NWNW, NESW, NWSE, and SWSW, Section 28, and the NWSW, Section 35, Township 57 North, Range 83 West, Sheridan County,

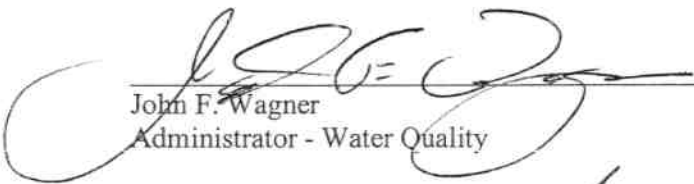
to receiving waters named

various named, on-channel reservoirs (3B) located on various unnamed tributaries (3B) of Dutch Creek (3B), Johnston Draw (3B), and Prairie Dog Creek (2AB). Dutch Creek and Johnston Draw are tributary to the Tongue River (2AB), via Prairie Dog Creek (2AB).

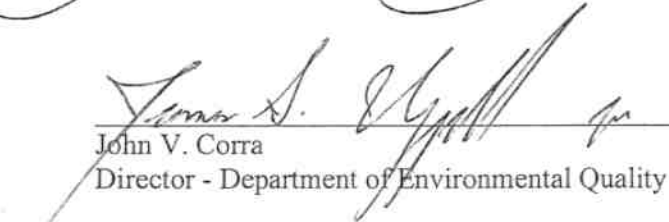
in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II and III hereof.

This 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 this major modification, all terms and conditions of WY0051977, 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 **April 30, 2009**, at midnight .

  
John F. Wagner  
Administrator - Water Quality

Date 8/31/05

  
John V. Corra  
Director - Department of Environmental Quality

Date 9/6/05

PART IA. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Effective immediately and lasting through April 30, 2009, 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 - 010.

1. Discharges from all permitted outfalls (001-010) are limited as specified below:

<u>Effluent Characteristic</u>	<u>Effluent Limits</u>	
	<u>Daily Maximum Outfall</u>	<u>Daily Maximum Irrigation Compliance Point**</u>
Chlorides, mg/l	46	
Dissolved Manganese, µg/l	50	
pH, standard units	6.5 – 9.0	
Specific Conductance, micromhos/cm	7500	2000
Sulfates, mg/l	3000	
Total Arsenic, µg/l	1.4	
Total Barium, µg/l	1800	
Total Dissolved Solids, mg/l	5000	
Total Flow, MGD*	3.8	
Dissolved Zinc, µg/l	33	
Sodium Adsorption Ratio, calculated as unadjusted ratio		6

\*Total flow is to be calculated as the sum of all discharge from all permitted outfalls. The permit requires that the produced water being discharged by this facility originate on or more of the following formations: the Dietz1, Dietz3, Monarch, and/or Carney coal seams.

\*\*Limits at the irrigation compliance point are in effect whenever produced water from this facility contributes to flow at the irrigation compliance point.

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

## 2. Distance based effluent limits by outfall:

Distance-Based Effluent Limits by Outfall

<u>Outfall</u>	<u>Distance to Nearest Class 2 Stream</u>	<u>Radium 226 + Radium 228, pCi/L</u>	<u>Radium 226, pCi/L</u>	<u>Dissolved Iron, µg/l</u>
001	0.96	1	NA	104
002	1.11	NA	3	1000
003	1.79	NA	3	1000
004	1.62	NA	3	1000
005	1.42	NA	3	1000
006	1.75	NA	3	1000
007	1.54	NA	3	1000
008	2.17	NA	5	1000
009	1.03	NA	3	1000
010	0.72	1	NA	104

## 3. The following limits and requirements apply to all outfalls:

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 originally permitted, contained 8 outfalls and 101 wells. Upon approval of this major modification, this facility will contain 10 outfalls and 91 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.

The representative water quality analyses indicate that this facility's discharge has the potential to exceed the established permit limits for dissolved iron. However, the permittee has submitted information indicating that the installation of enhanced oxidation channels and stilling basins for dissolved iron can eliminate this problem by increasing the precipitation of iron out of the discharge. Therefore, the permittee will be required to, and has committed to, the installation of enhanced oxidation channels and stilling basins prior to the discharge reaching a water of the state. Enhanced oxidation facilities must be installed and operational prior to commencement of discharge from this facility.

Reservoir and/or discharge water is to be released at a rate which does not cause significant erosion to the channel or receiving lands. The permittee has committed to containment of all CBM effluent within a series of on-channel reservoirs. The permittee is required to contain all effluent within the reservoirs, and may not discharge except during periods of time in which stormwater runoff enters the reservoir, causing it to overtop and spill. Should the reservoirs discharge, the permittee will be required to substantiate that the discharge was due to the influx of stormwater runoff.

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.

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.

4. Discharges shall be monitored by the permittee as specified below:

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 specified 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, Total Recoverable	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 me/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 me/l

<u>Parameter</u> (See notes following the table on chemical states)	<u>Required Detection Limits and Required Units</u>
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
Radium 226, Total	0.2 pCi/l
Radium 228, 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 me/l
Sodium, Dissolved	100 µg/l, report as mg/l
Specific Conductance	5 micromhos/cm
Sulfates	10 mg/l
Zinc, Dissolved	50 µg/l

\*Initial monitoring sampling and reporting requirements for total radium<sup>228</sup> do not apply to outfalls greater than one stream mile from a class 2 water (002-009). See Table 1 Part I.B.13 for a list of outfall distances to class 2 water.

**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:** Volume 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 – 001-010**

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)	Monthly	Grab
Dissolved Calcium (mg/l)	Monthly	Grab
Dissolved Calcium (me/l)	Monthly	Grab
Chloride (mg/l)	Annually	Grab
Dissolved Iron ( $\mu\text{g/l}$ )	Annually	Grab
Dissolved Manganese ( $\mu\text{g/l}$ )	Annually	Grab
Dissolved Magnesium (mg/l)	Monthly	Grab
Dissolved Magnesium (me/l)	Monthly	Grab
pH (s. u.)	Once Every Six Months	Grab
Total Radium 226 (pCi/l)	Annually	Grab
Dissolved Sodium (mg/l)	Monthly	Grab
Dissolved Sodium (me/l)	Monthly	Grab
Sodium Adsorption Ratio (unadjusted ratio)	Monthly	Calculated
Specific Conductance (micromohs/cm)	Monthly	Grab
Sulfate (mg/l)	Annually	Grab
Total Alkalinity (mg/l as $\text{CaCO}_3$ )	Monthly	Grab
Total Arsenic ( $\mu\text{g/l}$ )	Annually	Grab
Total Barium ( $\mu\text{g/l}$ )	Annually	Grab
Total Flow - (MGD)	Monthly	Continuous
Dissolved Zinc ( $\mu\text{g/l}$ )	Annually	Grab

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. Routine monitoring End of Pipe – constituents and requirements applicable only to outfalls 001 and 010:

In addition to the routine monitoring requirements and constituents as described in Part I.A.2.c of the permit above, the following constituent shall be included in the list of routine monitoring constituents for outfalls 001 and 010. All limitations regarding routine monitoring, sampling and reporting apply as described in Part I.A.2.c for this additional constituent.

<u>Parameter</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Total Radium 228 (pCi/l)	Annually	Grab

d. Irrigation Compliance Points – ICP1

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 any permitted outfall reaches any irrigation compliance point. Irrigation compliance point limits and requirements are in effect year-round due to the large amount of irrigation taking place on Prairie Dog Creek, and the potential for this discharge to impact irrigation water quality.

<u>Parameter</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Bicarbonate (mg/l)	Monthly	Grab
Dissolved Calcium (mg/l)	Monthly	Grab
Dissolved Calcium (me/l)	Monthly	Grab
Dissolved Magnesium (mg/l)	Monthly	Grab
Dissolved Magnesium (me/l)	Monthly	Grab
Dissolved Sodium (mg/l)	Monthly	Grab
Dissolved Sodium (me/l)	Monthly	Grab
Sodium Adsorption Ratio (calculated as unadjusted ratio)	Monthly	Calculated
Specific Conductance (micromohs/cm)	Monthly	Grab
Total Flow - (MGD)	Monthly	Instantaneous

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: at the irrigation compliance point which is located as follows: in the NESE, Section 34, Township 57 North, Range 83 West, on Dutch Creek prior to the first downstream irrigation diversion on Dutch Creek.

The permit requires daily monitoring on Dutch Creek to determine whether water discharged from the outfalls reaches the established irrigation compliance point. Daily monitoring is necessary because the permit establishes different sampling and analysis requirements based on

whether the effluent reaches the irrigation compliance point. Once flow at the irrigation compliance point has been documented within a sampling month, then weekly monitoring of flow is required for the month. At the beginning of each calendar month, the frequency will revert to daily. Effluent samples must be collected on a weekly basis if flow persists at the irrigation compliance point for 24 hours or more. Results are to be reported twice-yearly and if no flow occurs then "no discharge" is to be reported. Should the permittee be able to substantively document that this facility did not contribute to flows at the ICP at any time during the monitoring period in question, the permittee may report "did not contribute" on the discharge monitoring reports for the monitoring period in question, and is not required to collect samples at the irrigation compliance point for the monitoring period in question. In such cases, it is the responsibility of the permittee to demonstrate that the effluent from this facility did not contribute to the flow occurring at the irrigation compliance point.

e. Water Quality Monitoring Stations – TRIB1-TRIB3\*, UPDC, DPDC, UTR, and DTR

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>
Bicarbonate (mg/l)	Monthly	Grab
Dissolved Calcium (mg/l)	Monthly	Grab
Dissolved Calcium (me/l)	Monthly	Grab
Dissolved Magnesium (mg/l)	Monthly	Grab
Dissolved Magnesium (me/l)	Monthly	Grab
Dissolved Sodium (mg/l)	Monthly	Grab
Dissolved Sodium (me/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 stations (TRIB1-TRIB3). The permittee is not required to monitor or report flow data at the mainstem water quality monitoring stations (UPDC, DPDC, UTR, and DTR). Furthermore, the permittee is not required to monitor for bicarbonate, dissolved calcium, dissolved magnesium, dissolved sodium, SAR, or specific conductance as listed above. See Table 1 at the end of Part I for location descriptions.

