Wyoming Department of Environmental Quality
Water Quality Division
WYPDES Program

STATEMENT OF BASIS

Renewal

APPLICANT NAME:	Petro-Canada Resources USA, Inc.
MAILING ADDRESS:	3801 North Hwy 14-16 Gillette, WY 82718
FACILITY LOCATION:	Wild Horse Creek CBM Facility, which is located in the SESW of Section 7, the SWNW of Section 8, the SWSW of Section 5, and the NENE of Section 6 in Township 50 North, Range 74 West; the NESE, , SWNE, and NENE of Section 14, the NESE of Section 11, the NWNW of Section 12, the NESW and SWNE of Section 7, the NWSE of Section 6, and the NESE, NENE, and SWNE of Section 2 in Township 50 North, Range 75 West; the NESE and NWNE of Section 31 in Township 51 North, Range 74 West; the NESW and SWNW of Section 35, the NWNE of Section 26, the SWNE of Section 24, the NESE, SESW, and SWSW of Section 23, the SESE of Section 22, the NWNE of Section 21, the SENW and SWNE of Section 16, the NENW and NENE of Section.15, the NWSE and NWSW of Section 10, the NWSE of Section 9, the NWSE and NENW of Section 3, the NWNW, SENW, and SWSE of Section 2, and the NWSE of Section 13 in Township 51 North, Range 75 West; the NWNW of Section 18 and the SESW of SWNW of Section 7 in Township 52 North, Range 74 West; and in the SESE and NWNW of Section 35, the NENE of Section 25, the NESE of Section 23, the SESW, NWSW, and NENW of Section 22, the SWNE of Section 16, the NESW, SWNW, NWNW, and NWNE of Section 13, and the SENE of Section 12 in Township 52 North, Range 75 West, all in Campbell County. The produced water will be discharged to the Wild Horse Creek drainage (class 3B), which is tributary to the Powder River (class 2ABWW). The permit establishes an irrigation monitoring point (IMP1), 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 16.16 MGD, and requires that the produced water being discharged by this facility originate in the Canyon, Anderson, Cook, and/or Wall coal seams.
NUMBER:	WY0051985

Note: This permit was revised following its public notice period (May 2005 WYPDES Public Notice) as follows:

1) Add Part I.A.2.e, establishing requirements for monitoring and mitigation of headcuts, where access to the affected property is granted.

2) Revise Part I.A.1, to include clarification that the permit may be re-opened if necessary in order to address downstream erosion within the drainage.

3) Reduce maximum discharge flow limit from 22.83 MGD to 16.16 MGD, based on re-evaluation by permittee of current needs in this project area.

4) Add Part I.C.2, a standard permit update establishing conditions related to reclamation performance bonds for on-channel reservoirs at CBM facilities.

5) Update Table 1 (Outfall and receiving water descriptions) to reflect changes submitted by the permittee regarding proposed reservoirs at this facility.

This permit renewal represents a consolidation of permit coverage for all current Petro-Canada CBM discharges on Wild Horse Creek. This renewal consolidates permits WY0051985, WY0039870, and WY0039853. Upon issuance of this consolidated permit renewal, permits WY0039870 and WY0039853 will be inactivated.

The following permit conditions have also been updated with this renewal:

1) Based on a site-specific irrigation study for Wild Horse Creek (referenced in the Statement of Basis below), effluent limits for EC and SAR are changed from EC = 2,000 micromhos/cm and SAR = 6 at an irrigation compliance point, to EC = 2,350 micromhos/cm and SAR = 15 at the outfalls.

2) Previous containment requirements are eliminated.

3) The pH limit is being updated to 6.5-9.0 standard units, as per the current WYPDES permitting approach for this constituent.

4) Dissolved manganese, total petroleum hydrocarbons, total radium 226, and sulfate end of pipe effluent limits and monitoring requirements are being removed from this permit as per current WYPDES permitting approaches for these constituents.

General Facility Description

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

The permittee has chosen option 2 of the coal bed methane permitting options. Under this permitting option, the produced water is immediately discharged to a class 2 or 3 receiving stream which is eventually tributary

to a class 2AB perennial water of the state. The permit establishes effluent limits for the end of pipe, which are protective of all the designated uses defined in Chapter 1 of Wyoming Water Quality Rules and Regulations. This may include drinking water, game and non-game fish, fish consumption, aquatic life other than fish, recreation, agriculture, wildlife, industry and scenic value. In addition, the permit establishes an irrigation monitoring point (IMP1 listed in Table 1 of the permit below). The irrigation monitoring point is a designated monitoring location prior to the first downstream point of irrigation diversion/use on 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.

This CBM facility is located approximately 35 stream miles from the Powder River. The permit establishes a tributary monitoring station on Wild Horse Creek (TRIB1) which will serve to monitor any CBM flows from this facility to the Powder River.

Effluent Limits

Permit effluent limits are based on federal and state regulations and are effective as of the date of issuance. The permit requires that the pH must remain within 6.5 and 9.0 standard units. The permit establishes a total barium limit of 1800 µg/l, and a total arsenic limit of 7 µg/l. The permit also establishes a chlorides limit of 150 mg/l and a dissolved iron effluent limit of 1000 µg/l. These limits are based on chronic aquatic life standards for class 2AB and 3B 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.

This permit originally established a total radium^{226} limit of 1 pCi/l, a chlorides limit of 46 mg/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 removal of the originally-established total radium^{226} 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) 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. A wasteload allocation performed using chloride concentrations within the Powder River indicates that the original permit effluent limit of 46 mg/l was overly conservative. This permit also originally established a sulfates limit of 3000 mg/l and a dissolved manganese limit of 650 µg/l at the end of pipe. Review of discharge monitoring report data for this facility and other CBM facilities in Northeast Wyoming indicates that the maximum reported concentrations for dissolved manganese and sulfates in the discharge were well below the water quality standards or water quality criteria of 3000 mg/l for sulfates and 650 µg/l for dissolved manganese, as established in Chapter 1 of the *Wyoming Water Quality Rules and Regulations*. Therefore, WDEQ has removed the effluent limits and monitoring requirements for dissolved manganese and sulfates in this permit. Based on evaluation of the available data, it is WDEQ's determination that the above changes to this permit conform 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. The Wyoming DEQ has determined that an SAR effluent limit of 15 and a specific conductance effluent limit of 2,350 micromhos/cm are appropriate for protection of agriculture use in the Wild Horse Creek drainage. These effluent limits for EC and SAR were derived using information obtained in the application for this permit

(*Section 20 Compliance Analysis for Proposed Discharges by Petro-Canada to Wild Horse Creek, Campbell County, WY;* KC Harvey, LLC, November 2005). The specific conductance limit of 2,350 micromhos/cm was derived through evaluation of the average root zone salinity in the downstream irrigated hay meadows (Floyd Ranch in Section 1 of Township 52 North, Range 76 West, Section 6 of Township 52 North, Range 75 West, and Sections 25, 26, and 36 of Township 53 North, Range 76 West). As indicated in the above referenced report, the average root zone salinity within the downstream irrigated area was measured at 4,084 micromhos c/m, with a 95 % confidence interval of +/- 552 micromhos/cm (based on the 32 samples analyzed). This means that while the sampled population indicates a mean root zone salinity of 4,084 micromhos/cm, the actual mean root zone salinity for the whole field likely falls within the range of 3,532 to 4,636 micromhos/cm. For the purpose of introducing a margin of conservatism to the calculation of irrigation effluent limits for this permit, the lower value (3,532 micromhos/cm) was assumed to be the actual mean root zone salinity for the downstream irrigated fields. In calculating an effluent limit for EC that will maintain a mean root zone salinity of 3,532 micromhos/cm in the downstream irrigated fields, 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 2,350 micromhos/cm at the outfall.

The SAR limit of 15 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 5. The mean background ESP of the downstream irrigated soils was measured at 3.9%. 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 $ESP = [(0.0366 \times SAR^2) + (0.1194 \times SAR) + 2.008]$, with a correlation value of $R^2 = 0.84$. 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 17. Again, for the purpose of introducing a margin of conservatism, the permit limits SAR to 15, rather than 17. Continued irrigation with water containing an SAR level of 15 would theoretically increase the ESP of the downstream irrigated soils from 3.9% to around 12%, which is well below the accepted 15% maximum ESP threshold necessary for maintaining soil permeability.

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

Monitoring and Reporting Requirements

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

The permit also requires sampling at a designated tributary water quality monitoring station located on the receiving stream – Wild Horse Creek, and at mainstem water quality monitoring station locations on the Powder River upstream and downstream of the Wild Horse Creek - Powder River confluence. Water quality monitoring stations on the Powder River will be located in the main channel of the Powder River outside of

the mixing zone of Wild Horse Creek and the Powder River. Effluent samples at the designated water quality monitoring stations must be collected on a monthly basis and are to be reported semiannually. Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations: designated water quality monitoring stations identified as TRIB1, UPR, and DPR in Table 1, Part I.B. 13 of the permit below. Established water quality monitoring stations on the mainstem are to be located outside the mixing zone with the tributary and the mainstem. Monthly water quality samples are to be collected at all three water quality monitoring stations when effluent from this CBM facility reaches the TRIB1 station on Wild Horse Creek. If flow occurs at the TRIB1 station during a given monthly monitoring period, but this CBM facility did not contribute to that flow, the permittee will report "did not contribute" in the discharge monitoring reports for that monthly monitoring period. Under such circumstances, sampling is not required at the three water quality monitoring stations, and it will be the responsibility of the permittee to demonstrate that the effluent from this facility did not contribute to the flow occurring at the TRIB1 station. If no flow at all occurs at the TRIB1 station for an entire monthly monitoring period, then "no flow" is to be reported and samples need not be collected at the three water quality monitoring stations for that monthly monitoring period.

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

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

Other Permit Requirements

Specialized Erosion Control Measures:

To ensure protection of water quality standards, this permit requires the permittee to monitor identified headcuts measuring two or more feet from the top of the headcut to the channel bottom, located between the outfall(s) and the Powder River. On an annual basis, these headcut(s) must be evaluated by the permittee to determine if there has been a change in either the lateral movement, or the vertical drop in the identified headcuts. Movement of headcuts will be determined using a stationary marker in the field, placed by the permittee at the initial location of the headcut. If the headcut has moved more than four (4) feet, either laterally or vertically, within a calendar year, the permittee must submit for review and approval a mitigation plan. Within three months of approval of the mitigation plan, the plan must be implemented. If the plan is not implemented, WQD may require the permittee to cease discharge from the contributing outfalls authorized by this permit until the plan is implemented. In addition to the minimum annual headcut monitoring requirements noted above for the permittee, headcuts may also be reported to WQD early at any time, and by any party.

Headcuts which are already being mitigated in conjunction with separate BLM requirements will not require a mitigation plan to be submitted in association with this permit. In addition, if the permittee demonstrates that their effluent has not reached a particular downstream headcut area, then the permittee will not be required to submit a mitigation plan for that headcut. In the absence of such a demonstration from the permittee, WQD will assume that the effluent from this facility is contributing to the headcut. If a downstream headcut is located on private property and is not contributing to a water quality violation or impairment, the upstream discharger(s) may be released from obligation to monitor and/or mitigate that headcut in the event that a written waiver is submitted to WQD from the affected landowner. The written waiver must identify on a map the specific headcut in question, and list the latitude, longitude, quarter/quarter, section, township, and range. The written waiver must also be signed by the affected landowner. In the absence of such a written waiver

from affected downstream landowner(s), the permittee is responsible for monitoring and/or mitigation of all identified downstream headcuts between the outfall(s) and the Powder River as specified above. In the event that the permittee is not granted access to downstream private property for purposes of monitoring and/or mitigation of headcuts, this permit does not require monitoring and/or mitigation of headcuts by the permittee on that particular property.

General Requirements:

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

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

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

Jason Thomas
Water Quality Division
Department of Environmental Quality
Drafted: May 5, 2006
Revised: October 19, 2006

AUTHORIZATION TO DISCHARGE UNDER THE WYOMING POLLUTANT DISCHARGE ELIMINATION SYSTEM

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

Petro-Canada Resources USA, Inc.

is authorized to discharge from the wastewater treatment facilities serving the

Wild Horse Creek CBM Facility

which is located in the

SESW of Section 7, the SWNW of Section 8, the SWSW of Section 5, and the NENE of Section 6 in Township 50 North, Range 74 West; the NESE, , SWNE, and NENE of Section 14, the NESE of Section 11, the NWNW of Section 12, the NESW and SWNE of Section 7, the NWSE of Section 6, and the NESE, NENE, and SWNE of Section 2 in Township 50 North, Range 75 West; the NESE and NWNE of Section 31 in Township 51 North, Range 74 West; the NESW and SWNW of Section 35, the NWNE of Section 26, the SWNE of Section 24, the NESE, SESW, and SWSW of Section 23, the SESE of Section 22, the NWNE of Section 21, the SENW and SWNE of Section 16, the NENW and NENE of Section 15, the NWSE and NWSW of Section 10, the NWSE of Section 9, the NWSE and NENW of Section 3, the NWNW, SENW, and SWSE of Section 2, and the NWSE of Section 13 in Township 51 North, Range 75 West; the NWNW of Section 18 and the SESW of SWNW of Section 7 in Township 52 North, Range 74 West; and in the SESE and NWNW of Section 35, the NENE of Section 25, the NESE of Section 23, the SESW, NWSW, and NENW of Section 22, the SWNE of Section 16, the NESW, SWNW, NWNW, and NWNE of Section 13, and the SENE of Section 12 in Township 52 North, Range 75 West, all in Campbell County

to receiving waters named

Wild Horse Creek drainage (class 3B), which is tributary to the Powder River (class 2ABWW)

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

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

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

John F. Wagner
Administrator - Water Quality

10/19/06
Date

John V. Corra
Director - Department of Environmental Quality

10/19/06
Date

PART I

A. 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 outfalls(s) serial numbers 001-018, 020, 021, 026, 033, 035, 037-070.

1. Such discharges shall be limited as specified below:

Effluent Limits

Effluent Characteristic	Daily Maximum Outfall
Chlorides, mg/l	150
Dissolved Iron, µg/l	1000
pH, standard units	6.5 – 9.0
Specific Conductance, micromhos/cm	2350
Sodium Adsorption Ratio, calculated as unadjusted ratio	15
Total Arsenic, µg/l	7
Total Dissolved Solids, mg/l	1567
Total Flow, MGD*	16.16
Total Barium, µg/l	1800

*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 in one or more of the following formations: the Canyon, Anderson, Cook, and/or Wall 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.

Information gathered from the water quality monitoring stations and irrigation monitoring points may result in modification of the permit, in accordance with Part III.A.3 of the permit below, to protect existing uses on the tributary and the mainstem. In addition, WQD may re-open and modify this permit, in accordance with Part III.A.3, in the event that additional or more stringent conditions are determined by WQD to be necessary for control of erosion downstream of the discharges within the Wild Horse Creek drainage.

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.

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

a. Monitoring of the initial discharge

Note: The initial monitoring requirement described below will not apply to outfalls which have already undergone sampling for these parameters under previous permit coverage.

Within 60 days of commencement of discharge following issuance of this permit renewal, 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.

Parameter* (See notes following the table on chemical states)	**Required Detection Limits and Required Units**
Alkalinity, Total	**1 mg/l as $CaCO_3$**
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**
Fluoride, Dissolved	**0.1 mg/l**
Hardness, Total	**10 mg/l as $CaCO_3$**
Iron, Dissolved	**50 µg/l**

Parameter* (See notes following the table on chemical states)	Required Detection Limits and Required Units
Lead, Dissolved	2 µg/l
Magnesium, Dissolved	100 µg/l, report as me/l
Magnesium, Dissolved	100 µg/l, report as mg/l
Manganese, Dissolved	50 µg/l
Mercury, Dissolved	1 µg/l
Nickel, Dissolved	5 µg/l
pH	to 0.1 pH unit
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 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

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 – 001-018, 020, 021, 026, 033, 035, 037-070

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.

Parameter	Measurement Frequency	Sample Type
Bicarbonate (mg/l)	Once every six months	Grab
Dissolved calcium (mg/l)	Monthly	Grab
Dissolved calcium (me/l)	Monthly	Grab
Chloride (mg/l)	Annually	Grab
Dissolved Iron (µg/l)	Once every six months	Grab
Dissolved Magnesium (mg/l)	Monthly	Grab
Dissolved Magnesium (me/l)	Monthly	Grab
pH (standard units)	Once Every Six Months	Grab
Dissolved Sodium (mg/l)	Monthly	Grab
Dissolved Sodium (me/l)	Monthly	Grab
Sodium Adsorption Ratio (unadjusted)	Monthly	Calculated
Specific Conductance (micromhos/cm)	Monthly	Grab
Total Alkalinity (mg/l)	Once Every Six Months	Grab
Total Arsenic (µg/l)	Annually	Grab
Total Barium (µg/l)	Once every six months	Grab
Total Flow - (MGD)	Monthly	Continuous
Total Recoverable Aluminum, (µg/l)	Once Every Six Months	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. Irrigation Monitoring Points (IMP1)

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.

Parameter	Measurement Frequency	Sample Type
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, unitless	Monthly	Calculated
Specific Conductance, µmhos/cm	Monthly	Grab
Bicarbonate, mg/l as $CaCO_3$	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 Wild Horse Creek below the outfalls in order to determine whether effluent discharged from the outfalls reaches the established irrigation monitoring points (IMP1 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.

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.

Parameter	Measurement Frequency	Sample Type
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 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, Part I.B.13 of the permit below for water quality monitoring station 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, Part I.B.13. 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.

e. Headcut Monitoring and Mitigation

The permittee shall monitor identified headcuts measuring two or more feet from the top of the headcut to the channel bottom, located between the outfall(s) and the Powder