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WATER QUALITY DIVISION
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**PENNACO ENERGY**

A Wholly Owned Subsidiary Of Marathon Oil Company

March 22, 2006

Jennifer Zygmunt
Wyoming Department of Environmental Quality
Water Quality Division
122 W. 25th St., Herschler Building 4-W
Cheyenne, WY 82002

RE: Additional modification requests to be included in Constituent Modification for NPDES Permit #WY0039616
Option 2- On Channel Impoundments
Railroad POD, Powder River Basin
Pennaco Energy, Inc.

Dear Ms. Zygmunt:

Enclosed is supplemental information for Pennaco Energy, Incorporated's (Pennaco's) application for a Major Modification submitted December 30th of 2005. This supplemental information supports Pennaco's plan to expand development of Coal Bed Methane production at this POD. Specifically this package contains information to increase the permitted flow limit, increase the number of permitted discharge locations and add wells to the permit.

The specifics of these changes are listed on the following pages

- Item # 7 Water balance and maximum permitted flow (pgs 10-17)
- Item # 8 Topographical map (pg 19)
- Item # 12 Additional proposed discharge points (pg 21)
- Item # 13 Additional proposed Well list (pg 27)
- Item # 15 Proposed and Existing CBM well flow rates (pgs 33-37)

This supplemental information for Option 2 impoundments includes the addition of 17 new outfalls and 17 new on-channel water impoundments. A companion permit application is being prepared for Option 1A off-channel impoundments at the Railroad POD to fulfill water production requirements.

The water balance presented with this supplemental includes both the Option 2 and Option 1A impoundments and future and existing CBM wells for the POD. This revised water balance incorporates water balance data for existing impoundments and proposed impoundments.

Mixing and stormwater runoff calculations are presented for four new on-channel reservoirs. Please refer to the existing permit for these calculations for existing reservoirs.

A revised map for the POD's water facilities is enclosed and an expanded list of outfalls is provided in Table 1. The list of CBM wells (Table 2) has been revised to include 20 new CBM wells and updated (year 2005) laboratory data are enclosed for CBM produced water.

Expected Well Production (Table 3A) has been revised based on new well production data for the POD and past well production data are presented on Table 3B. Our documentation of Beneficial Uses of CBM water remains unchanged.

Please feel free to contact Greg Smith, Jake Stroupe or David Hill at the address listed above or jstroupe@marathonoil.com if you have questions regarding this application.

Sincerely,

Pablo Velasquez
Operations Manager
Pennaco Energy, Inc.

EXHIBIT C

3601 Southern Drive • Gillette, WY 82718 • Telephone 307/685-5100 • Fax 307/682-7621

**SUBMIT IN TRIPLICATE**

**For Agency Use Only**

Application Number

WY00-

Date Received:

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WATER QUALITY DIVISION
WYOMING

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**
**APPLICATION FOR PERMIT TO SURFACE DISCHARGE PRODUCED WATER FROM COAL BED METHANE NEW DISCHARGES, RENEWALS, OR MAJOR MODIFICATIONS**

Revised 12-19-03

**PLEASE PRINT OR TYPE**

1. Check the box corresponding to the type of application being applied for

☐ New CBM permit

☐ CBM permit renewal Permit number _____

☒ CBM permit major modification Permit number **WY0039616**

2. Select a permit option

☐ Option 1A - complete containment to an off-channel man made containment unit(s) (class 4C), no discharge allowed to surface waters of the state outside the containment unit.

☐ Option 1B - complete containment to a natural closed basin or playa lake (class 3A), no discharge allowed to surface waters of the state outside the basin or playa.

☐ Option 2 - surface discharge to class 2 or 3 receiving stream of the Belle Fourche River or Cheyenne River drainage (class 2ABWW).

☒ Option 2 - surface discharge to class 2 or 3 receiving stream of the Powder River or Little Powder Rivers (class 2ABWW).

☐ Option 2 – surface discharge to class 2 or 3 receiving streams of the Tongue, Clear Creek, or Crazy Woman Creek (class 2AB)– this option requires the permittee to demonstrate that quality of the effluent at the discharge point is equal to or better than the ambient quality of the perennial class 2 receiving water.

3. Name, mailing address, e-mail address, location and telephone number of the individual or company which owns the facility producing the discharge.

**Name:** Pennaco Energy, Inc.
**Street Address:** 3601 Southern Drive
**City, State, and Zip Code:** Gillette, WY 82718
**Telephone Number:** (307) 685-5100
**E-Mail Address:** PVelasquez@MarathonOil.com

4. Name(s) and mailing address(es) of owner(s) of the surface rights on whose land the discharge occurs (in cases where the land is owned by the state or federal government but surface rights are leased to a private individual, provide lessee's name and address)

   1. **Name:** Fred and Darleen Floyd
      **Street Address:** 2600 West Echeta Road
      **City, State, and Zip Code:** Gillette, WY 82716
      **Telephone Number:** (307) 736-2231

   2. **Name:** Robert I and Patricia M Laramore
      **Street Address:** 2690 West Echeta Road
      **City, State, and Zip Code:** Gillette, WY 82716
      **Telephone Number:** (307) 736-2228

5. Name of the facility producing the discharge (this is the facility name that will appear on the NPDES permit. It is not necessary to name every well contributing to this facility's discharge in this section)

   **Railroad POD**

6. For Option 1A or 1B permit, attach a water balance that demonstrates, considering total maximum projected discharge inflows, natural precipitation, evaporation and infiltration, that the containment unit will be adequately sized to contain all projected discharge and stormwater runoff from a 100 year, 24 hour storm event. If actual flow rates are available, use the maximum flow rate from all active wells within the previous six months of operation in the water balance.

   **N/A**

7. For an Option 2 permit utilizing on-channel reservoirs, attach a water balance and mixing analysis documenting the amount of CBM discharge that, under normal operating conditions, can be contained within the reservoirs, the amount and circumstances under which the reservoirs will discharge, and the expected water quality upon discharge from the reservoirs.

   **Based on the water balance attached for Item 7 the requested maximum CBM discharge rate is 99,048 barrels per day or 4,160,016 gallons per day for the Railroad POD.**

8. Attach a description and a clear, legible, detailed topographic map of the discharging facility. Include the following:
   a. A legend
   b. Well locations
   c. Ponds
   d. Reservoirs
   e. Stock tanks
   f. Discharge points (outfalls)
   g. Immediate receiving streams
   h. Water quality monitoring stations
   i. Irrigation compliance points
   j. Location of nearest downstream irrigator.
   k. Section, Township, and Range information

   *If any of the above are not applicable please indicate in the description and include a brief explanation as to why the item is not applicable)*

   **See Figure 1 for Item 8.**

9. Describe the control measures that will be implemented to prevent significant damage to or erosion of the receiving water channel at the point of discharge.

**Pennaco Energy, Inc. will construct erosion control structures at the outfall such as riprap and/or geotextile/geomembrane. These structures will dissipate energy and promote aeration of produced water. These measures are intended to control erosion and reduce the dissolved iron concentration prior to outfall water mixing with receiving waters of the state.**

10. Describe the control measures that will be implemented to achieve water quality standards and effluent limits. If proposing to utilize a treatment process, provide a detailed description of the treatment process, including, but not limited to: Water quality analyses demonstrating the effluent quality before and after treatment; waste stream volumes and planned method of disposal; aquatic life toxicity data for any chemicals being used in the treatment process; description of how the chemicals will be handled at the facility and the potential for any impacts to waters of the state in the event of a spill; and diagrams of the facility indicating the water treatment path. Additional sheets and diagrams may be attached.

**Pennaco does not expect violations of Water Quality Standards based on previous monitoring and compliance at current outfalls. To act in good faith to minimize potential downstream impacts, Pennaco will direct any discharge onto a riprap surface underlain by an impermeable geotextile. This will provide additional aeration to aid in the precipitation and trapping of iron and other salts from the produced CBM water. New outfall construction practices are being utilized to maximize aeration and precipitation of iron and radium. Lined treatment paths are being extended to remove iron precipitates.**

11. Outfall locations must be established as part of a preliminary field reconnaissance survey using GPS or conventional survey equipment and documented in Table 1. Please document the type of equipment used, the expected accuracy of your measurements, and a brief rationale for locating the outfalls at the requested sites below.

**Outfalls associated with this modification will be constructed at locations reviewed by the landowner. These outfalls are listed on Table 1 and shown on Figure 1. Field personnel using hand-held GPS units with accuracies ranging from 7 to 22 feet verified the impoundment locations and coordinates. Outfall location coordinates were measured from reservoir design drawings using topographic surface elevations.**

12. Complete the attached **Table 1.** Provide all the information in the table for each proposed discharge point or monitoring point. If proposing changes (a major modification) to an existing facility, clearly indicate the desired changes on the table. Additional tables may be attached. Use the format provided.

**Please see attached Table 1 for Item 12: Outfall Information for On-Channel Reservoirs-Railroad POD. Also attached is Table 1 from permit #WY0039616, which lists proposed outfalls and existing outfalls from August 30, 2004.**

13. Complete the attached **Table 2.** Provide all the information in the table for each well associated with this proposed discharge authorization. If proposing changes (a major modification) to an existing facility, clearly indicate the desired changes on the table. Additional tables may be attached. Use the format provided.

**Please see Table 2 for Item 13: CBM Well Information-Railroad POD**

14. Provide the results of water analyses for a sample collected from a location representative of the quality of the water being proposed for discharge for the 25 chemical parameters listed below. The sample must be collected from well(s) or outfall(s) within a twenty-mile radius of the proposed facility's location, and from the same coal formation(s) and the same approximate depth(s) as proposed in this application. If filing an application for a permit renewal or modification, the representative sample must be collected from the facility being proposed for renewal or modification. Explain why this sample is representative of the produced water to be discharged.

**The chemical analysis for CBM water produced from multiple wells at the Railroad POD is listed on the attached laboratory report. This co-mingled sample was collected from the water gathering line for the POD in 2005. These data are representative of groundwater produced from the Anderson, Canyon, Wall, and Pawnee coal seams.**

*Samples from co-mingled coal seams are acceptable as long as the sample(s) meet the following criteria:*

*A. all of the coal seams being proposed for development are represented in the co-mingled sample,*

*B. the ratio of each coal seam's contribution is approximately the same in the sample and the proposed development,*

*C. documentation is provided to verify the criteria listed in A. and B.*

The analyses must be conducted in accordance with approved EPA test procedures (40 CFR Part 136). Include a signed copy of your lab report that includes the following:

**a.** detection limits
**b.** results of each of the 25 chemical parameters at the chemical state given below
**c.** quarter/quarter, section, township and range of the sample collection location
**d.** Time and date of sample collection
**e.** Time and date of analysis for each parameter
**f.** Analyst's initials for each parameter
**g.** Detection limit for each parameter as achieved by the laboratory
**h.** NPDES permit number and outfall number, where the sample was collected.
**i.** Origin of produced water (coal seam)

If more than one coal seam is being proposed for development, the permittee must submit a lab analysis and complete information characterizing water quality from each coal seam being proposed for development. If the permittee is proposing to include discharges from a coal seam not previously developed at this facility, the permittee must submit a lab analysis and complete information characterizing water quality from the new coal seam being proposed for development. Analyses must be provided in the units listed below.

| 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, Total | 50 µg/l, report as meq/l |
| Calcium, Total | 50 µg/l, report as mg/l |
| Chlorides | 5 mg/l |
| Chlorides | 5 mg/l |
| Copper, Dissolved | 10 µg/l |
| Dissolved Solids, Total | 5 mg/l |
| Hardness, Total | 10 mg/l as $CaCO_3$ |
| Iron, Dissolved | 50 µg/l |
| Lead, Dissolved | 2 µg/l |
| Magnesium, Total | 100 µg/l, report as meq/l |
| Magnesium, Total | 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 |
| Selenium, Total Recoverable | 5 µg/l |
| Sodium Adsorption Ratio | Calculated as unadjusted ratio |
| Sodium, Total | 100 µg/l, report as meq/l |
| Sodium, Total | 100 µg/l, report as mg/l |
| Specific Conductance | 5 micromhos/cm |
| Sulfates | 10 mg/l |
| Zinc, Dissolved | 50 µg/l |

**Discharges into drainages other than the Powder River geologic basin may require analysis of additional parameters, please contact the WDEQ for a separate list.*

15. For new facilities, provide the expected (estimated) flow volume from each well in gallons per day, and provide the rationale behind the flow volume estimate. For existing facilities, provide actual flow data from all wells within the last six months.

**The average flow rate for new outfalls is presented in Table 3A for Item 15. Data in this table represent the well flow rates over time and is based on a Fekete ™ well production curve. The average flow rate during the first two years of well operation is representative of the average per well production rate for the POD.**

**Table 3B for Item 15 represents actual flow data for operating CBM wells at the Railroad POD over the last six months (July 2005 through December 2005).**

16. For applications for new facilities, are any of the required chemical constituents in the laboratory analysis present in concentrations above Wyoming Water Quality Standards?

☐ YES ☒ NO

If the answer to question # 16 is yes, answer 16.a. – 16.b below. If no, proceed to question 18.

a. Which constituents? **N/A**
b. Has this constituent been addressed in the response to question 10? **N/A**

17. For applications for existing facilities, has the facility ever exceeded permit limits or water quality standards?

☐ YES ☒ NO

If the answer to question 17 is yes, answer 17.a. – 17.b. If no, proceed to question 18.

a. Which constituents? **N/A**
b. Has the exceedance been addressed? **N/A**
c. Describe how the exceedance is being addressed. **N/A**

18. Is there active irrigation, (including but not limited to irrigation of cultivars or flood irrigation) in the drainage of the discharge?

☒ YES ☐ NO

If the answer to question #18 is yes, then documentation demonstrating one of the following must be provided:

A. Effluent will meet SAR and specific conductance (EC) values that are equal or of better quality to ambient values in the mainstem or highest quality receiving stream; or
B. Demonstrate that a higher level of EC and SAR at the point of irrigation diversion can be tolerated by irrigated soils and crops without a significant reduction in crop yield and soil quality/permeability.

This information should include, but is not limited to the following:

a. Location and description of irrigated crop land between the discharge points and mainstem, including maximum local tolerance thresholds to SAR, EC, and sodium of each crop.
b. Description of irrigation practices including when and how frequent irrigation occurs.
c. Soil characteristics for each area where irrigation occurs which includes: Classification of soils and soil type (i.e. sandy loam, clay, etc.) Composition of soils (% clay, silt, sand), type of soils, texture and permeability
d. Baseline soil parameters in all actively irrigated areas, which includes soil SAR, EC, Na, Mg, Ca, permeability, and exchangeable sodium percentage (ESP).
e. Determine the maximum SAR and EC of water that can be applied to the least tolerant and most sensitive identified irrigated soil type and crop, which would not result in a short and/or long-term reduction in soil infiltration/permeability or yield.
f. Provide the location (township, range, section, quarter/quarter and lat/long coordinates) of point(s) upstream from the first downstream point of irrigation diversion/use between the outfalls and mainstem and/or provide the location(s) of the irrigation diversion/use that requires the least flow to operate.
g. An evaluation that demonstrates the proposed discharge will be in compliance with Section 20, Chapter 1 of the Wyoming Water Quality Rules and Regulations.

h. If necessary to protect irrigated crops and/or soils, describe changes that must be made in traditional irrigation practices to protect downstream irrigation activities.
i. A monitoring plan, if necessary to gauge changes in water/soil quality and make adjustments before substantial reduction in crop production and soil permeability would occur.
j. Citations of reference for all the above information must be provided.

**For question 18B, a-j, please refer to the tributary study submitted with permit #WY0047805 - West Kitty #2 Facility, by Devon Energy Production Co., L.P. This study sites the first downstream irrigation diversion on Wild Horse Creek (WHC) at Township 54, Range 76.**

19. Name(s) and address(es) of all downstream irrigators between the outfalls and the mainstem must be provided.

**Name:** Clabaugh, Kenny, Clabaugh Ranch
**Street Address:** P.O. Box 12
**City, State, and Zip Code:** Arvada, WY 82831
**Telephone Number:** 307-736-2222

20. Section 40 CFR Part 435 Subpart E requires that the permittee document agricultural and wildlife uses of produced water. Provide documentation that the produced water will be used for agriculture or wildlife during periods of discharge. Agriculture and wildlife use includes irrigation, livestock watering, wildlife watering and other agricultural uses. Agricultural and wildlife use documentation includes (but is not limited to) a certified letter from a landowner(s), a formal written statement from a state, federal or local resource management agency, or a formal written statement with supporting documentation from a natural resources or environmental professional accompanied by the credentials of the natural resources or environmental professional. Agriculture and wildlife use documentation must be provided for each outfall included in the application. Agricultural and wildlife certification must be submitted for each outfall's discharge, and must have original signatures.

**Please see documentation of Beneficial Uses of CBM Water for item 20 attached**

I (CEO or other authorized person) certify that I am familiar with the information contained in this application and that to the best of my knowledge and belief, such information is true, complete, and accurate. I am requesting 17 outfalls in this application.

PABLO VELASQUEZ — Printed Name of Person signing*

OPERATIONS MANAGER — Title*

Signature — Date

MARCH 22, 2006

*All permit applications must be signed in accordance with 40 CFR Part 122.22, "for" or "by" signatures are not acceptable.

Section 35-11-901 of Wyoming Statutes provides that:
Any person who knowingly makes any false statement, representation, or certification in any application ... shall upon conviction be fined not more than $10,000 or imprisoned for not more than one year, or both.

Mail this application to:

NPDES Permits Section
Department of Environmental Quality/WQD
122 West 25th Street, Herschler Building, 4W
Cheyenne, WY 82002

*Please include unique footer information on each page of this application and on all supporting documentation using the following format:*
*Company Name: Year/Month/Day/NEW, MOD, RENEWAL/10 Digit HUC Code/Permit # (if a modification or renewal) or Application # (from this particular company) for that particular day*