

**FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Yates Petroleum Corporation
Moolah POD**

ENVIRONMENTAL ASSESSMENT –WY-070-07-076

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Yates Petroleum Corporation’s Moolah POD Coal Bed Natural Gas (CBNG) POD comprised of the following 18 Applications for Permit to Drill (APDs) and a Right-Of-Way Grant for a water line, as follows:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	MOOLAH CS COM	1	SWNW	20	55N	74W	WYW129532
2	MOOLAH CS	4	SWSE	20	55N	74W	WYW129532
3	MOOLAH CS	3	SWSW	20	55N	74W	WYW129532
4	MOOLAH CS	2	NESW	20	55N	74W	WYW129532
5	MOOLAH CS	5	NESE	21	55N	74W	WYW129532
6	MOOLAH CS	17	NESE	22	55N	74W	WYW129532
7	MOOLAH CS	6	NENW	27	55N	74W	WYW129532
8	MOOLAH CS	7	SWNW	27	55N	74W	WYW129532
9	MOOLAH CS FEDERAL	8	NESW	27	55N	74W	WYW129532
10	MOOLAH CS	9	SWSW	27	55N	74W	WYW129532
11	MOOLAH CS COM	11	NESE	28	55N	74W	WYW129532
12	MOOLAH CS COM	12	NESW	28	55N	74W	WYW129532
13	MOOLAH CS	10	NENE	28	55N	74W	WYW129532
14	MOOLAH COIN CS COM	1	SWNW	29	55N	74W	WYW146804
15	MOOLAH CS COM	13	NENE	29	55N	74W	WYW129532
16	MOOLAH CS COM	15	NESE	29	55N	74W	WYW129532
17	MOOLAH CS COM	16	NESW	29	55N	74W	WYW129532
18	MOOLAH CS	14	NENW	29	55N	74W	WYW129532

The following impoundments were approved as part of the water management plan for this project:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
1	Bank	SWSW	27	55	74	WYW129532
2	Big Bucks	NENW	33	55	74	FEE
3	Big Does	NWNE	33	55	74	FEE
4	Dinero	SENE	27	55	74	FEE
5	Enlargment of Jim's	NENW	34	55	74	WYW132918
6	Loaded	NWSW	27	55	74	WYW129532
7	Pitch Fork	NENE	27	55	74	FEE

R-O-W Grant Information: There is one R-O-W Grant, a 4 inch, polymer water pipeline.

<u>R-O-W Grant</u>	<u>Type</u>	<u>Length/Acres of Disturbance</u>	<u>Section</u>	<u>TWP/RNG</u>
WYW 169739	Water Pipeline	1,714 feet by 30 feet wide = 1.180 acres	27	T55N/R74W

This approval is subject to adherence with all of the operating plans and mitigation measures contained in

the Master Surface Use Plan of Operations, Drilling Plan, Water Management Plan, and information in individual APDs. This approval is also subject to operator compliance with all mitigation and monitoring requirements contained within the Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003.

RATIONALE: The decision to authorize Alternative C, as described in the attached Environmental Assessment (EA), is based on the following:

1. The Operator, in their POD, has committed to:
 - Comply with all applicable Federal, State and Local laws and regulations.
 - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
 - Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
 - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.

FINDING OF NO SIGNIFICANT IMPACT: Based on the analysis of the potential environmental impacts, I have determined that NO significant impacts are expected from the implementation of Alternative C and, therefore, an environmental impact statement is not required.

ADMINISTRATIVE REVIEW AND APPEAL: Under BLM regulations, this decision is subject to administrative review in accordance with 43 CFR 3165. Any request for administrative review of this decision must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this Decision Record is received or considered to have been received.

Any party who is adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: _____ Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Yates Petroleum Corporation
Moolah POD
PLAN OF DEVELOPMENT
WY-070-07-076**

INTRODUCTION

This site-specific analysis tiers into and incorporates by reference the information and analysis contained in the Powder River Basin Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS), #WY-070-02-065 (approved April 30, 2003), pursuant to 40 CFR 1508.28 and 1502.21. This document is available for review at the Buffalo Field Office. This project EA addresses site-specific resources and/or impacts that are not covered within the PRB FEIS.

1. PURPOSE AND NEED

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on two valid federal oil and gas mineral leases issued to the applicant by the BLM. Analysis has determined that federal CBNG is being drained from the federal leases by surrounding fee or state mineral well development. The need exists because without approval of the Applications for Permit to Drill (APDs), federal lease royalties will be lost and the lessee will be deprived of the federal gas they have the rights to develop.

1.1. Conformance with Applicable Land Use Plan and Other Environmental Assessments:

The proposed action is in conformance with the terms and the conditions of the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office (BFO), April 2001 and the PRB FEIS, as required by 43 CFR 1610.5

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

A No Action Alternative was considered in the PRB FEIS, Volume 1, pages 2-54 through 2-62. This alternative would consist of no new federal wells. An oil and gas lease grants the lessee the “right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits” in the lease lands, “subject to the terms and conditions incorporated in the lease.” Thus, under this alternative, the operator’s proposal would be denied.

2.2. Alternative B Proposed Action

Description of the Proposed Action

Proposed Action Title/Type: Yates Petroleum Corporation’s Moolah POD Plan of Development (POD) for 18 coal bed natural gas well APD’s, a Right-Of –Way Grant for a water line and associated infrastructure.

Proposed Well Information: There are 18 wells proposed within this POD, as follows:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	MOOLAH CS COM	1	SWNW	20	55N	74W	WYW129532
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The following impoundments were proposed as part of the water management plan for this project:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
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6	Loaded	NWSW	27	55	74	WYW129532
7	Pitch Fork	NENE	27	55	74	FEE
8	Greenback	SWNW	27	55	74	FEE

R-O-W Grant Information: There is one R-O-W Grant, a 4 inch, polymer water pipeline.

<u>R-O-W Grant</u>	<u>Type</u>	<u>Length/Acres of Disturbance</u>	<u>Section</u>	<u>TWP/RNG</u>
WYW 169739	Water Pipeline	1,714 feet by 30 feet wide = 1.180 acres	27	T55N/R74W

County: Campbell

Applicant: Yates Petroleum Corporation

Surface Owners: BLM, Sharp Ranch, Sorenson Family Land Et.al., Howard & Myra Spellman, Avonne Amende Family Trust, Rule Trust; C/O 1st Interstate Bank Trust Dept.

The proposed action includes the following:

- Drilling of 18 wells are proposed to be single well bores for each location in which subsurface commingling is proposed for the Upper and Lower Canyon, Cook, and Wall coal zones to depths from approximately 500 to 1300 feet.. Multiple wells within the same quarter-quarter are not proposed (e.g. twin or triplet wells).
- An unimproved and improved road network.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 8 discharge points and 8 stock water reservoirs that will provide full containment of CBNG discharge waters within the Middle Powder River watershed.
- A buried gas, water and power line network, and 1 screw compressor.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan (MSUP), Drilling Plan and WMP(WMP) in the POD and individual APDs. Also see the subject POD and/or APDs for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

Implementation of committed mitigation measures contained in the MSUP, Drilling Program and WMP, in addition to the Standard COA contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

Additionally, the Operator, in their POD, has committed to:

1. Comply with all applicable Federal, State and Local laws and regulations.
2. Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
3. Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
4. Provide water analysis from a designated reference well in each coal zone.

The Operator has certified that a Surface Use Agreement has been reached with the Landowners.

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be reduced. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate or reduce environmental impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator’s proposal. The specific changes identified for the Moolah POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

1. Moved well Moolah CS #2 and infrastructure approximately 500 yards NE, out of steep hills.
2. Moved well Moolah CS #3 approximately 300' West, to a flatter spot to reduce surface disturbance.
3. Rerouted route to wells Moolah CS # 7 & Moolah CS Federal #8 to reduce surface disturbance.
4. Moved proposed route to follow an existing route to the newly installed "Emergency Tower".
5. Moved well Moolah CS #10 approximately 160' North off a steeper slope to a flatter location.
6. Greenback Reservoir was dropped from the WMP due to the close proximity of a domestic water well.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

Programmatic mitigation measures are those, determined through analysis, which may be appropriate to apply at the time of APD approval if site specific conditions warrant. These mitigation measures can be applied by BLM, as determined necessary at the site-specific NEPA APD stage, as COAs and will be in addition to stipulations applied at the time of lease issuance and any standard COA.

2.3.2.1. Groundwater

1. In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the latest DEQ standards and monitoring guidance.

2.3.2.2. Surface Water

1. Channel Crossings:
 - a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
 - b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
 - c) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
 - d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
3. Concerns regarding the quality of the discharged CBM water on downstream irrigation use may require operators to increase the amount of storage of CBM water during the irrigation months and allow more surface discharge during the non-irrigation months.
4. The operator will be required to provide a reclamation bond for impoundments over federal minerals

in the amount specified by a qualified Professional Engineer for the impoundments to be used for the management of CBNG water. The bond amount will be approved by the BLM prior to POD approval.

5. The operator will supply a copy of the complete approved SW-4, SW-3, or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.
6. The operator will supply to the BLM copies of the WYPDES permits for this POD as soon as they are available from WDEQ.

2.3.2.3. Soils

1. The Companies, on a case by case basis depending upon water and soil characteristics, will test sediments deposited in impoundments before reclaiming the impoundments. Tests will include the standard suite of cations, ions, and nutrients that will be monitored in surface water testing and any trace metals found in the CBM discharges at concentrations exceeding detectable limits.

2.3.2.4. Wetland/Riparian

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance can not occur, the minimum number of poles necessary to cross the area will be used.
2. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.
3. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.
4. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.5. Wildlife

1. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
2. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
3. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.
4. The Companies will locate impoundments to avoid sagebrush shrublands, where practical. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.
5. The Companies will limit the construction of aboveground power lines near streams, water bodies, and wetlands to minimize the potential for waterfowl colliding with power lines.
6. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho

BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

7. Additional measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse effect on a Threatened, Endangered, Proposed, or Candidate species or their habitat.

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of the APD/POD or Sundry Notices.
2. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a BLM approved biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.
3. A disturbance-free buffer zone of at least 0.5 mile will be established year round for all bald eagle nests. This buffer may be adjusted based on topographic features, visibility, disturbance and human activity levels, land use plans, and other factors. A seasonal minimal disturbance buffer zone of at least 1-mile will be established for all bald eagle nest sites (February 1 – August 15). These buffer zone restrictions will be based on site specific information and coordinated with the Service's Wyoming Field Office which will provide written agreement. Note: Although active bald eagle nests occur throughout the project area; they are more concentrated along Clear Creek, Piney Creek, Powder River, and Tongue River.
4. A year-round disturbance-free buffer zone of at least 0.5 mile will be established year round for all bald eagle roost sites. This buffer may be adjusted based on topographic features, visibility, disturbance and human activity levels, land use plans, and other factors. A seasonal minimal disturbance buffer zone of at least 1-mile will be established for all bald eagle roost sites (November 1 – April 15). These buffer zone restrictions will be based on site specific information and coordinated with the Service's Wyoming Field Office which will provide written agreement. Note: Although active bald eagle roosts occur throughout the project area; they are more concentrated along Clear Creek, Piney Creek, Powder River, and Tongue River.
5. Weed treatment and limited reclamation activities (i.e. seeding) may occur within a 0.5 to 1.0 mile radius of active bald eagle nests between May 15 and June 15. Operators must contact the authorizing agency who will coordinate with and receive written confirmation from the Service before application of this measure. Eaglets at two weeks of age are able to thermoregulate and are able to survive periods when the adult is off the nest due to temporary disturbance (Bortolotti 1984, Watson and Rodrick 2001, Watts et. al. 2004). Just before fledging, eaglets are sensitive to disturbance and can be frightened off the nest before being able to fly (Watson and Rodrick 2001). Eaglets within the Powder River Basin typically reach two weeks of age by the middle of May and fledge in early July.

2.3.2.6.2. Black-footed Ferret

1. Prairie dog colonies will be avoided wherever possible.

2.3.2.6.3. Mountain Plover

1. Project-related features that encourage or enhance the hunting efficiency of predators of mountain

plover will not be constructed within ¼ mile of known mountain plover nest sites.

2. Construction of ancillary facilities (for example, compressor stations, processing plants) will not be located within ½ mile of known nesting areas. The threats of vehicle collision to adult plovers and their broods will be minimized, especially within breeding aggregation areas.
3. Where possible, roads will be located outside of plover nesting areas.
4. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.
5. The BLM will monitor all road-associated carcasses, jackrabbit sized and larger, along project (operator-maintained) roads. The presence of carrion could attract mountain plover predators.
6. Project related features that encourage or enhance the hunting efficiency of avian mountain plover predators shall not be constructed within 0.5 mile of documented mountain plover nesting habitat. Creation of hunting perches or nest sites for avian predators within 0.5 of identified nesting areas shall be avoided by burying powerlines, using the lowest possible structures for fences and other structures, and by incorporating perch-inhibiting devices into their design. No capped and abandoned well markers within 0.5 mile of mountain plover nesting areas shall be taller than 4 feet or will have perch inhibiting devices installed to avoid creating raptor hunting perches.
7. When above ground markers are used on capped and abandoned wells they will be identified with markers no taller than four feet with perch inhibiting devices on the top to avoid creation of raptor hunting perches within 0.5 mile of nesting areas.
8. 14. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.
9. 15. To minimize destruction of nests and disturbance to breeding mountain plovers from reclamation activities, no grading, seeding, or other ground-disturbing activities shall occur from April 10 to July 10 unless surveys consistent with the most recent approved mountain plover survey guidelines (currently USFWS 2002) find that no mountain plovers are nesting in the area.

2.3.2.6.4. Ute Ladies'-tresses Orchid

1. Suitable habitat will be avoided wherever possible. If suitable habitat for Ute ladies'-tresses cannot be avoided, surveys will be conducted in compliance with USFWS standards (USFWS 1995) by a BLM approved biologist or botanist. Surveys can only be conducted between July 20 and August 31.
2. If reclamation or weed treatment is proposed within suitable Ute ladies'-tresses habitat and during the orchid's growing season (July 1 – September 30) then a survey for the orchid, according to FWS protocol, shall be conducted prior to treatment. If any orchids are found, in order to minimize potential effects, the Service shall be consulted with prior to implementation.

2.3.2.7. Noise

1. Noise mufflers will be installed on the exhaust of compressor engines to reduce the exhaust noise.
2. Where noise impacts to existing sensitive receptors are an issue, noise levels will be required to be no greater than 55 decibels measured at a distance of one-quarter mile from the appropriate booster

(field) compressor. When background noise exceeds 55dBA, noise levels will be no greater than 5dBA above background. This may require the installation of electrical compressor motors at these locations.

2.3.2.8. Air Quality

1. During construction, emissions of particulate matter from well pad and resource road construction will be minimized by application of water, or other dust suppressants, with at least 50 percent control efficiency. Roads and well locations constructed on soils susceptible to wind erosion could be appropriately surfaced or otherwise stabilized to reduce the amount of fugitive dust generated by traffic or other activities, and dust inhibitors (surfacing materials, non-saline dust suppressants, and water) could be used as necessary on unpaved collector, local and resource roads that present a fugitive dust problem. The use of chemical dust suppressants on BLM surface will require prior approval from the BLM authorized officer.

2.3.3. Site specific mitigation measures

All changes made at the onsite will be followed. They have all been incorporated into the operator’s POD.

1. Access to wells Moolah CS # 7, Moolah CS Federal # 8 and Moolah CS Com #11(accesses between S.U. 1 and 3) will be used by PU trucks or smaller rigs. Larger rigs will access these wells from the access going south from the Moolah CS # 7 well. Access roads will be signed indicating this COA.
2. Minimize sagebrush disturbance widths to 25 feet or less on corridors to wells Moolah CS COM #13 and Moolah CS #14.
3. All four, “No Access” road sections need to be signed “No Access”.
4. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates “Standard Environmental Colors.” The color selected for the Moolah POD is Covert Green, 18-0617TPX.
5. The operator will drill seed on the contour to a depth of 0.5 inch or less and/or surface apply, depending on species, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

SEED MIX: See Below

15 to 17” Precipitation Zone, Loamy/Clayey Sites (Includes Shallow sites):

Species - Cultivar	% in Mix	Lbs PLS*/acre
Thickspike Wheatgrass – <i>Critana</i> OR Western Wheatgrass - <i>Rosana</i>	35	4.2
Bluebunch Wheatgrass – <i>Secar or P-7</i>	15	1.8

Species - Cultivar	% in Mix	Lbs PLS*/acre
Green needlegrass - <i>Lodorm</i>	25	3.0
American vetch OR Cicer Milkvetch - <i>Lutana</i>	10	1.2
White – <i>Antelope</i> or Purple Prairie Clover - <i>Bismarck</i>	5	.60
Lewis - <i>Appar</i> , Blue, or Scarlet flax	5	.60
Winterfat – <i>Open Range</i>	5	.60
Totals	100%	12 lbs/acre

*PLS = pure live seed

*Northern Plains adapted species

*Double this rate if broadcast seeding

*Varieties planted will be “suitable/adaptable” to Powder River Basin

Wildlife COAs

1. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, “The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time” (M32). The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, Yates will coordinate with the BLM to determine if additional resurvey will be required.
2. No surface disturbing activities are permitted in suitable mountain plover habitat, from March 15-July 31 annually, unless a mountain plover survey has been conducted during the current breeding season. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following proposed wells and their associated infrastructure:

Township/Range	Section	Affected Wells and Infrastructure
T55N, R74W	34	Main gas and water line in Section 34 that runs north to south towards Highway 14/16. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.

The surveys will be conducted in suitable habitat (i.e. prairie dog colonies, roads, pipelines, reservoirs under construction and any short grass prairie area) throughout the entire project area.

- a. Mountain plover nesting surveys shall be conducted by a biologist following the most current U.S. Fish and Wildlife Service Mountain Plover Survey Guidelines (the survey period is May 1-June 15). All survey results must be submitted in writing to the BFO and approved prior to initiation of surface disturbing activities.
- b. If a mountain plover is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then

surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).

3. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following proposed wells and their associated infrastructure:

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
T55N, R74W	20	MOOL 1, MOOL 2, MOOL 3 and associated infrastructure. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.
T55N, R74W	22	17 MOOL and associated infrastructure. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.
T55N, R74W	26	Access road in Section 26, Pitch Fork Res, Dinero Res.,
T55N, R74W	30	Main access road in Section 30 and Big Bucks Res.

- a. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
- b. Nest productivity checks shall be completed for the first five years following project completion. The productivity checks for burrowing owls shall be conducted no earlier than July 1 or later than July 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. Nests to be checked are within a ½ mile or less of the proposed development. The nests are listed below:

BLM ID #	UTM N	UTM E	Legal
New (BUOW)	4950829	438444	T55N, R74W Sec 28/30

- c. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
 - d. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.
4. No surface disturbing activities are permitted within 2 miles of the following leks: Spotted Horse, Case II, Case III, and Wolfe between March 1 and June 15, prior to completion of a greater sage-grouse lek survey. As of the 2006 survey no proposed infrastructure will be affected.
 - a. If an active sage grouse lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during

the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.

- b. Creation of raptor hunting perches will be avoided within 0.5 mile of documented sage grouse and sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage-grouse.
 - c. Access road/pipeline to the MOOL 13 well and the MOOL 14 well will not exceed 25 feet maximum width.
 - d. Brush hogging around well sites will not be shorter than 6 inches.
5. If a new sharp-tailed grouse lek is identified during the survey, the 0.67 mile timing restriction (March 1 to June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the buffer until the following breeding season. The required survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
- a. Creation of raptor hunting perches will be avoided within 0.5 mile of documented sage grouse and sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sharp-tailed grouse.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 7/24/2006. Field inspections of the proposed Moolah POD CBNG project were conducted on 11/7 and 11/13/2006 by Mr. and Mrs. Sharp, Mr. and Mrs. Sorenson, Jim and John Spellman-Landowners, Bob Irwin, Jim Nies, John Melgard, Don Nygard-Yates Petroleum Reps. and Dan Sellers, Clint Crago, Chris Williams and Guymen Easdale-BLM.

This section describes the environment that would be affected by implementation of the Alternatives described in Section 2. Aspects of the affected environment described in this section focus on the relevant major issues. Certain critical environmental components require analysis under BLM policy. These items are presented below in Table 3.1.

Table 3.1 - Critical elements requiring mandatory evaluation are presented below.

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species	X			Guymen Easdale
Floodplains		X		Dan Sellers, Chris Williams
Wilderness Values			X	Dan Sellers
ACECs			X	Dan Sellers
Water Resources	X			Dan Sellers, Chris Williams
Air Quality		X		Dan Sellers
Cultural or Historical Values		X		Clint Crago
Prime or Unique Farmlands			X	Dan Sellers
Wild & Scenic Rivers			X	Dan Sellers

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Wetland/Riparian		X		Dan Sellers, Chris Williams
Native American Religious Concerns			X	Clint Crago
Hazardous Wastes or Solids			X	Dan Sellers
Invasive, Nonnative Species	X			Dan Sellers
Environmental Justice			X	Dan Sellers

3.1. Topographic Characteristics of Project Area

The area is typical NE Wyoming sagebrush/grasslands with improved pastures. Elevations within the project area range from 4,000 to 4,440 feet above sea level. Topography throughout the project area varies from relatively flat to steep features several deep draws, prominent ridges and rolling hills. Chicken Creek Divide, the most prominent feature in the area, is characterized by exposed sandstone cliffs and runs from southwest of Section 20 to the northwest of Section 3. Two smaller, but significant, unnamed ridges also exist in southwest Section 20 and the western half of Section 27, and areas of exposed scoria and sandstone were found in both of those areas. Climate is semi-arid, averaging 13.8 inches of precipitation annually, about 74% of which occurs between April and September (Gregory 2006). Major land uses are grain and hay production, livestock and wildlife use, and CBNG production.

3.2. Vegetation & Soils

The project area is comprised of approximately 45% agriculture lands (planted fields, fallow fields, seeded grasses and hat fields), 35% grasslands (mainly dry herbaceous), 17% sagebrush grasslands and 3% other (woodlands, water, bare rock and soil, etc.) Grasslands and agriculture dominate the majority of the project area, but sagebrush grasslands are also prevalent among much of the rugged terrain in the central portion of the western half of Section 27, Section 28 and the eastern half of Section 29. Grass cover varies from dense among the rolling hills and level valleys to sparse along many of the steeper hills and ridge tops. The majority of the grasses throughout the project area range in height from 4 to 12 inches. The shortest grasses (less than 6 inches) occur in the northeast of Section 22 and the southwest of Sections 29, 30, and 32. Common grasses include needle-and-tread (*Hesperostipa comata*), cheat grass (*Bromus tectorum*), junegrass (*Koeleria macrantha*), Indian ricegrass (*Oryzopsis hymenoides*), bluegrass (*Poa spp.*), wheatgrass (*Pascopyron and Elymus spp.*), and blue grama (*Bouteloua gracilis*). Threadleaf sedge (*Carex filifolia*) occurs on the windswept hilltops and ridges. Several cultivated fields in Sections 22, 27 and 29 have been seeded with crested wheatgrass (*Agropyron cristatum*). Grass height in these sections ranged from 12 to 18 inches tall. One field in the southeast quarter in Section 21 was tilled but unplanted (Gregory 2006).

Wyoming big sagebrush (*Artemisia tridentate wyomingensis*), the primary shrub, occurs throughout the central portion of the western half of Section 27, Section 28, and the eastern half of Section 29 within the project area in a patchy mosaic of sparse (0-5% cover), low (5-10% cover), moderate (10-15% cover), and dense (15-25% cover) stands. Rabbitbrush (*Chrysothamnus viscidiflorus*), silver sage (*Artemisia cana*), and Great Plains yucca (*Yucca glauca*) are sparsely distributed throughout the steeper slopes of Chicken Creek Divide. A few chokecherry shrubs (*Prunus virginiana*) are located within the draws in southwest of Section 27 (Gregory 2006).

The distribution of trees within the project area is limited to individuals and small stands (1 to 6 trees) isolated within the drainages or windbreaks near residences. A relatively dense stand of juniper (*Juniperus spp.*) with some ponderosa pines (*Pinus ponderosa*), and four cottonwoods (*Populus spp.*) are present near the top of a draw in the southwest portion of Section 20. A few scattered individuals and small stands of cottonwoods exist along the same drainage in the northeast quarter of Section 30. Small

stands of cottonwoods are also found along LX Bar Creek in the NENE quarter of Section 20 and the northwest quarter of Section 21. A windbreak of 15 cottonwoods exists at the ranch in the southwest quarter of Section 21 and alone cottonwood was found in the NESE quarter of Section 27. A few junipers are scattered along slopes in the eastern half of Section 19 (Gregory 2006).

Soils

The soils vary from clay loam to primarily sandy clay loam throughout the project area. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 1 inches on ridges to 12 inches plus in bottomland. Erosion potential varies from high to low depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area. Reclamation, representative of the surrounding Range Sites is expected with adequate moisture and use of sound land management principles described in the POD and required by BLM regulations.

Summary of Soils and Ecological Sites for the 15-17" PZ NP Loamy

Using the Natural Resource Conservation Service, (NRCS, USDA), Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains, in the 15-17" Northern Plains precipitation zone, the landforms and soils of this site are deep to moderately deep (greater than 20" to bedrock), well-drained & moderately permeable. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. These layers consist of the A horizon with very fine sandy loam, loam, or silt loam texture and may also include the upper few inches of the B horizon with sandy clay loam, silty clay loam or clay loam texture. The predominant ecological site occurring within the proposed POD is found to be Loamy and the plant communities consist of mixed Sagebrush/Grassland, Western Wheatgrass/Cheatgrass Plant Communities, and Improved Pastures/Cropland.

This site occurs on land nearly level up to 50% slopes. Landform: Hill slopes with associated alluvial fans & stream terraces.

For more detailed soil information, see the NRCS Soil Survey WY705.

Ecological Sites:

Mixed Sagebrush/Grass Plant Community

This site is found under moderate, season-long grazing by livestock in the absence of fire or brush management. Wyoming big sagebrush is a significant component of this plant community. A mix of warm and cool-season grasses make up the majority of the understory with the balance made up of annual cool-season grasses, and miscellaneous forbs.

Dominant grasses include needleandthread, western wheatgrass, little bluestem and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and Sandberg bluegrass. Forbs commonly found in this plant community include plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear can also occur.

When compared to the Historic Climax Plant Community (HCPC), sagebrush and blue grama have increased. Production of cool-season grasses, particularly green needlegrass, has been reduced. The cool-season mid-grasses are protected by the sagebrush canopy, but this protection makes them unavailable for grazing. Cheatgrass (downy brome) has invaded the site. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope.

This plant community is resistant to change. A significant reduction of big sagebrush can only be

accomplished through fire or brush management. Species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

Western Wheatgrass/Cheatgrass Plant Community

This plant community is created when the Mixed Sagebrush/Grass Plant Community or the Heavy Sagebrush Plant Community is subjected to fire or brush management not followed by prescribed grazing. Rhizomatous wheatgrasses and annuals will dominate the site.

Compared to the HCPC, cheatgrass has increased with western wheatgrass and thickspike wheatgrass maintaining at a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. Blue grama is the same or slightly less than found in the HCPC. Plant diversity is low.

3.2.1. Wetlands/Riparian

No wetlands areas, other than existing reservoirs or ponds, were observed within the POD area. All channels within the POD boundary are ephemeral, and stream reaches with enhanced riparian vegetation are rare.

3.2.2. Invasive Species

State-listed noxious weeds and invasive/exotic plant infestations were discovered by consultation with Campbell County Weed and Pest Office, a search of inventory maps and/or databases or during subsequent field investigation by the proposed project proponent. The company has developed a weed control program, to control noxious weeds. See POD and Campbell County Weed and Pest Office for more detail if needed.

3.3. Wildlife

Several resources were consulted to identify wildlife species that may occur in the proposed project area. Resources that were consulted include the wildlife database compiled and managed by the BLM Buffalo Field Office (BFO) wildlife biologists, the PRB FEIS, the Wyoming Game and Fish Department (WGFD) big game and sage-grouse maps, and the Wyoming Natural Diversity Database (WYNDD).

A habitat assessment and wildlife inventory surveys were performed by Thunderbird-Jones and Stokes Wildlife Consulting during 2004, 2005 and 2006. Thunderbird-Jones and Stokes Wildlife Consulting performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2004-2006. A habitat assessment for the Ute ladies-tress orchid was conducted following Fish and Wildlife Service protocol.

A BLM biologist conducted field visits on November 11, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose. A Biological Assessment was prepared by a BLM biologist. The Biological Assessment was submitted to the U.S. Fish and Wildlife Service (USFWS) for consultation.

Wildlife species common to the habitat types present are identified in the Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (PRB FEIS 3-114). Species that have been identified in the project area or that have been noted as being of special importance are described below.

3.3.1. Big Game

Big game species expected to be within the Moolah project area include pronghorn antelope, mule deer, and seasonally elk. The project area is part of the Powder River mule deer herd unit. The 2004 estimated

herd population was 55,561 with a population objective of 52,000 (Wyoming Game and Fish Department (WGFD) 2004).

The Moolah project area is part of Gillette pronghorn antelope herd unit. The 2004 estimated herd population was 13,985 with a population objective of 11,000 (Wyoming Game and Fish Department (WGFD) 2004). The population of both herds has been increasing since 1998.

The WGFD has designated the entire Moolah project area as yearlong range for mule deer, within 0.1 miles west of the project area is winter-yearlong habitat for mule deer. The project area is yearlong range pronghorn antelope.

The Moolah project area is approximately 14 miles northeast of the Fortification Creek elk yearlong range. According to the BLM Buffalo Field Office database, numerous elk have been sighted many times approximately 11 miles north of the project area. Elk from the Fortification Creek herd, regularly move north into Montana and to back Fortification Creek. The elk may be using the project area for foraging as they migrate.

Winter-Yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Yearlong** use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of LX Bar Creek and Chicken Draw Creek which are tributaries to the Powder River. No natural springs were identified within the project area. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available for them.

3.3.3. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151). Species observed by Thunderbird-Jones and Stokes Wildlife Consulting include burrowing owl (*Athene cunicularia*), and Brewer’s sparrow (*Spizella breweri*).

3.3.4. Raptors

Eleven raptor nest sites were identified by Thunderbird-Jones & Stokes (2006) and BLM within 0.5 miles of the project area, of these three nests were active in 2006.

Table 4. Documented raptor nests within and adjacent to the Moolah project area in 2006.

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS
4182	FEHA	4953222N, 436388E	SENE Sec 19, T55N, R74W		poor	inactive
4183	FEHA	4953276N, 436595E	SWNW Sec 20 T55N, R74W		poor	inactive
4184	FEHA	4953331N, 436364E	SENW Sec 20		poor	inactive

			T55N, R74W			
New	RTHA	4953998N, 437992E	NENE Sec 20 T55N, R 74W	cottonwood tree live	good	active
New	FEHA	4953454N, 441153E	SENE Sec 22 T55N, R74W	rock outcrop	remnants	inactive
New	SWHA or RTHA	4952950N, 441778E	NESW Sec 23 T55N, R74W	cottonwood tree live	good	failed
715	FEHA	4952032N, 441738E	SWNE Sec 26 T55N, R74W		gone	gone
717	FEHA	4951698N, 442033E	SENE Sec 26 T55N, R74W		gone	gone
New	FEHA	4952162N, 442025E	NWNE Sec 26 T55N, R74W	ground/hillside	fair	inactive
New	FEHA	4952087N, 441972E	NWNE Sec 26 T55N, R74W	ground/hillside	fair	inactive
New	BUOW	4950829N, 438444E	SESW Sec 28 T55N, R74W	prairie dog colony	NA	active

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act.

3.3.5.1.1. Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 1988, the WGFD identified four prairie dog complexes (Arvada, Recluse, Thunder Basin National Grasslands, and Midwest) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Oakleaf 1988).

This nocturnal predator is closely associated with prairie dogs, depending almost entirely upon them for its food. The ferret also uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1000 acres of black-tailed prairie dog colonies for survival (USFWS 1989).

The WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Big Horn

Mountains (Grenier 2003). The U.S. Fish and Wildlife Service has also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

Two black-tailed prairie dog colonies (totaling 32 acres) were identified during site visits by Thunderbird-Jones & Stokes within and adjacent to the Moolah project area. The colonies are located in the eastern half of Section 34 and the southwest quarter of Section 28, Township 55 North, Range 74 West. The project area is located approximately 7.5 miles northeast of Arvada, the nearest potential reintroduction area. The prairie dog colonies are not of sufficient size to support ferrets, therefore black-footed ferret habitat is not present within the Moolah project area.

3.3.5.1.2. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered in all of the continental United States except for Minnesota, Wisconsin, Michigan, Oregon, and Washington. In these states the bald

eagle was listed as Threatened. On July 12, 1995 the eagle's status was changed to Threatened throughout the United States. Species-wide populations are recovering from earlier declines, and the bald eagle was proposed for de-listing in 2000, but as yet no final decision has been made.

Bald eagle nesting habitat is generally found along lakes, rivers, and other areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles can be more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, domestic sheep and big game carcasses may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

Small areas of suitable nesting and roosting habitat are scattered throughout the Moolah project area. The distribution of trees within the project area is limited to individuals and small stands (1 to 6 trees) within the drainages or windbreaks near residences. A relatively dense stand of juniper (*Juniperus spp.*) with some ponderosa pines (*Pinus ponderosa*), and four cottonwoods (*Populus spp.*) are present near the top of a draw in the southwest portion of Section 20. A few scattered individuals and small stands of cottonwoods exist along the same drainage in the northeast quarter of Section 30. Small stands of cottonwoods are also found along LX Bar Creek in the NENE quarter of Section 20 and the northwest quarter of Section 21. A windbreak of 15 cottonwoods exists at the ranch in the SWSW quarter of Section 21 and alone cottonwood was found in the NESE quarter of Section 27. A few junipers are scattered along slopes in the eastern half of Section 19 (Gregory 2006).

According to the BLM Buffalo Field Office database (2007), bald eagles have been observed within one to four miles of the Moolah project area on five separate occasions. These observations were of single bald eagles. The eagles were perched in trees, on hill tops, powerline poles and were seen flying near the project area.

A reliable prey base exists within and around the Moolah project area. The prey base for bald eagles within the project area consists of lagomorphs (hares and rabbits), prairie dogs, waterfowl, and carrion. During the onsite jack rabbits and cottontail rabbits were abundant. With four proposed and three existing reservoirs within the project area there is the potential to have waterfowl year round. Highway 14-16 borders the project area to the south, fresh deer and antelope carcasses are seen weekly along the highway.

3.3.5.1.3. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

A habitat assessment for the Ute ladies-tress orchid was conducted following Fish and Wildlife Service protocol. Currently, bottomland habitats within the Moolah project area have little potential to support the Ute ladies-tresses orchid. Most of the drainages were dry during the 2006 survey, the drainages quickly transitioned to upland vegetation. The only area within the project area that held water during spring 2006 was a drainage with a small pool of water (<8 inches deep) in NSW quarter of Section 28, Township 55 North, Range 74 West. The pool hosted emergent cattails (*Typha spp.*), but no other wetland or mesic edge vegetation, and it quickly transitioned to upland vegetation. No Ute ladies-tresses orchid habitat exists within the Moolah project area, therefore no formal surveys were conducted for Ute ladies –tresses orchid

3.3.5.2. Sensitive Species

The USDI Bureau of Land Management (BLM) Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.3.5.2.1. Black-tailed prairie dog

On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog’s Candidate status. The Buffalo Field Office however will consider prairie dogs as a sensitive species and continue to afford this species the protections described in the FEIS. The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains. Their decline is related to multiple factors including, habitat destruction, poisoning, and Sylvatic plague.

Two black-tailed prairie dog colonies were identified during site visits by Thunderbird-Jones & Stokes within and adjacent to the project area. The colonies are located in the eastern half of Section 34 and the southwest quarter of Section 28, Township 55 North, Range 74 West. Total acreage for the two colonies equals 32 acres.

3.3.5.2.2. Greater sage-grouse

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003).

The project area is approximately 65% grassland and agriculture and 35% sagebrush grassland. Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), the primary shrub, occurs throughout the project area in small pockets in a patchy mosaic of sparse (0-5% cover), low (5-10% cover), moderate (10-15% cover), and dense (15-25% cover) stands. On average the sagebrush ranged in size from 15 to 20 inches tall. Suitable sage-grouse habitat is present throughout the project area. BLM records identified five sage grouse leks within 3.0 miles of the Moolah project area. These lek sites are identified below (Table 6).

Table 6. Sage-grouse leks surrounding the Moolah project area.

Lek Name	Legal Location	Status In 2006 (Peak Males)	Distance From Project Area
Spotted Horse	NESW Sec 35 T55N, R74W	inactive	2.3 miles
Case II	N1/2 SE Sec 6 T54N, R74W	unknown	1.7 miles

Lek Name	Legal Location	Status In 2006 (Peak Males)	Distance From Project Area
Case III	SESW Sec 31 T54N, R74W	inactive	1.7 miles
Case I	NENW Sec 8 T54N, R74W	unknown	2.0 miles
Wolfe	SESW Sec 4 T54N,R73W	unknown	2.33 miles

3.3.5.2.3. Mountain plover

Mountain plovers, which are a Buffalo Field Office sensitive species, are typically associated with high, dry, short grass prairies containing vegetation typically shorter than four inches tall, and slopes less than 5 degrees (BLM 2003). Mountain plovers are closely associated with heavily grazed areas such as prairie dog colonies and livestock pastures.

Topography within the Moolah project area is flat to slightly rolling, the majority of the project area has a slope ranging from 0-10%, with the average being from 3-6%. Based on topography, agricultural and grazing practices, fire, drought, and prairie dog colony expansion and new colonization, the majority of the Moolah project area has the potential to be good mountain plover breeding and nesting habitat.

At the time of the onsite (conducted on November 7, 2006), most of the project area had good grass cover and the grass height ranged from 8-12 inches tall. However, suitable mountain plover habitat exists within the two prairie dog colonies. The colonies are located in the eastern half of Section 34 and the southwest quarter of Section 28, Township 55 North, Range 74 West..

3.4. West Nile Virus

West Nile virus (WNV) is a mosquito-borne disease that can cause encephalitis or brain infection. Mosquitoes spread this virus after they feed on infected birds and then bite people, other birds, and animals. WNV is not spread by person-to-person contact, and there is no evidence that people can get the virus by handling infected animals.

Since its discovery in 1999 in New York, WNV has become firmly established and spread across the United States. Birds are the natural vector host and serve not only to amplify the virus, but to spread it. Though less than 1% of mosquitoes are infected with WNV, they still are very effective in transmitting the virus to humans, horses, and wildlife. *Culex tarsalis* appears to be the most common mosquito to vector, WNV.

The human health issues related to WNV are well documented and continue to escalate. Historic data collected by the CDC and published by the USGS at www.westnilemaps.usgs.gov are summarized below. Reported data from the Powder River Basin (PRB) includes Campbell, Sheridan and Johnson counties.

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2

Human cases of WNV in Wyoming occur primarily in the late summer or early fall. There is some evidence that the incidence of WNV tapers off over several years after a peak following initial outbreak (Litzel and Mooney, personal conversations). If this is the case, occurrences in Wyoming are likely to increase over the next few years, followed by a gradual decline in the number of reported cases.

Although most of the attention has been focused on human health issues, WNV has had an impact on vertebrate wildlife populations. At a recent conference at the Smithsonian Environmental Research Center, scientists disclosed WNV had been detected in 157 bird species, horses, 16 other mammals, and alligators (Marra et al 2003). In the eastern US, avian populations have incurred very high mortality, particularly crows, jays and related species. Raptor species also appear to be highly susceptible to WNV. During 2003, 36 raptors were documented to have died from WNV in Wyoming including golden eagle, red-tailed hawk, ferruginous hawk, American kestrel, Cooper's hawk, northern goshawk, great-horned owl, prairie falcon, and Swainson's hawk (Cornish et al. 2003). Actual mortality is likely to be greater. Population impacts of WNV on raptors are unknown at present. The Wyoming State Vet Lab determined 22 sage-grouse in one study project (90% of the study birds), succumbed to WNV in the PRB in 2003. While birds infected with WNV have many of the same symptoms as infected humans, they appear to be more sensitive to the virus (Rinkes 2003).

Mosquitoes can potentially breed in any standing water that lasts more than four days. In the Powder River Basin, there is generally increased surface water availability associated with CBNG development. This increase in potential mosquito breeding habitat provides opportunities for mosquito populations to increase. Preliminary research conducted in the Powder River Basin indicates WNV mosquito vectors were notably more abundant on a developed CBNG site than two similar undeveloped sites (Walker et al. 2003). Reducing the population of mosquitoes, especially species that are apparently involved with bird-to-bird transmission of WNV, such as *Culex tarsalis*, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is not necessary to place the briquettes in the main water body because wave action prevents this environment from being optimum mosquito breeding habitat. Follow-up treatment of adult mosquitoes with malathion may be needed every 3 to 4 days to control adults following application of larvicide (Mooney, personal conversation). These treatment methods seem to be effective when focused on specific target areas, especially near communities, however they have not been applied over large areas nor have they been used to treat a wide range of potential mosquito breeding habitat such as that associated with CBNG development.

The WDEQ and the Wyoming Department of Health sent a letter to CBNG operators on June 30, 2004. The letter encouraged people employed in occupations that require extended periods of outdoor labor, be provided educational material by their employers about WNV to reduce the risk of WNV transmission. The letter encouraged companies to contact either local Weed and Pest Districts or the Wyoming Department of Health for surface water treatment options.

3.5. Water Resources

The project area is within the Middle Powder River drainage system. LX Bar Creek and Chicken Draw Creek are the two named tributaries to the Powder River that drain the POD area.

3.5.1. Groundwater

WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for TDS: 500 mg/l TDS for Drinking Water (Class I), 2000 mg/l for Agricultural Use (Class II) and 5000 mg/l for Livestock Use (Class III).

The ROD includes a Monitoring, Mitigation and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation of the EIS. The MMRP called for the use of adaptive management where changes could be made based on monitoring data collected during implementation.

Specifically relative to groundwater, the plan identified the following (PRB FEIS ROD page E-4):

- The effects of infiltrated waters on the water quality of existing shallow groundwater aquifers are not well documented at this time;
- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions;
- It may be necessary to conduct investigations at representative sites around the basin to quantify these impacts;
- Provide site specific guidance on the placement and design of CBM impoundments, and;
- Shallow groundwater wells would be installed and monitored where necessary.

The BLM has installed shallow groundwater monitoring wells at five impoundment locations throughout the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. The most intensively monitored site has a battery of nineteen wells which have been installed and monitored jointly by the BLM and USGS since August, 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment lies atop approximately 30 feet of unconsolidated deposits (silts and sands) which overlie non-uniform bedrock on a side ephemeral tributary to Beaver Creek and is approximately one and one-half miles from the Powder River. Baseline investigations showed water in two sand zones, the first was at a depth of 55 feet and the second was at a depth of 110 feet. The two water bearing zones were separated by a fifty-foot thick shale layer. The water quality of the two water bearing zones fell in the WDEQ Class III and Class I classifications respectively. Preliminary results from this sampling indicate increasing levels of TDS and other inorganic constituents over a six month period resulting in changes from the initial WDEQ classifications.

The on-going shallow groundwater impoundment monitoring at four other impoundment locations are less intensive and consist of batteries of between 4 and 6 wells. Preliminary data from two of these other sites also are showing an increasing TDS level as water infiltrates while two other sites are not.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 46 registered stock and domestic water wells within the POD boundary with depths ranging from 40 to 805 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is mostly within the LX Bar Creek drainage that is tributary to the Middle Powder River watershed. Chicken Creek Draw drains a small part of the southern POD area and is also tributary to the Powder River. All of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in $\mu\text{mhos/cm}$) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters “illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Middle Powder River, the EC ranges from 1,421 at Maximum monthly flow to 2,154 at Low monthly flow and the SAR ranges from 3.92 at Maximum monthly flow to 4.62 at Low monthly flow. These values were determined at the USGS station located at Moorehead, Mt, USGS Station ID 06324500 (PRB FEIS page 3-49).

For more information regarding surface water, please refer to the PRB FEIS Chapter 3 Affected Environment pages 3-36 through 3-56.

3.6. Cultural Resources

Class III inventories were conducted for the Moolah project prior to on-the-ground project work (BFO project #'s 70060223, 70060223a). ACR Consultants, Inc., conducted the Class III inventories following the Archeology and Historic Preservation: Secretary of the Interior’s Standards and Guidelines (48FR190) for the proposed project. Clint Crago, BFO archaeologist, reviewed the reports for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined them to be adequate. The following resources are located within the Area of Potential Effect (APE).

Table 3.6 Cultural Resource Sites Identified within the Moolah Project Area

Site Number	Site Type	Eligibility
48CA5586	Prehistoric Lithic Scatter	Not Eligible
48CA5587	Prehistoric Lithic Scatter and Historic Can Fragments	Not Eligible
48CA5588	Historic Well	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action POD, which resulted in development of Alternative C as the preferred alternative, have reduced the potential impact to the environment which will result from this action. The environmental consequences of Alternative C are described below.

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator’s plans and BLM applied mitigation. Of the 18 proposed well locations, all 18 wells can be drilled without constructing a pad. One well is on a reclaimed conventional well pad. Surface disturbance would involve minor digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 15’ wide x 60’ long x 16’ deep), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 18 wells would involve approximately 0.2 acre/well for 3.6 total acres.

Approximately 1.9 miles of improved roads would be constructed to provide access to various well locations. Approximately 5.8 miles of new and existing two-track trails would be utilized to access well

sites. The majority of proposed pipelines (gas and water) have been located in “disturbance corridors.” Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 3.93 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap etc.) would ensure land productivity/stability is regained and maximized.

Proposed stream crossings, such as culverts and fords (low water crossings) are shown on the MSUP and the WMP maps (see the POD). These structures would be constructed in accordance with sound, engineering practices and BLM standards.

The PRB FEIS made predictions regarding the potential impact of produced water to the various soil types found throughout the Basin, in addition to physical disturbance effects. “Government soil experts state that SAR values of only 13 or more cause potentially irreversible changes to soil structure, especially in clayey soil types, that reduce permeability for infiltration of rainfall and surface water flows, restrict root growth, limit permeability of gases and moisture, and make tillage difficult.” (PRB FEIS page 4-144).

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	18	0.2/acre	3.6	Long Term
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	1	325 sq/feet	2.42	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments			16.26	Long Term
On-channel	7	Site Specific	16.05	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	7	Site Specific or 0.01 ac/WDP	0.21	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads	1.9			Long Term
No Corridor	0.75	45' Width	4.07	
With Corridor	1.15	75' Width	10.43	
2-Track Roads	5.8			Long Term
No Corridor	1.89	20' Width	4.57	
With Corridor	3.91	45' Width	21.35	
Pipelines				Short Term
With Corridor	3.93	45' Width	21.44	
Overhead Powerlines	0.43	30' Width	1.56	Long Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Temporary Storage Yards	3	200' x 200'	2.8	Long Term

The designation of the duration of disturbance is defined in the PRB FEIS (pg 4-1 and 4-151). “For this EIS, short-term effects are defined as occurring during the construction and drilling/completion phases. Long-term effects are caused by construction and operations that would remain longer”.

4.1.1. Wetland/Riparian

There will be no effects to existing wetlands as a result of this POD development. Seepage downstream of impoundments may potentially promote the establishment of wetland-riparian species in short reaches of ephemeral channels.

4.1.2. Invasive Species

Utilization of existing facilities and surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, cheatgrass, Canada thistle and perennial pepperweed, leafy spurge, buffalobur and cocklebur. The company has developed, in cooperation with Campbell County Weed & Pest Office, an Integrated Pest Management (IPM) Plan for this POD. The IPM plan and mitigation as required by BLM regulations will reduce potential impacts from noxious weeds and invasive plants. See POD for more detailed information.

4.1.3. Cumulative Effects

The PRB FEIS stated that cumulative impacts to soils could occur due to sedimentation from water erosion that could change water quality and fluvial characteristics of streams and rivers in the sub-watersheds of the Project Area. SAR in water in the sub-watersheds could be altered by saline soils because disturbed soils with a conductivity of 16 mmhos/cm could release as much as 0.8 tons/acre/year of sodium (BLM 1999c). Soils in floodplains and streambeds may also be affected by produced water high in SAR and TDS. (PRB FEIS page 4-151).

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and soils are anticipated to within the parameters of the PRB FEIS for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Middle Powder River drainage, which is approximately 40.8% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to contain all CBNG discharge water so that there will be no flow into LX Bar Creek and Chicken Creek

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, yearlong range for mule deer and yearlong range for pronghorn antelope would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be

direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). The WGFD feels a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests not only do mule deer avoid mineral activities, but after three years of drilling activity the deer have not accepted the disturbance (Madson 2005).

Big game animals are expected to return to the project area following construction; however, populations will likely be lower than prior to project implementation as the human activities associated with operation and maintenance continue to displace big game. Mule deer are more sensitive to operation and maintenance activities than pronghorn, and as the Pinedale Anticline study suggests mule deer do not readily habituate. A study in North Dakota stated “Although the population (mule deer) had over seven years to habituate to oil and gas activities, avoidance of roads and facilities was determined to be long term and chronic” (Lustig 2003). Deer have even been documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. In order to survive below the maintenance level, requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978) further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

4.2.1.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-211.

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be discharged into seven on-channel full-containment reservoirs (4 proposed and 3 existing). The reservoirs are designed to not discharge water, however if a reservoir were to discharge, it is unlikely produced water will reach a fish-bearing stream. It is unlikely downstream species would be affected.

4.2.3. Migratory Birds Direct and Indirect Effects

Disturbance of the habitat types within the project area is likely to impact migratory birds. Native habitats are being lost directly with the construction of wells, roads, and pipelines. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Human activities likely displace migratory birds farther than simply the physical habitat disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males’ ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

Density of breeding Brewer’s sparrows declined by 36% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). Findings suggest that indirect habitat losses from energy development may be substantially larger than direct habitat losses (Ingelfinger 2004).

Density of breeding sage sparrows was reduced by 57% within a 100-m buffer of dirt roads regardless of traffic volume. The density of roads constructed in natural gas fields exacerbated the problem and the area of impact was substantial (Ingelfinger 2004).

Overhead power lines may affect migratory birds in several ways. Power poles provide raptors with perch sites and may increase predation on migratory birds. Power lines placed in flight corridors may result in collision mortalities. Some species may avoid suitable habitat near power lines in an effort to avoid predation. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235.

4.2.4. Raptors Direct and Indirect Effects

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to over heating or chilling of eggs or chicks. The prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

Table 4.2. Infrastructure within close proximity to documented raptor nests within the Moolah project area (Timing limitations will apply to this infrastructure).

BLM ID#	UTM (NAD 83)	SPECIES	STATUS	WELL / PIT NUMBER	DISTANCE
New	4953998N, 437992E	RTHA	active	1MOOL, 2MOOL and access road	0.67miles
New	4953454N, 441153E	FEHA	inactive	17MOOL, access road/pipeline	0.25 miles
New	4952950N, 441778E	SWHA/FEHA	active/nest failed	17MOOL, access road/pipeline	0.43 miles
New	4952162N, 442025E	FEHA	inactive	Dinero Res. Pitch Fork	0.50 miles 0.54 miles
New	4952087N, 441972E	FEHA	inactive	Dinero Res. Pitch Fork	0.54 miles 0.56 miles
New	4950829N, 438444E	BUOW	active	Big Bucks Big Does	0.16 miles 0.33 miles

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a one-half mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation to be located greater than one-quarter mile from occupied raptor nests. All of the proposed wells were located outside of the quarter mile buffer, no wells were moved.

4.2.4.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced

PRB FEIS, Volume 2, Chapter 4, page 4-221. No additional mitigation measures are required.

4.2.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed in a Biological Assessment and a summary is provided in Table 4.3. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered and Sensitive Species

Table 4.3 Summary of Threatened and Endangered Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat is of insufficient size.
Threatened				
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	S	LAA	Project includes overhead power and roads.
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence

K Known, documented observation within project area.

S Habitat suitable and species suspected, to occur within the project area.

NS Habitat suitable but species is not suspected to occur within the project area.

NP Habitat not present and species unlikely to occur within the project area.

Effect Determinations

LAA Likely to adversely affect

NE No Effect.

NLAA May Affect, not likely to adversely effect individuals or habitat.

4.2.5.1.1. Black-footed ferret

Because the black-tailed prairie dog colonies within the Moolah project area are of insufficient size (32 acres) for supporting ferrets, suitable habitat for the black-footed ferret does not exist within the Moolah project area. Therefore, implementation of the proposed coal bed natural gas wells will have **“no effect”** on the black-footed ferret.

4.2.5.1.2. Bald eagle

Small areas of suitable nesting and roosting habitat exists within and around the Moolah project area. The proposed project is **“likely to adversely affect”** bald eagles due to roads, powerlines, and human presence.

Noise and human presence associated with well drilling, road and pipeline construction and well operation may cause bald eagles to avoid areas of suitable nesting and roosting habitat within the project area.

There are 2.03 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee’s (2006) suggested practices and with the Service’s standards (USFWS 2002); however other features may not be in compliance. Yates is proposing an additional 0.43 miles of overhead three-phase distribution lines.

The presence of overhead power lines and roads may adversely affect foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are sparse or lacking, such as the Moolah project area. Twenty-two raptors including 16 golden eagles were electrocuted within Wyoming’s Powder River Basin in 2003; 12 electrocutions were on recently constructed lines which did not fully meet APLIC standards (Rogers pers. Comm.). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Roads present a collision hazard, primarily from bald eagles scavenging on carcasses resulting from other road related wildlife mortalities. Collision risk increases with automobile travel speed. Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%).

Produced water will be stored in seven reservoirs (4 proposed and 3 existing) which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoir(s) on eagles is unknown. The reservoir(s) could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.2.5.1.3. Ute's Ladies Tresses Orchid

The seven reservoirs (4 proposed and 3 existing) are located within ephemeral drainages of LX Bar Creek and Chicken Draw Creek. Suitable habitat is not present. The project area is composed of mostly upland vegetation, area dries up by mid July and the water table is lower than 12 inches below the soil surface.

Suitable habitat is not currently present. Reservoir seepage may create suitable habitat, however no historic seed source is present within or near the project area. Implementation of the proposed coal bed natural gas project will have "no effect" on the Ute ladies'-tresses orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (<i>Rana pipiens</i>)	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will effect existing waterways.
Spotted frog (<i>Ranus pretiosa</i>)	Ponds, sloughs, small streams	NP	NI	Prairie not mountain habitat.
Birds				
Baird's sparrow (<i>Ammodramus bairdii</i>)	Grasslands, weedy fields	S	MIIH	Sagebrush cover and grasslands will be affected, displacement by project activities.
Brewer's sparrow (<i>Spizella breweri</i>)	Basin-prairie shrub	K	MIIH	Displacement by project activities.
Burrowing owl (<i>Athene cunicularia</i>)	Grasslands, basin-prairie shrub	K	MIIH	Project activity may displace birds.
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	K	MIIH	Old nests found within project area. Project activity may displace birds.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush cover will be affected. Project activity will displace birds.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected. . Project activity may displace birds.
Long-billed curlew (<i>Numenius americanus</i>)	Grasslands, plains, foothills, wet meadows	S	MIIH	Grassland habitat will be lost. Project activity may displace birds.
Mountain plover (<i>Charadrius montanus</i>)	Short-grass prairie with slopes < 5%	S	MIIH	Two small prairie dog colonies present and near

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Northern goshawk (<i>Accipiter gentilis</i>)	Conifer and deciduous forests	NP	NI	major access road. Project activity may displace birds. No forest habitat present.
Peregrine falcon (<i>Falco peregrinus</i>)	cliffs	NP	NI	No nesting habitat present.
Sage sparrow (<i>Amphispiza billneata</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected. Project activity may displace birds.
Sage thrasher (<i>Oreoscoptes montanus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected. Project activity may displace birds.
Trumpeter swan (<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	S	MIH	Reservoirs may provide migratory habitat.
White-faced ibis (<i>Plegadis chihi</i>)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (<i>Oncorhynchus clarki bouvieri</i>)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (<i>Cynomys ludovicianus</i>)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIH	Prairie dog towns will be affected. Near major access roads.
Fringed myotis (<i>Myotis thysanodes</i>)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (<i>Myotis evotis</i>)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<i>(Euderma maculatum)</i> Swift fox <i>(Vulpes velox)</i>	Grasslands	S	MIIH	present. Sagebrush/grassland habitat will be lost. Project activity may displace animals.
Townsend's big-eared bat <i>(Corynorhinus townsendii)</i>	Caves and mines.	NP	NI	Habitat not present.
Plants Porter's sagebrush <i>(Artemisia porteri)</i>	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip <i>(Cymopterus williamsii)</i>	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

Presence

K Known, documented observation within project area.

S Habitat suitable and species suspected, to occur within the project area.

NS Habitat suitable but species is not suspected to occur within the project area.

NP Habitat not present and species unlikely to occur within the project area.

Project Effects

NI No Impact.

MIIH May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.

WIPV Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

BI Beneficial Impact

4.2.5.2.1. Black-tailed prairie dog Direct and Indirect Effects

The water and gas line in Section 34, Township 55 North, Range 74 West skirts the edge of a prairie dog colony and an existing improved road in the southwest quarter of Section 28, and the northwest quarter of Section 33, Township 55 North, Range 74 West goes through an active prairie dog colony. Mineral related traffic on the adjacent road may result in prairie dog road mortalities. The well house and nearby power poles may provide habitats for mammal and avian predators increasing prairie dog predation.

4.2.5.2.2. Greater sage-grouse Direct and Indirect Effects

Case II and Case III sage grouse leks are within 1.7 miles of the proposed development. Most of the project area is grassland and agricultural fields. Where ever possible wells, access roads and pipelines were moved to avoid sage-grouse nesting habitat. However, direct sage grouse nesting habitat loss will occur at three locations, access road/pipeline to the MOOL 3 well, the 15 MOOL well and 14 MOOL well and its access road /pipeline. Direct sage grouse nesting habitat loss is approximately 2.0 acres.

Mitigation measures:

1. The MOOL 3 well was moved approximately 300 feet west to reduce disturbance to sage-grouse nesting habitat. The new location is on a grassy ridge.
2. Access road/pipeline to the MOOL 13 well and the MOOL 14 well will not exceed 25 feet maximum width.
3. Brush hogging around well sites will not be shorter than 6 inches.

Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, power lines, reservoirs and other infrastructure (Theiele 2005, Oedekoven 2004). Sage grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. The Wyoming Game and Fish Department (WGFD) feels a well density of eight wells per section creates a high level of impact for sage grouse and that sage-grouse avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004).

The presence of overhead power lines and roads within the project area may adversely affect sage grouse. Overhead power lines create hunting perches for raptors, thus increasing the potential for predation on sage grouse. Increased predation from overhead power near leks may cause a decrease in lek attendance and possibly lek abandonment. Overhead power lines are also a collision hazard for sage grouse flying through the area. Increased roads and mineral related traffic can affect grouse activity and reduce survival (Braun et al. 2002). Activity along roads may cause nearby leks to become inactive over time (WGFD 2003).

Noise can affect sage grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). Sage grouse attendance on leks within one mile of compressors is lower than for sites farther from compressors locations (Braun et al. 2002).

Another concern with CBNG is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (Oedekoven 2004). West Nile virus represents a significant new stressor which in 2003 reduced late summer survival of sage-grouse an average of 25% within four populations including the Powder River Basin (Naugle et al. 2004). Powder River Basin grouse losses during 2004 and 2005 were not as severe. Summer 2003 was warm and dry, more conducive to West Nile virus replication and transmission than the cooler summers of 2004 and 2005 (Cornish pers. Comm.).

The Buffalo Field Office (BFO) Resources Management Plan (BLM 2001) and the Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA), which includes the WGFD, 1977 sage-grouse guidelines (Bennett 2004).

Under pressure for standardization BLM Wyoming adopted the two-mile recommendation in 1990, and instructed the field offices to incorporate the measure into their land use plans (Bennett 2004, Murkin 1990).

The two-mile recommendation was based on research which indicated between 59 and 87 percent of sage-grouse nests were located within two-miles of a lek (Bennett 2004). These studies were conducted within prime, contiguous sage-grouse habitat such as Idaho's Snake River plain.

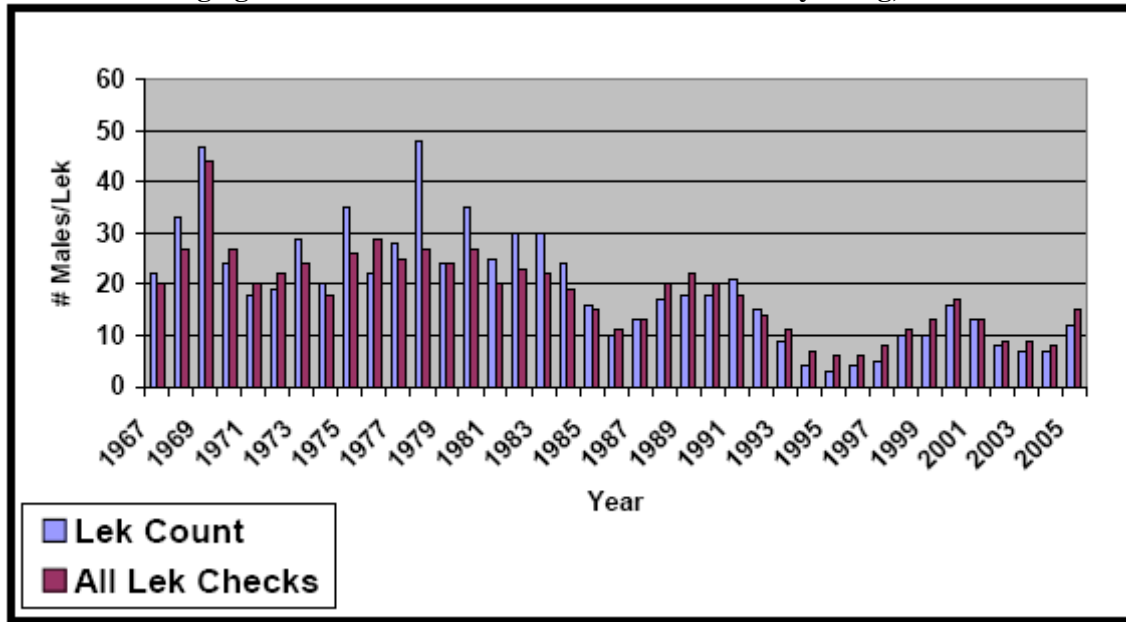
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km (1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found 36% of their grouse nesting within 3 km of the capture leks. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. In press).

Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development. Habitat conditions and sage grouse biology within the Buffalo Field Office is probably most similar to Moynahan's north-central Montana study area.

Vegetation communities within the Powder River Basin are naturally fragmented as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. Without contiguous habitat available to nesting grouse it is likely a smaller percentage of grouse nest within two-miles of a lek within the PRB than grouse within those areas studied in the development of the 1977 WAFWA recommendations and even the Holloran and Moynahan study areas. Holloran and Moynahan both studied grouse in areas of contiguous sagebrush habitats without large scale fragmentation and habitat conversion (Moynahan et al In press, Holloran and Anderson 2005). A recent sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within Holloran and Anderson's Upper Green River Basin study area to be 58% with an average patch size greater than 1200 acres; meanwhile Powder River Basin sagebrush coverage was estimated to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size decreased by more than 63% in forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). Recognizing that many populations live within fragmented habitats and nest much farther than two miles from the lek of breeding WAFWA revised their sage grouse management guidelines (Connelly et. al. 2000) and now recommends the protection of suitable habitats within 5 km (3.1 mi) of leks where habitats are not distributed uniformly such as the Powder River Basin.

The sage grouse population within northeast Wyoming is exhibiting a steady long term downward trend (Figure 1) (Thiele 2005). The figure illustrates a ten year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak and each periodic low is lower than the previous population low. Long-term harvest trends are similar to that of lek attendance (Thiele 2005).

Figure 4.1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



Sage-grouse populations within the PRB are declining independent of coalbed natural gas development. CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (Oedekoven 2004). The Powder River Basin Oil and Gas Project Final Environmental Impact Statement estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003). Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (Oedekoven 2004). In other terms, CBNG development is expected to accelerate the downward sage-grouse population trend.

A two-mile timing limitation given the long-term population decline and that less than 50% of grouse are expected to nest within the limitation area is likely insufficient to reverse the population decline. Moynahan and Lindberg (2004) like WAFWA (Connelly et al. 2000) recommend increasing the protective distance around sage grouse leks. Even with a timing limitation on construction activities, sage-grouse may avoid nesting within CBNG fields because of the activities associated with operation and production. As stated earlier, a well density of eight wells per section creates sage-grouse avoidance zones which overlap creating contiguous avoidance areas (WGFD 2004).

An integrated approach including habitat restoration, grazing management, temporal and spatial mineral limitations etc. is necessary to reverse the population decline. The Wyoming Game and Fish Department (WGFD) has initiated such a program within the Buffalo Field Office area (Jellison 2005). The WGFD program is modeled after a successful program on the Deseret Ranch in southwestern Wyoming and northeastern Utah. The Deseret Ranch has demonstrated a six-fold increase in their sage-grouse population while surrounding areas exhibited decreasing populations (Danvir 2002).

4.2.5.2.3. Mountain plover Direct and Indirect Effects

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors, newly constructed reservoirs, staging areas and roads may be attractive to plovers while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. The existing overhead power lines

provide perch sites for raptors potentially resulting in increased mountain plover predation. CBNG infrastructure such as the well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

With the loss or alteration of their natural breeding habitat (predominately prairie dog colonies), mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat. Such as heavily grazed land, burned fields, fallow agriculture lands, roads, oil and gas well pads, pipelines and newly constructed reservoirs. These areas could become reproductive sinks. Adult mountain plovers may breed there and lay eggs and hatch chicks, however the young may not reach fledging age due to the poor quality of the habitat.

Recent analysis of the US Fish and Wildlife Service (USFWS) Breeding Bird Survey (BBS) data suggests that mountain plover populations have declined at an annual rate of 3.7 % over the last 30 years which represents a cumulative decline of 63% during the last 25 years (Knopf 1995).

Based on topography, agricultural and grazing practices, fire, drought, and prairie dog colony expansion and new colonization, the majority of the Moolah project area has the potential to be good mountain plover breeding and nesting habitat. Suitable mountain plover habitat exists within the two prairie dog colonies. The colonies are located in the eastern half of Section 34 and the southwest quarter of Section 28, Township 55 North, Range 74 West. No proposed infrastructure is currently planned within the prairie dog colonies. The project should have little affect mountain plovers.

An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

4.2.5.3. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-271.

4.3. West Nile Virus Direct and Indirect Effects

The PRB FEIS and ROD included a programmatic mitigation measure that states, “The BLM will consult with appropriate state agencies regarding WNV. If determined to be necessary, a COA will be applied at the time of APD approval to treat mosquitoes for any CBM discharge waters that become stagnant.” This project is likely to result in standing surface water which may potentially increase mosquito breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNV species and its effects in Wyoming.

There is no evidence that treatment, either through the use of larvicides or malithion, on a site specific or basin-wide scale will have any effect on the overall spread of the disease. The State agencies have not instituted state-wide treatment for mosquitoes due to WNV, nor are they requiring any mitigation specific to permitting for CBM operations.

Cumulatively, there are many sources of standing water, i.e. water produced from coal bed natural gas wells, natural flows, livestock watering facilities, coal mining operations, and outdoor water use and features in and around communities. Implementation of the Moolah project will double the amount of reservoirs within the project area and will increase the amount of standing water. The total number of

reservoirs within the Moolah project area will be seven (3 existing and 4 proposed). This will increase the potential for mosquito habitat and West Nile virus.

BLM will keep monitoring this issue by continuing to consult with the State agencies and the researchers working in the area in order to stay abreast of the most current developments and any need to apply mitigation.

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, to minimize downstream impacts within the Middle Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should minimize project area and downstream potential impacts from proposed water management strategies.

The WDEQ has assumed primacy from United States Environmental Protection Agency for maintaining the water quality in the waters of the state. The WSEO has authority for regulating water rights issues and permitting impoundments for the containment of surface waters of the state.

The maximum water production is predicted to be 29.2 gpm per well or 525.6 gpm (1.21 cfs or 848 acre-foot per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Middle Powder River drainage, the projected volume produced within the watershed area was 54,690 acre-feet in 2006 (maximum production is estimated in 2006). As such, the volume of water resulting from the production of these wells is 1.5% of the total volume projected for 2006. This volume of produced water is within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater Direct and Indirect Effects

The PRB FEIS predicts an infiltration rate of 37% to groundwater aquifers and coal zones in the Middle Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 194.5 gpm will infiltrate at or near the discharge points and impoundments (314 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may effect the static water level of wells in the area. The permitted water wells produce from depths which range from 40 to 805 feet compared to a CBNG target drilling range from 600 feet to the Upper Canyon coal unit to 1,100 to the Wall coal unit. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence of the proposed wells.

Recovery of the coal bed aquifer was predicted in the PRB FEIS to "...resaturate and repressurize the areas that were partially depressurized during operations. The amount of groundwater storage within the coals and sands units above and below the coals is enormous. Almost 750 million acre-feet of recoverable groundwater are stored within the Wasatch - Tongue River sand and coals (PRB FEIS Table 3-5). Redistribution is projected to result in a rapid initial recovery of water levels in the coal. The model projects that this initial recovery period would occur over 25 years." (PRB FEIS page 4-38).

Adherence to the drilling plan, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures will protect any potential fresh water aquifers above the target coal zone. This will ensure that ground water will not be adversely impacted by well drilling and completion operations.

In order to determine the actual water quality of the producing formations in this POD, and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well within the POD. The reference well will be sampled at the well head for analysis within sixty days of initial production and a copy of the water analysis will be submitted to the BLM Authorizing Officer.

Shallow ground water monitoring is ongoing at impoundment sites across the basin. Due to the limited data available from these sites, the still uncertain overall fate or extent of change that is occurring due to infiltration at those sites, and the extensive variable site characteristics both surface and subsurface, it is not reliable at this time to infer that findings from these monitoring wells should be directly applied to other impoundment locations across the basin.

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

As stated in the PRB FEIS, "The aerial extent and magnitude of drawdown effects on coal zone aquifers and overlying and underlying sand units in the Wasatch Formation also would be limited by the discontinuous nature of the different coal zones within the Fort Union Formation and sandstone layers within the Wasatch Formation." (PRB FEIS page 4-64).

Development of CBM through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water "...cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBM development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5)." (PRB FEIS page 4-65). No additional mitigation is necessary.

4.4.2. Surface Water Direct and Indirect Effects

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in the WDEQ's WYPDES permit, and the levels found in the POD's representative water sample.

Table 4.4.2. Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	TDS, mg/l	SAR	EC, μ mhos/cm
Most Restrictive Proposed Limit –		2.0	1,000
Least Restrictive Proposed Limit		10.0	3,200
Middle Powder River Watershed at Moorhead, MT USGS #06324500 Gauging Station			
Historic Data Average at Maximum Flow		3.92	1,421
Historic Data Average at Minimum Flow		4.62	2,154
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirements for WYPDES Permit # (Pending)			
At discharge point	5,000	Na	7,500
Predicted Produced Water Quality Upper and Lower Canyon, Cook, and Wall	1,030	12.1	1,640

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1,030.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2,000 mg/l TDS).

The quality for the water produced from the commingled Canyon, Cook, and Wall target coal zones from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 29.2 gallons per minute (gpm) is projected to be produced from these 18 wells, for a total of 525.6 gpm for the POD. See Table 4.4 .

There are 7 discharge points proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 7 impoundments (114.4 ac-ft) would potentially be constructed within the project area. These impoundments are all on-channel reservoirs will disturb approximately 16.05 acres including the dam structures. Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 78.8 gpm (0.2 cfs) below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the

peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Middle Powder River of 86 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 18 wells is anticipated to be a total of 525.6 gpm or 1.21 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in LX Bar Creek and Chicken Creek from this action (0.2 cfs) may add a maximum 0.16 cfs to the Middle Powder River flows, or 0.002% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Middle Powder River (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 4). The POD is located in the headwaters of the LX Bar Creek and Chicken Creek Watersheds and there is no drainage area upstream of the POD. As an example of produced water versus runoff, using an assumed density of 1 well per location every 80 acres, the potential exists for the development of 8 wells within the LX Bar Creek drainage within the POD boundary. This area could produce a maximum flow rate of 233.6 gpm (0.52 cfs) of. The BLM agrees with the operator that the actual maximum flow would be lower because:

1. New wells will be phased in over several years, and
2. A decline in well discharge generally occurs after several months of operation.

The potential maximum flow rate of produced water within this watershed within the project area, 0.52 cfs, is much less than the volume of runoff estimated from the 2-year storm event of 50 cfs for LX Bar Creek.

The proposed method for surface discharge provides passive treatment through the aeration supplied by the energy dissipation configuration at each discharge point outfall. Aeration adds dissolved oxygen to the produced water which can oxidize susceptible ions, which may then precipitate. This is particularly true for dissolved iron. Because iron is one of the key parameters for monitoring water quality, the precipitation of iron oxide near the discharge point will improve water quality at downstream locations.

The operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ.

Permit effluent limits are typically set at values in the WYPDES permits similar to those below:

pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Dissolved iron	299.7 µg/l max
Dissolved manganese	629 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	46 mg/l

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The designated point of compliance will be identified for this permit as end of pipe.

In order to determine the actual water quality of the producing formations in this POD and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well to each coal zone within the POD boundary. The reference well will be sampled at the wellhead for analysis within sixty days of initial production. A copy of the water analysis will be submitted to the BLM Authorized Officer.

As stated previously, the operator has committed to offer water well agreements to properly permitted domestic and stock water wells within the circle of influence of the proposed CBNG wells.

The development of coal bed natural gas and the production and discharge of water in the area surrounding the existing natural spring may affect the flow rate or water quality of the spring.

Impacts due to water production from this action are addressed in the WMP for the Moolah POD prepared by CBM Associates Inc. for Yates Petroleum Corporation.

4.4.2.1. Surface Water Cumulative Effects

The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Middle Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

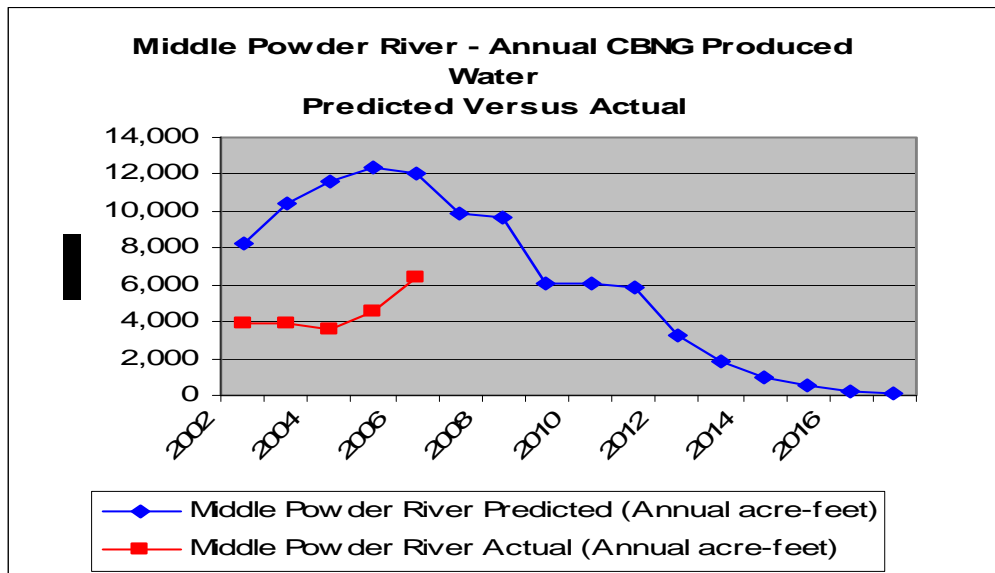
As of December 2006, all producing CBNG wells in the Middle Powder River watershed have discharged a cumulative volume of 22,292 acre-ft of water compared to the predicted 54,690 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.6 and Figure 4.1 following. This volume is 40.8% of the total predicted produced water analyzed in the PRB FEIS for the Middle Powder River watershed.

Table 4.6 Actual vs predicted water production in the Middle Powder River watershed 2006 Data Update 3-16-07

Year	Middle Powder River Predicted (Annual acre-feet)	Middle Powder River Predicted (Cumulative acre-feet from 2002)	Middle Powder River Actual (Annual acre-feet)		Middle Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	8,257	8,257	3,929	47.6	3,929	47.6
2003	10,421	18,678	3,860	37.0	7,789	41.7
2004	11,640	30,318	3,547	30.5	11,336	37.4
2005	12,328	42,646	4,588	37.2	15,924	37.3
2006	12,044	54,690	6,368	52.9	22,292	40.8
2007	9,897	64,587				
2008	9,689	74,276				
2009	6,030	80,306				
2010	6,030	86,336				
2011	5,899	92,235				
2012	3,276	95,511				
2013	1,797	97,308				

Year	Middle Powder River Predicted (Annual acre-feet)	Middle Powder River Predicted (Cumulative acre-feet from 2002)	Middle Powder River Actual (Annual acre-feet)		Middle Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2014	964	98,272				
2015	495	98,767				
2016	231	98,998				
2017	82	99,080				
Total	99,080		22,292			

Figure 4.1 Actual vs predicted water production in the Middle Powder River watershed



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation water. The water quality analysis in the PRB FEIS was conducted using produced water quality data, where available, from existing wells within each of the ten primary watersheds in the Powder River Basin. These predictions of EC and SAR can only be reevaluated when additional water quality sampling is available.

The PRB FEIS states, “Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ’s (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. As the two states develop a better understanding of the effects of CBM discharges through the enhanced monitoring required by the MOC, they can adjust the permitting approaches to allow more or less discharges to the Powder River drainage. Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117)

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur as a result of

discharged produced CBNG water. The cumulative effects relative to this project are anticipated to be within the parameters of the PRB FEIS for the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the Middle Powder River drainage, which is approximately 40.8% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to contain all discharged CBNG water.

Refer to the PRB FEIS, Volume 2, page 4-115 – 117 and table 4-13 for cumulative effects relative to the Middle Powder River watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

The Bureau of Land Management has determined that no historic properties are within the area of potential effect. Sites 48CA5587 and 48CA5588 will be impacted by the project; however both are considered not eligible to the NRHP. No historic properties will be impacted by proposed construction. On 2/16/07, the Bureau electronically notified the Wyoming State Historic Preservation Office (SHPO) following section V(A)(2) of the Wyoming State Protocol that no historic properties were identified in the proposed project area.

If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the *Standard COA* (General)(A)(1).

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Sara Needles	Wyoming SHPO	Wyoming SHPO	No

6. OTHER PERMITS REQUIRED

A number of other permits are required from Wyoming State and other Federal agencies. These permits are identified in Table A-1 in the PRB FEIS Record of Decision.

7. REFERENCES AND AUTHORITIES

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