FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Lance Oil & Gas Company, Inc.
Big Corral Unit Epsilon
ENVIRONMENTAL ASSESSMENT –WY-070-07-043

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Lance Oil & Gas Company, Inc.'s Big Corral Unit Epsilon Coal Bed Natural Gas (CBNG) POD comprised of the following 8 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	BIG CORRAL U EPSILON E KNUDSON	23-2*	NESW	2	53N	78W	WYW146361
2	BIG CORRAL U EPSILON E KNUDSON	34-2	SWSE	2	53N	78W	WYW146361
3	BIG CORRAL U EPSILON E KNUDSON	14-11	SWSW	11	53N	78W	WYW146363
4	BIG CORRAL U EPSILON E KNUDSON	21-11	NENW	11	53N	78W	WYW126722
5	BIG CORRAL U EPSILON E KNUDSON	23-11	NESW	11	53N	78W	WYW146363
6	BIG CORRAL U EPSILON E KNUDSON	32-11	SWNE	11	53N	78W	WYW146363
7	BIG CORRAL U EPSILON FED	43-10	NESE	10	53N	78W	WYW146362
8	BIG CORRAL U EPSILON TIETJEN	23-3	NESW	3	53N	78W	WYW146361

The following impoundments were approved as part of WMP for this POD:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Outfall Number	Lease Number
1	E23-2-5378	SENW	2	53	78	006	WYW146361
2	Haigler Stock Reservoir 1	SWSE	2	54	79	001	WYW146361
3	Cottonwood North #1	SENW	3	53	78	010	WYW152544
4	Cottonwood #1	SENW	3	53	78	011	WYW152544
5	P13-1-5378	NWSW	1	53	78	005	WYW146361
6	P33-2-5378	NWSE	2	53	78	003	WYW146361
7	P22-2-5378	SENW	2	53	78	007	WYW146361
8	Cottonwood North #2	SWSE	34	54	78	009	Fee
9	Cottonwood North #3	SWSE	34	54	78	008	Fee
10	P12-2-5379	SWSE	34	53	78	002	WYW145361
11	P42-10-5378	SWSE	34	53	78	004	Fee
12	P22-11-5378	SWNW	11	53	78	None	Fee
13	P12-11-5378S	SWNW	11	53	78	None	Fee

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
Lance Oil & Gas Company, Inc.
Big Corral Unit Epsilon
PLAN OF DEVELOPMENT
WY-070-07-043

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 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

Proposed Action Title/Type: Lance Oil & Gas Company, Inc.'s Big Corral Unit Epsilon Plan of Development (POD) for 10 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 10 wells proposed within this POD, as follows:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	BIG CORRAL U EPSILON E KNUDSON	23-2	NESW	2	53N	78W	WYW146361

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
2	BIG CORRAL U EPSILON E KNUDSON	24-2	SESW	2	53N	78W	WYW126722
3	BIG CORRAL U EPSILON E KNUDSON	34-2	SWSE	2	53N	78W	WYW146361
4	BIG CORRAL U EPSILON E KNUDSON	14-11	SWSW	11	53N	78W	WYW146363
5	BIG CORRAL U EPSILON E KNUDSON	21-11	NENW	11	53N	78W	WYW126722
6	BIG CORRAL U EPSILON E KNUDSON	23-11	NESW	11	53N	78W	WYW146363
7	BIG CORRAL U EPSILON E KNUDSON	32-11	SWNE	11	53N	78W	WYW146363
8	BIG CORRAL U EPSILON FED	42-9	SENE	9	53N	78W	WYW146362
9	BIG CORRAL U EPSILON FED	43-10	NESE	10	53N	78W	WYW146362
10	BIG CORRAL U EPSILON TIETJEN	23-3	NESW	3	53N	78W	WYW146361

The following impoundments were originally proposed with this POD submittal:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Outfall Number	Lease Number
1	E23-2-5378	SENW	2	53	78	006	WYW146361
2	Haigler Stock Reservoir 1	SWSE	2	54	79	001	WYW146361
3	Cottonwood North #1	SENW	3	53	78	010	WYW152544
4	Cottonwood #1	SENW	3	53	78	011	WYW152544
5	P13-1-5378	NWSW	1	53	78	005	WYW146361
6	P33-2-5378	NWSE	2	53	78	003	WYW146361
7	P22-2-5378	SENW	2	53	78	007	WYW146361
8	Cottonwood North #2	SWSE	34	54	78	009	Fee
9	Cottonwood North #3	SWSE	34	54	78	008	Fee
10	P12-2-5379	SWSE	2	53	78	002	WYW145361
11	P42-10-5378	SWSE	10	53	78	004	Fee
12	P21-2-5378	NENW	2	54	78	003	WYW145361
13	P22-11-5378	SWNW	11	53	78	None	Fee
14	P12-11-5378S	SWNW	11	53	78	None	Fee

County: Sheridan

Applicant: Lance Oil & Gas Company, Inc.

Surface Owners: Eddie Knudson, Sheri Tietjen, BLM

The proposed action involves the following:

- Drilling of 10 total federal CBM wells in the Wall coal zone to depths ranging from 2025 to 2625 feet below ground surface.

- An unimproved and improved road network.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 11 new discharge points (7 discharge points in Big Corral/Jewel Draw are within the POD area) and 15 stock water reservoirs (10 new and 4 existing) that will provide total containment of CBNG well water discharge within the Upper Powder River primary watershed.

- A buried gas, water and power line network, and no central gathering/metering facilities or compression facilities.

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 MSRP, 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 minimized. 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 minimize 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 Big Corral Unit Epsilon POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well #	Aliquot	Section	T/R	Notes
23-2-5378	NESW	2	53/78	Engineered Section #1 changed. Access relocated to avoid ranch water line, per landowner's request. Erosion controls will be required to mitigate possible downstream impacts on Cottonwood Creek.

Well #	Aliquot	Section	T/R	Notes
24-2-5378	SESW	2	53/78	Well location was moved 50ft west to a Fee location. The operator submitted a letter withdrawing this APD.
23-3-5378	NESW	3	53/78	Constructed pad on location. The operator will cut and/or "round-off" the NE corner of the pad due to it's proximity to a drainage. Per landowner's request, the access road was moved up slope and changed to an Improved Road template design. In addition, the landowner requested all weather roads to all other facilities within the property.
43-10-5378	NESE	10	53/78	Sizeable disturbance of dense sage stand along access road. Fair to poor reclamation potential. Access route will require additional reclamation efforts. Sage brush mitigation plan will be required to alleviate impacts of access road construction.
14-11-5378	SWSW	11	53/78	Possibly brush hogging a 150ft long oval to minimize sage/surface disturbance. Expedient soil stabilization measures to mitigate impacts of access road construction/disturbance will be required.
23-11-5378	NESW	11	53/78	Constructed pad on location. Access road into location. The proposed access road will now cross drainage W of the well location. The southern section of Template Section #10 and Engineered Section #4 were subsequently dropped.

Water Management

One reservoir (P21-2-5378) on BLM surface was dropped due to access concerns.

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. 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.

4. The operator will supply to BLM copies of WYPDES permit changes for this POD as soon as they 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 when dry conditions persist (e.g., late summer or fall) or when the ground is frozen during the winter.

3. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.

4. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.

5. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.5. Wildlife

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.

2. 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.

3. 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.

4. 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.

5. The Companies will locate impoundments to avoid sagebrush shrublands, where practical.

6. 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.

7. 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.

8. 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.

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 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.

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.

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.

2.3.2.6.2. Black-footed Ferret

1. Site-specific project areas will be evaluated for suitable black-footed ferret habitat prior to permit

approval. Suitable habitat consists of a black-tailed prairie dog town or complex greater than 80 acres (USFWS 1989). A prairie dog town is a group of intact prairie dog holes whose density exceeds 8 burrows/acre; a complex consists of two or more neighboring prairie dog towns each less than 4.34 miles (7 kilometers) from the other (USFWS 1989).

2. Prairie dog colonies will be avoided wherever possible.

3. If suitable prairie dog colonies cannot be avoided, surveys will be conducted in compliance with the USFWS guidelines (USFWS 1989). The entire colony or colony complex affected will be surveyed, even if part of the colony has a burrow density below eight per acre.

4. If any black-footed ferrets are located, the USFWS will be consulted. Absolutely no disturbance will be allowed within prairie dog colonies inhabited by black-footed ferrets.

5. Additional mitigation measure may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to black-footed ferrets or their habitat. In the event that a mountain plover is located during construction or operation, the USFWS' Wyoming Field Office (307-772-2374) and the USFWS' Law Enforcement Office (307-261-6365) will be notified within 24 hours.

2.3.2.6.3. Mountain Plover

1. No project activities shall occur in suitable nesting habitat prior to surveys for nesting mountain plovers conducted in compliance with the most recent Mountain Plover Survey Guidelines (USFWS 2002). An approved biologist will conduct the surveys. Project activities shall be limited within identified nesting areas in a manner to avoid the abandonment of these areas.

2. A disturbance-free buffer zone of 0.25 mile will be established around all occupied mountain plover nesting habitat between March 15 and July 31.

3. 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.

4. 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.

5. Where possible, roads will be located outside of plover nesting areas.

6. 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.

7. 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.

8. Where possible, roads will be located outside of mountain plover nesting habitat. Maximum allowed travel speed on roads within 0.5 mile of identified mountain plover nesting areas shall not exceed 25

miles per hour from March 15 to July 31.

9. When above ground markers are used on capped and abandoned wells they will 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.

10. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

11. 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.

2.3.2.7. Visual Resources

1. The Companies will mount lights at compressor stations and other facilities on a pole or building and direct them downward to illuminate key areas within the facility while minimizing the amount of light projected outside the facility.

2.3.2.8. 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.

2.3.2.9. 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 form the BLM authorized officer.

2.3.3. Site specific mitigation measures

General

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

2. Please contact Julian Serafin – Natural Resource Specialist, @ (307) 684-1043, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

Surface Use

1. The operator will narrow access corridors, wherever possible, to avoid sizeable disturbance of dense

sage stand.

2. Access roads/pipeline corridors to the following well locations will be allowed a working width of 45 feet with a blading/clearing width not to exceed 25 feet: 43-10 and 14-11.

3. For those proposed disturbance areas mentioned below, there are lands with limited reclamation capability that shall be stabilized in a manner which eliminates accelerated erosion until a self-perpetuating non-weed native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be completed within 30 days of cessation of construction activities.

   Well locations: 14-11, 21-11, 23-11, 32-11, 43-10, and 23-2.
   Road/Pipeline section(s): Template Sections 1, 3, 4, 6, 8, and 9; and, Engineered Sections 1, 2, and 4.

4. Interim Reclamation of disturbed areas will adhere to the following guidance (as per the Wyoming Policy on Reclamation (IM WY-90-231):
   A. The reclaimed area shall be stable and exhibit none of the following characteristics:
      i. Large rills or gullies.
      ii. Perceptible soil movement or head cutting in drainages.
      iii. Slope instability on, or adjacent to, the reclaimed area in question.
   B. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
   C. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself.
      This shall be demonstrated by:
      i. Successful onsite establishment of species included in the planting mixture or other desirable species.
      ii. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
   D. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

5. 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 BCU-Epsilon POD is Covert Green 18-0617 TPX.

6. Provide 4" of aggregate where grades exceed 8% for stability and erosion prevention.

7. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing:

Grade	Drainage Spacing
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft

8. The operator is responsible for having the licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.

9. To reduce the potential for erosion related to storm events, any channel crossing will be reclaimed expediently to BLM standards, including appropriate revegetation and stabilization using Best Management Practices.

10. The operator will drill seed on the contour to a depth of 0.5 inch, 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:

Species	**% in Mix**	**Lbs PLS***
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	50	6.0
Bluebunch wheatgrass (Pseudoroegneria spicata ssp. Spicata)	35	4.2
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata) /or ***American vetch***(Vicia americana)	5	0.6
Totals	**100%**	**12 lbs/acre**

*Pure Live Seed
*Northern Plains adapted species
*Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed. Complete fall seeding after September 15 and prior to prolonged ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.

Wildlife

1. If any dead or injured threatened, endangered, proposed, or candidate species is located during construction or operation, the U.S. Fish and Wildlife Service's Wyoming Field Office (307-772-2374) and law enforcement office (307-261-6365) and BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours (T&C1).

2. Observations of any threatened, endangered, proposed, or candidate species within the project area shall be reported to the BLM Buffalo Field Office (307-684-1100).

3. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly re-vegetated if construction activities impact the vegetation in these areas. Re-vegetation will be designed to avoid the establishment of noxious weeds (CM 22).

4. Native seed mixes will be used to re-establish short grass prairie vegetation, where appropriate, during reclamation (T&C19).

5. 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, Lance will coordinate with the BLM to determine if additional resurveys will be required.

6. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.

7. No surface disturbing activities are permitted in suitable mountain plover habitat i.e. prairie dog colonies 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***
T54N, R78W	34	Cottonwood 2, Cottonwood 3 reservoirs and access road. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.
T53N, R78W	3	Access road to the 23-3 well.
T53N, R78W	2	Access road into reservoir P 12-2 and E 23-2, P reservoir 23-2 and access road, Haigler reservoir, 34-2 well, access road/pipeline to 14-2 well. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.
T53N, R78W	10	Access road/pipeline to Fee well 42-10 and reservoir 42-10. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.
T53N, R78W	11	Fed wells 21-11, 32-11 and access road/pipeline, access road to Fee well 12-11, P 12-11 reservoir and access road. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.

Note: Roads/pipelines to proposed Fee wells were submitted as part of the federal action, timing limitations will apply.

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).

8. 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:

Township/Range	***Section***	***Affected Wells and Infrastructure***
T53N, R78W	2	Access road/pipeline to Fee well 43-3. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.
T53N, R78W	3	Access road/pipeline to well 23-3, access road/pipeline to Cottonwood Reservoir and access road to Fee well 43-11. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.
T53N, R78W	10	Access road into Fee well 41-10, reservoir 42-10 and infrastructure, access road/pipeline to Fee well 43-3, access road to Fee well 42-10, access road/pipeline to Fee well 12-11 and Fed well 43-10 and infrastructure. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.
T53N, R 78W	11	Access road/pipeline to Fee well 12-11, access road to reservoir 12-11. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.
T53N, R78W	15	Proposed improved road leading into the main project area. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed.

Note: Roads/pipelines to proposed Fee wells were submitted as part of the federal action, timing limitations will apply.

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 shall be conducted no earlier than June 1 or later than June 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
3810	4938046N	403018E	T53N, R78W, Sec 10
1936	4938128N	403047E	T53N, R78W, Sec 10
New	4937780N	402300E	T53N, R78W, Sec 3

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.

9. No surface disturbing activities are permitted within 2 miles of the following leks: Cottonwood I, Cottonwood II, North Prong, Lake, Northwest Lake, between March 1 and June 15, prior to completion of a greater sage-grouse lek survey. This timing limitation will affect the "**Entire**" Big Corral Unit Epsilon project area.
    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. The maximum width for the access road and pipeline corridor into the 43-10 well will not exceed 25 feet. This will help to limit the loss of good sage grouse nesting habitat.

10. 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.

11. All other conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion shall be complied with.

Cultural

All earth moving activity in the following areas must be monitored by an archeologist who meets or exceed the qualification standards recommended by the Secretary of the Interior. The Bureau has identified these areas as containing the potential for buried cultural deposits (areas containing alluvial deposits along Cottonwood Creek). The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of all monitoring work. It is noted that many portions

of the required monitoring areas are outside the alluvial deposits within the creek bottom, the exact areas to be monitored are left to the discretion of the archeological monitor. All monitored areas must be plotted on a map provided with the monitoring report.

1. **Buried water pipeline between the P13-1-5378 reservoir and the P12-2-5378 reservoir in T54N R78W Section 2:** All earth moving activity within alluvial deposits of Cottonwood Creek must be monitored. The exact monitoring areas are left to the discretion of the archeological monitor.

2. **Access/utility corridor for the 23-2 well where it crosses the Cottonwood Creek drainage in T54N R78W Section 2:** All earth moving activity within alluvial deposits of Cottonwood Creek must be monitored; the exact area to be monitored is left to the discretion of the archeological monitor.

3. **P13-1-5378 reservoir in T54N R78W Sections 1 and 2:** All earth moving activity within alluvial deposits of Cottonwood Creek must be monitored; the exact area to be monitored is left to the discretion of the archeological monitor.

4. **Template road/utility corridor accessing the Cottonwood N #2 and Cottonwood N #3 reservoirs in T54N R78W Section 2:** All earth moving activity within alluvial deposits of Cottonwood Creek must be monitored; the exact area to be monitored is left to the discretion of the archeological monitor.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on June 1, 2006. Field inspections of the proposed Big Corral Unit Epsilon CBM project were conducted on October 19, 2006 by Kathy Brus, Natural Resource Specialist – BLM; Buck Damone, Archeologist – BLM; Guymen Easdale, Wildlife Biologist – BLM; Darrel Gentry, Field Superintendent – Lance Oil & Gas/Anadarko; Joy Kennedy, Permitting Specialist – Lance Oil & Gas/Anadarko; Craig Klaahsen, Construction Contractor – Lance Oil & Gas/Anadarko; Eddie T. Knudson, Surface Owner; Liz Hunter, Engineer – Kadrmas, Lee & Jackson; Ethan Jahnke, Federal Permitting Coordinator – Lance Oil & Gas/Anadarko; Don Malli, Representing Sherri Tietjen; Stan Phillips, Landman – Lance Oil & Gas/Anadarko; Nathan Rager, Hydrologist – WWC; Colt Rodeman, Drilling Supervisor – Lance Oil & Gas/Anadarko; Julian Serafin, Natural Resource Specialist – BLM, Chris Williams, Hydrologist – BLM; and, Brian Venn, Hydrologist – WWC.

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 & Endangered Species	X			Guymen Easdale
Floodplains		X		Chris Williams
Wilderness Values			X	Julian Serafin
ACECs			X	Julian Serafin
Water Resources	X			Chris Williams
Air Quality		X		Julian Serafin
Cultural or Historical Values		X		G.L. "Buck" Damone

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
				III
Prime or Unique Farmlands			X	Julian Serafin
Wild & Scenic Rivers			X	Julian Serafin
Wetland/Riparian		X		Chris Williams
Native American Religious Concerns			X	G.L. "Buck" Damone III
Hazardous Wastes or Solids		X		Julian Serafin
Invasive, Nonnative Species	X			Julian Serafin
Environmental Justice			X	Julian Serafin

3.1. Topographic Characteristics of Project Area

The Big Corral Unit Epsilon POD is within the southeastern portion of Sheridan County, approximately six miles southwest of Arvada, WY. Elevations within the project area range from 4000 to 4300 feet above sea level. The climate in the area is semi-arid averaging 12 inches of precipitation annually. More than half the annual precipitation normally occurs during the growing season; April, May and June typically account for the majority of this moisture. The topography throughout most of POD consists of gently sloping terrain to undulating rolling hills with deeply cut drainages. Slope gradients vary between 5 and 15 percent, with some slopes at times exceeding 40 percent. Cottonwood Creek and associated drainages dissect much of sections 3 and 10. Both Federal and Fee CBNG development exists around and within the proposed BCU-Epsilon POD. This, in conjunction with livestock grazing, are the major land uses within the general area.

3.2. Vegetation & Soils

Ecological Site Descriptions are used to provide soils and vegetation information needed for resource identification and management recommendations. To determine the appropriate Ecological Sites for this proposed action, BLM specialists analyzed data from onsite field reconnaissance and USDA Natural Resource Conservation Service (NRCS) soil survey information.

Using the NRCS Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains, in the 10-14" Northern Plains precipitation zone, the soils and plant communities identified in this POD are predominantly shallow loamy-mixed sagebrush/grass. However, small sections within the project area, primarily access roads in section 2 and portions of well 34-2, fall in the sandy needleandthread/prairie sandreed category.

Shallow loamy-mixed sagebrush/grass occurs on steep slopes and ridge tops, but may occur on all slopes. Landforms include hill sides, ridges and escarpments. The soils of this site are shallow (less than 20"to bedrock) well-drained soils formed in alluvium over residuum or residuum. These soils have moderate permeability and may occur on all slopes. The bedrock may be any kind which is virtually impenetrable to plant roots, except igneous. The surface soil will have one or more of the following textures: very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam. Thin ineffectual layers of other textures are disregarded. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. The main soil limitations include the depth to bedrock and low organic matter content.

The vegetation identified in the field indicates that the primary Ecological Site description would be a Mixed Sagebrush/Grass Plant Community. Historically, this plant community evolved under grazing by bison and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush control. Wyoming big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of

short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, little bluestem, sideoats grama, and blue gramma. Grasses of secondary importance include little bluestem, prairie junegrass, and Sandberg bluegrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Big sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains prickly pear and winterfat can also occur. Common grasses and plants identified during the onsite inspection included: needleandthread, prairie sandreed, Indian ricegrass, prickley pear cactus, prairie junegrass, and western wheatgrass. Differences in dominant species within the project area vary with soil type, aspect and topography.

Topsoil depths to be salvaged for reclamation range from 2 to 6 inches. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. However, reclamation potential is generally fair due to the project area's high T-factor score and topsoil thickness. T-factor is the maximum rate of annual soil erosion that will permit crop productivity to be sustained economically and indefinitely.

Soil Units affected by the proposed action include:
114 – Bidman-Ulm dry complex, 0 to 6 percent slopes
166 – Hiland-Decolney complex, 3 to 15 percent slopes
255 – Shingle-Haverdad association, 0 to 80 percent slopes
260 – Shingle-Rock outcrop complex, 30 to 50 percent slopes
268 – Shingle-Theedle-Kishona association, 6 to 25 percent slopes
317 – Zigweid-Kishona-Cambria complex, 6 to 15 percent slopes

For more detailed soil information, see the NRCS Soil Survey WY633, Sheridan County Area, Wyoming.

3.2.1. Wetlands/Riparian

No wetlands sizeable wetlands, other than existing reservoirs, were identified within the POD area. Stream reaches with enhanced riparian vegetation are uncommon.

3.2.2. Invasive Species

The Sheridan Weed and Pest Control District identifies leafy spurge as a known weed population in T53N R78W. However, observations made during the onsite inspection did not identify the occurrence of this invasive species in the project area. The presence of cheatgrass was noted during the onsite.

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 Big Horn Environmental Consultants. Big Horn Environmental Consultants performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006. No formal surveys were conducted for Ute ladies'-tresses orchid.

A BLM biologist conducted a field visit on October 19, 2006. 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.

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 Big Corral Unit Epsilon project area include mule deer and pronghorn antelope. The project area is part of the Powder River mule deer herd unit. The 2004 estimated population of this herd was 55,561 with a population objective of 52,000 (WGFD 2004). The project area is part of the Ucross pronghorn antelope herd unit. The 2004 population estimate for this herd was 4,145 animals with a herd objective of 2,500 (WGFD 2004). The population of each herd unit has been increasing since 1998.

The WGFD has designated the entire project area as winter-yearlong range for mule deer and yearlong range for pronghorn antelope. Populations for both species within their respective hunt areas are at or slightly above Wyoming Game Fish Department (WGFD) objectives.

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 Cottonwood Creek and its tributaries, all of which are ephemeral. Cottonwood Creek is a tributary to the Powder River. No springs were identified within the project area (WWC Engineering 2006). 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.

Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

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).

3.3.4. Raptors

Ten raptor nest sites were identified by Big Horn Environmental Consultants and BLM within 0.5 mile of the project area, of these 6 nests were active in 2006.

Table 3.2. Documented raptor nests within the Big Corral Unit Epsilon project area in 2006.

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS
1934	Burrowing Owl	402907E 4935780N	T53N,R78W NWSE Sec 15	Ground (prairie dog colony)	Unknown	Unable to locate 2006
1936	Burrowing	403047E	T53N,R78W	Ground (prairie	Gone	Inactive

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS
	Owl	4938128N	NENE Sec 10	dog colony)		
3520	Long-eared Owl	401127E 4938572N	T53N,R78W SWSE Sec 4	Juniper Tree	Fair	Active
3521	Long-eared Owl	400624E 49838443N	T53N,R78W SESW Sec 4	Juniper Tree	Fair	Active
3522	Long-eared Owl	400706E 4938588N	T53N,R78W SESW Sec 4	Juniper Tree	Good	Active
3523	Long-eared Owl	400638E 4938450N	T53N,R78W SESW Sec 4	Juniper Tree	Good	Active
3524	Unknown Raptor	400778E 4938146N	T53N,R78W NENW Sec 9	Juniper Tree	Fair	Inactive
New	Burrowing Owl	403700E 4934992N	T53N,R78W NWNW Sec 23	Ground (prairie dog colony)	Unknown	Active
New	Burrowing Owl	402300E 4937780N	T53N,R78W SENW Sec 10	Ground (prairie dog colony)	Unknown	Unable to locate
New	Red-tailed Hawk	403018E 4938046N	T53N,R78W NENE Sec 10	Juniper Tree	Good	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).

Twenty-two active and densely populated black-tailed prairie dog colonies were identified during site visits by Big Horn Environmental Consultants within and surrounding the Big Corral Unit Epsilon project area. An additional 13 active and densely populated black-tailed prairie dog colonies are within three miles of the project area. The project area is within the Arvada potential reintroduction area. Black-footed ferret habitat is present within and around the Big Corral Unit Epsilon project area.

Prairie Dog Colonies Located Within the Big Corral Unit Epsilon Project Area and Near the Boundaries.

Legal Location Township, Range and Section	Size Acres	Location to Project Area
T53N, R78W northern portion of Sec 10 and the southern portion of Sec 3.	74.1	Within the project area.
T53N, R78W central portion of Sec 10	0.64	Within the project area.
T53N, R78W east central portion of Sec 3	31.3	Within the project area.
T53N, R78W SW1/4 Sec 2 and the northern portion of Sec 11	129	Within the project area.
T53N, R78W central portion Sec 2	6.8	Within the project area.
T53N, R78W central portion Sec 2	7.5	Within the project area.
T53N, R78W central portion Sec 2	9.5	Within the project area.
T53N, R78W SE1/4 Sec 2	7.5	Within the project area.
T53N, R78W west central portion Sec11	14.3	Within the project area.
T53N, R78W SE 1/4 Sec 15	50.4	Within the project area.
T53N, R78W SW 1/4 Sec 14 and NW 1/4 Sec 23	41.1	Within the project area.
T54N, R78W SE1/4 Sec 34 and SW 1/4 Sec 35	18.5	Within the project area.
T54N, R78W SW 1/4 Sec 35	21.1	Within the project area.
T54N, R78W SW 1/4 Sec 35	27.5	Within the project area.
T54N, R78W SW 1/4 Sec 35	13.3	Within the project area.
T54N, R78W NE 1/4 Sec 34	57.4	Within the project area.
T54N, R78W SE1/4 Sec 34	48	Within the project area.
T54N, R78W SE1/4 Sec 34	18.54	Within the project area.
T54N, R78W NW1/4 Sec 34	23.0	Within 0.3 miles of the project area.
T54N, R78W SW1/4 Sec 35	27.5	Within the project area.
T54N, R78W SW1/4 Sec 35	13.3	Within the project area.
T54N, R78W SW1/4 Sec 35	21.1	Within the project area.
Total	**661.38**	

The prairie dog colonies within and adjacent to the project area range in size from 0.64 to 129 acres. The total acreage for all 35 colonies equals 2,445.8 acres and the average distance between the 35 colonies is 0.37 miles.

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.

Juniper (*Juniperus spp*) trees are found in the upland draws. There are only a few lone cottonwood trees scattered throughout the project area. In general, the area would be classified as poor bald eagle nesting and winter roosting habitat. However, there are a few documented bald eagle nests in the Powder River Basin where bald eagles are nesting in areas which contain a single tree within a grassland/sage brush habitat type. These nest sites are associated with large active prairie dog colonies and have been found 5 to 15 miles from a water source (i.e. stream, river or lake). Clear Creek is located approximately 7.2 miles northwest and the Powder River is located approximately 5 miles east of the project area. The dense stands of cottonwood trees along Clear Creek and along the Powder River provide better nesting and winter roosting habitat than the few isolated cottonwood trees within the project area, however, a reliable prey base (661.38 acres of active and densely populated prairie dog colonies) exist within the project area. Bald eagles are likely to use the area regularly for foraging and may choose to nest or roost here to be closer to a reliable prey source.

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.

Cottonwood Creek and its tributaries are ephemeral. No springs occur within the project area (WWC Engineering 2006). Suitable orchid habitat is not present within the Big Coral Unit Epsilon project area.

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.

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Prairie dogs colonies create a biological niche or habitat for many species of wildlife (King 1955, Reading 1989). Agnew (1986) found that bird species diversity and rodent abundance were higher on

prairie dog towns than on mixed grass prairie sites. Several studies (Agnew 1986, Clark 1982, Campbell and Clark 1981 and Reading1989) suggest that richness of associated species on black-tailed prairie dog colonies increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of numerous prey species (Clark 1982, Agnew 1986, Agnew 1988).

In South Dakota, forty percent of the wildlife taxa (134 vertebrate species) are associated with prairie dog colonies (Agnew 1983, Apa 1985, Mac Cracken 1985, Agnew 1986, Uresk 1986, Deisch 1989). Of those species regularly associated with prairie dog colonies, six are on the Wyoming BLM sensitive species list. The species of concern are swift fox (*Vulpes velox*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), long-billed curlew (*Numenius americanus*).

Continued loss of prairie dog habitat and active prairie dog towns will result in numerous sensitive species decline in the short grass prairie ecosystem.

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 burrowing rodent that feeds primarily on grasses. The black-tailed prairie dog is the only species of prairie dog that is found on the short and mid-grass plains east of the Rockies. Black-tailed prairie dogs avoid areas with tall grass, heavy sagebrush and other thick vegetative cover which interfere with detection of predators (Krueger 1986, Clark and Stromberg 19987).

Early historical records suggest black-tailed prairie dogs may have been the most abundant mammals in North America at the time of the first Euro-American explorations of the west. Merriam calculated that prairie dogs occupied some 700 million acres of the West in the late 1800's (Cully 1989). Since the turn of the century, it is estimated that prairie dog numbers have been reduced 98-99% of their former numbers across the West (Miller 1994).

Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented, and isolated (Miller1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations and other problems that affect long term population viability (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994). An additional threat is posed by Sylvatic plague (Cully1989) which, combined with other human-caused mortality, may hasten the extirpation of the rodent from the Great Plains.

The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of Sylvatic plague and the extent of control efforts by landowners. Mapping conducted by the Wyoming Game and Fish Department between 1982 and 1987 indicated a minimum of 131,000 acres of black-tailed prairie dog colonies with a maximum estimate of 204,000 acres. Comparisons with 1994 Digital Ortho Quads indicated that black-tailed prairie dog acreage remained stable from 1994 through 2001. However, aerial surveys conducted in 2003 to determine the status of all known colonies indicated that a significant portion (approximately 47%) of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier 2005).

Twenty two active and densely populated black-tailed prairie dog colonies were identified during site visits by Big Horn Environmental Consultants within and around the Big Corral Unit Epsilon project area.

Prairie Dog Colonies Located Within the Big Corral Unit Epsilon Project Area and Near the Boundaries.

Legal Location Township, Range and Section	Size Acres	Location to Project Area
T53N, R78W northern portion of Sec 10 and the southern portion of Sec 3.	74.1	Within the project area.
T53N, R78W central portion of Sec 10	0.64	Within the project area.
T53N, R78W east central portion of Sec 3	31.3	Within the project area.
T53N, R78W SW1/4 Sec 2 and the northern portion of Sec 11	129	Within the project area.
T53N, R78W central portion Sec 2	6.8	Within the project area.
T53N, R78W central portion Sec 2	7.5	Within the project area.
T53N, R78W central portion Sec 2	9.5	Within the project area.
T53N, R78W SE1/4 Sec 2	7.5	Within the project area.
T53N, R78W west central portion Sec11	14.3	Within the project area.
T53N, R78W SE 1/4 Sec 15	50.4	Within the project area.
T53N, R78W SW 1/4 Sec 14 and NW 1/4 Sec 23	41.1	Within the project area.
T54N, R78W SE1/4 Sec 34 and SW 1/4 Sec 35	18.5	Within the project area.
T54N, R78W SW 1/4 Sec 35	21.1	Within the project area.
T54N, R78W SW 1/4 Sec 35	27.5	Within the project area.
T54N, R78W SW 1/4 Sec 35	13.3	Within the project area.
T54N, R78W NE 1/4 Sec 34	57.4	Within the project area.
T54N, R78W SE1/4 Sec 34	48	Within the project area.
T54N, R78W SE1/4 Sec 34	18.54	Within the project area.
T54N, R78W NW1/4 Sec 34	23.0	Within 0.3 miles of the project area.
T54N, R78W SW1/4 Sec 35	27.5	Within the project area.
T54N, R78W SW1/4 Sec 35	13.3	Within the project area.
T54N, R78W SW1/4 Sec 35	21.1	Within the project area.
Total	**661.38**	

The active prairie dog colonies within the Big Corral Unit Epsilon range in size from 0.64 acres to 129 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).

Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), the primary shrub, occurs throughout 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. 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 six sage grouse leks within 3.0 miles of the Big Corral Unit Epsilon project area. These lek sites are identified

below (Table 6).

Table 3.3. **Sage-grouse leks surrounding the Big Corral Unit Epsilon project area.**

Lek Name	Legal Location	Status In 2006 (Peak Males)	Distance From Project Area
Cottonwood I	T53N, R78W NESW Sec 5	23 males 45 individuals (unable to determine sex)	1.8 miles
Cottonwood II	T53N, R78W NENE Sec 9	2 males	Within the project area
North Prong	T54N, R78W NENE Sec 27	23 males	1.2 miles
Lake	T53N, R78W NWNE Sec25	6 males	1.7miles
Jewell Draw	T53N, R78W NWSE Sec 34	66 males	2.6 miles
Northwest Lake	T53N, R78W SWNE Sec23	8 males	0.6 miles

3.3.5.2.3. Mountain plover

The mountain plover originated on the plains, nesting solely on arid, level terrain (0-5% slope) with short vegetation and plenty of bare ground-the kind of habitat typically found in prairie dog colonies. According to Dinsmore (1995-2000) more food exists on prairie dog colonies than on adjacent grasslands. Prairie dogs produce lots of feces, which attracts the insects plovers like to eat. Consequently, prairie dog colonies long ago became prime nesting grounds for mountain plovers. According to the U.S. Geological Survey, prairie dogs currently exist on less than one percent of their former range, and their numbers have declined by 98 percent (Turbak 2004). Mountain plover numbers have declined-possibly from millions-to only about 10,000 birds today (Turbak 2004).

Once a common breeder in the short-grass prairie habitat of the Great Plains, the species is now absent from most of the eastern edge of its former range in South Dakota, Nebraska, Kansas, and Oklahoma. Numbers have also dropped considerably in the heart of its range in Montana, Wyoming, Colorado and New Mexico.

In September 2003, the U.S. Fish and Wildlife Service withdrew their proposal to list the mountain plover. However, the mountain plover remains an agency-designated Sensitive Species within both the Bureau of Land Management and the Forest Service.

Due to 22 active black-tailed prairie dog colonies within and adjacent to the project area and oil and gas development occurring within and adjacent to the project area, good mountain plover habitat exists throughout the area.

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 Upper Powder River drainage system. The POD area is located within the Cottonwood Creek watershed which flows into the Powder River approximately 7 miles east of the eastern boundary. Cottonwood Creek is ephemeral as are all of the small tributaries the drain the 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 3 registered stock and domestic water wells within the POD boundary with depths ranging from 580 to 1265 feet. Federal CBM wells will be completed in the Wall coal zone at depths ranging from 2025 to 2625 feet below ground surface (elevation ranges from approximately 4000 to 4300 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 within the Cottonwood Creek drainage which is tributary to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – 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 μmhos/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 Upper Powder River watershed, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located at Arvada, WY, Station ID 06317000 (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 cultural resource inventories were conducted for the Big Corral Unit Epsilon project prior to on-the-ground project work (BFO project no. 70060266). North Platte Archaeological Services conducted a Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. G.L. "Buck" Damone III, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following cultural resources are located near the area of potential effect.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	Eligibility
48SH1400	Historic Homestead	Not Eligible

Site Number	Site Type	Eligibility
48SH1401	Ranching Debris	Not Eligible
48SH1402	Historic Homestead	Not Eligible
48SH1403	Cairn	Unevaluated
48SH1404	Lithic Scatter	Eligible
48SH1405	Lithic Scatter/Historic Trash	Eligible

3.7. Foot Rot

Foot rot, also called infectious pododermatitis, foul claw, or hoof rot, is an acute or chronic infection of cattle characterized by lameness, swelling, and inflammation of the skin of the coronary band and the skin between the claws. The disease is seen most commonly in feedlot cattle or in the winter and spring months when mud, urine, and manure are the greatest problem. There is no indication that incidence of foot rot has occurred or increased anywhere in the Powder River Basin in association with coal bed methane development. It is extremely unlikely foot rot problems will occur or increase as a result of this project, therefore it will not be discussed further in this analysis.

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action, 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 8 proposed well locations, 1 can be drilled without a well pad being constructed, 5 locations will need slotted pads, and 2 will definitely require a constructed (cut & fill) well pad (wells 23-3 and 23-11). Surface disturbance associated with the drilling of the one [non-constructed] well would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 20 x 64 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with this well would involve approximately 0.2 acre/well. Of the 5 wells requiring slotted pads, 2 pads are 120ft x 20ft; 2 pads are 120ft x 30ft; and, 1 pad is 130ft x 30ft. Each slotted pad also involves a well layout of approximately 0.2 acre/well for 1 total acre. The other 2 wells requiring cut & fill pad construction would disturb approximately 1.31 acres/well at one location, and 0.31 acres/well at the second location for a total of 1.62 acres. The total estimated disturbance for all 8 wells would be 2.82 acres. This would be a short-term impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Approximately 7.02 miles of improved roads would be constructed to provide access to various well locations. Approximately 1.88 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 2.22 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, gabions etc.) would ensure land productivity/stability is regained and maximized.

Proposed stream crossings, including 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	1	0.2/acre	0.2	
Slotted Pad	5	0.2/acre	1.0	Long Term
Constructed Pad	2	Site Specific	1.62	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0.0	Long Term
Impoundments				
On-channel	13	Site Specific	55.12	
Off-channel	0.0	Site Specific	54.9	Long Term
Water Discharge Points	11	Site Specific or 0.01 ac/WDP	0.0 0.22	
Channel Disturbance				
Headcut Mitigation*	0.0	Site Specific	0.0	
Channel Modification	0.0	Site Specific	0.0	
Improved Roads:				
No Corridor		45' Width for Template roads 50' Width for Engineered roads	12.28	
Engineered	0.15			Long Term
Template	2.08			
With Corridor			26.42	
Engineered	0.47			
Template	4.32			
2-Track Roads				
No Corridor	0.0	45' Width		Long Term
With Corridor	1.88		10.22	
Pipelines				
No Corridor	2.22	45' Width	12.09	Short Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Buried Power Cable No Corridor	0.0	12' Width or Site Specific	0.0	Short Term
Overhead Powerlines	1.16	30' Width	4.20	Long Term
Additional Disturbance	0.0	Site Specific	0.0	

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 are no effects to existing wetlands as a result of this POD development. Seepage discharge from the impoundments may potentially allow for vegetation enhancement through wetland-riparian species establishment in ephemeral channels.

4.1.2. Invasive Species

Based on the investigations performed during the POD planning process, the operator has committed to the control of noxious weeds and species of concern using following measures in an Integrated Pest Management Plan (IPMP) included in the proposal:

1. Control Methods, including frequency
2. Preventive practices
3. Education

The species downy brome, *Bromus tectorum* and to a lesser extent, Japanese brome, *Bromus Japonicus* are known to exist in the affected environment. These two species are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible at this time. Pricklypear cactus, *Opuntia polyacantha*, is a native species and found throughout native rangelands. A control program for this species is not recommended.

The use of existing facilities along with the 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, Canada thistle and perennial pepperweed. However, mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants.

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 within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 14.7% 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 monitor the volume of water flowing into Cottonwood Creek.
- The WMP for the Big Corral Unit Epsilon proposes to contain all produced water; therefore, there will be no contribution downstream flows other than infiltration water that may resurface.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, winter 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 9 on-channel impoundments. 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.

4.2.2.1. Cumulative effects

WDEQ is aware of the concerns about the effects of water quality and flows relative to discharge of treated water directly into the Powder River. They are taking a conservative approach to permitting until more information can be obtained and their watershed based permitting approach is implemented. Long term water quality and flow monitoring, that would be required in the NPDES permit, would ensure that effluent limitations are met. Under permitted conditions, it is not anticipated that existing downstream water uses would be affected. 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 4-247. No additional mitigation measures are required.

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, pipelines and reservoirs. 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.

Existing and newly constructed reservoirs may have either a positive or negative affect on waterfowl. The reservoirs may provide winter forage and nesting habitat for migrating waterfowl and shore birds. Concentrations of salts and metals, particularly barium and selenium, may increase in the containment reservoirs receiving coalbed natural gas produced water discharges, as water evaporates over time. Direct effects (toxicity) to waterfowl could occur, depending on the quality of the produced water.

Salt toxicosis has been reported in ponds with sodium concentrations over 17,000 mg/L. Ingestion of water containing high sodium levels can chronically affect aquatic birds, especially if a source of fresh water is not available nearby. Aquatic birds ingesting hypersaline water can be more susceptible to avian botulism. During cooler temperatures, sodium in the hypersaline water can crystallize on the feathers, causing problems with thermoregulatory and buoyancy functions causing the bird to die of hypothermia or drowning.

With numerous existing reservoirs surrounding the project area and nine proposed reservoirs within the

project area, the potential for mosquito breeding areas will increase. With the creation of more reservoirs within the sage brush community more species are being exposed to the West Nile virus. Mortality rates are likely to increase and reproductive success is likely to decrease in most bird species using the region. 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 Big Corral Unit Epsilon project area (Timing limitations will apply to this infrastructure).

BLM ID#	UTM (NAD 83)	SPECIES	STATUS	WELL / PIT NUMBER	DISTANCE
3810	403018E 4938046N	Red-tailed Hawk	Active	Road/pipeline to Fee well 43-3; Road/pipeline to Fee well 41-10; Pipeline to Fee well 41-10; Road/pipeline to Fee well 12-11; Reservoir 42-10 and access road; Road/pipeline to Fed well 23-3; Road/pipeline to Cottonwood 2 Res. Road/pipeline to Fed well 43-10;	0.19 miles 0.25 miles 0.03 miles 0.34 miles 0.20 miles 0.24 miles 0.23 miles 0.4 miles
1936	403047E 4938128N	Unknown Raptor	Inactive	Road/pipeline to Fee well 43-3; Road/pipeline to Fee well 41-10; Pipeline to Fee well 41-10; Road/pipeline to Fee well 12-11; Reservoir 42-10 and access road; Road/pipeline to Fed well 23-3; Road/pipeline to Cottonwood 2 Res. Road/pipeline to Fed well 43-10	0.19 miles 0.25 miles 0.03 miles 0.34 miles 0.20 miles 0.24 miles 0.23 miles 0.4 miles
New	402300E 4937780N	Burrowing Owl	Active	Road/pipeline to Fed well 23-3	0.35 miles
1934	402907E 4935780N	Burrowing Owl	Inactive	Improved road to Fed well 34 10; Proposed template road to Fed well 23-11	0.09 miles 0.08 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.

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 (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NS	NLAA	Suitable habitat of sufficient size exists within the project area and within 1.5kilometers of the project area.
Threatened				
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body.	S	LAA	Project includes overhead power and roads.
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	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

Black-tailed prairie dog colonies within the Big Corral Unit Epsilon project area are of sufficient size for supporting ferrets and are located within the Arvada potential reintroduction area.

There are four proposed gas wells (2 Fee and 2 Fed) and their associated infrastructure within active prairie dog colonies. The wells are listed below:

Township/Range	Section	Affected Wells and Infrastructure
T53N,R78W	11	Well Fee 12-11, Fed 32-11
T53N,R78W	2	Fee 14-2, Fed 23-2; Reservoir 23-2 and Haigler Reservoir
T54N, R78W	34	Cottonwood 1, Cottonwood 2 Reservoirs

Approximately 38.6 acres of black-footed ferret habitat will be lost due to well pad, road/pipeline and reservoir construction. The construction of well pads, roads, pipelines and reservoirs causes direct prairie dog mortalities and an immediate loss of prairie dog burrows, thus causing direct habitat loss for the black-footed ferret.

Because suitable habitat is of sufficient size to support a black-footed ferret population and the project area is in the potential reintroduction area, but it is highly unlikely ferrets are present, implementation of the proposed development ***"may affect, but is not likely to adversely affect"*** the black-footed ferret. If any ferrets become present, the proposed action will most likely make portions of the project area unsuitable for inhabitance.

4.2.5.1.2. Bald eagle

Based on the raptor nesting and bald eagle winter roost surveys no bald eagles where observed nesting or roosting within the Big Corral Unit Epsilon project area. With 35 active and densely populated black-tailed prairie dog colonies within and adjacent to the project area and the close proximity to Clear Creek and the Powder River, bald eagles are likely to be found foraging in the area on a regular basis. Eagles may also initiate a nest or roost site to take advantage of the large prey base.

The Big Corral Unit Epsilon project area is surround by extensive natural gas development, existing 3-phase overhead powerlines can be found surrounding the project area. There are 1.13 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 (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Lance is proposing an additional 1.16 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 lacking, such as the Big Corral Unit Epsilon project area. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). 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 9 proposed reservoirs which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs 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.

The proposed project is ***"likely to adversely affect"*** bald eagles due to roads, overhead powerlines and reservoirs.

4.2.5.1.3. Ute's Ladies Tresses Orchid

All wells and infrastructure are located in dry upland vegetation with no perennial water.
Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area.

Suitable habitat is not present, therefore the proposed development of the Big Corral Unit Epsilon 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 (*Rana pipiens*)	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will effect existing waterways.
Spotted frog (*Ranus pretiosa*)	Ponds, sloughs, small streams	NP	NI	Prairie not mountain habitat.
Birds				
Baird's sparrow (*Ammodramus bairdii*)	Grasslands, weedy fields	S	MIIH	Sagebrush cover will be affected.
Brewer's sparrow (*Spizella breweri*)	Basin-prairie shrub	S	MIIH	Sagebrush cover will be affected.
Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	K	MIIH	Prairie dog burrows will be lost.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Sage brush grassland habitat will be lost, human activity will be present within the area.
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush cover will be lost, roads and powerlines will displace birds.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be lost.
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	S	MIIH	Sage and grassland habitat will be lost.
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	S	MIIH	22 Active prairie dog colonies occur within and adjacent to the project area.
Northern goshawk (*Accipiter gentilis*)	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon (*Falco peregrinus*)	cliffs	NP	NI	No nesting habitat present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (*Amphispiza billneata*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be lost.
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be lost.
Trumpeter swan (*Cygnus buccinator*)	Lakes, ponds, rivers	S	MIIH	Reservoirs may contain high concentrations of salts
White-faced ibis (*Plegadis chihi*)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (*Coccyzus americanus*)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (*Oncoryhynchus clarki bouvieri*)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (*Cynomys ludovicianus*)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIIH	Prairie dog burrows and habitat will be lost.
Fringed myotis (*Myotis thysanodes*)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (*Myotis evotis*)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat (*Euderma maculatum*)	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not present.
Swift fox (*Vulpes velox*)	Grasslands	S	MIIH	Grassland habitat and prairie dog colonies will be lost.
Townsend's big-eared bat (*Corynorhinus townsendii*)	Caves and mines.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Plants				
Porter's sagebrush (*Artemisia porteri*)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (*Cymopterus williamsii*)	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

There are four proposed gas wells (2 Fee and 2 Fed) and their associated infrastructure within active prairie dog colonies. The wells are listed below:

Township/Range	Section	Affected Wells and Infrastructure
T53N,R78W	11	Well Fee 12-11, Fed 32-11
T53N,R78W	2	Fee 14-2, Fed 23-2; Reservoir 23-2 and Haigler Reservoir
T54N, R78W	34	Cottonwood 1, Cottonwood 2 Reservoirs

Approximately 38.6 acres of active and densely populated prairie dog colonies and foraging habitat will be lost due to well pad, road/pipeline and reservoir construction. The construction of well pads, roads, pipelines and reservoirs will cause direct prairie dog mortalities and an immediate loss of prairie dog burrows. When construction begins on reservoirs, roads, pipelines and pads the earth moving equipment can remove anywhere from an inch to over several feet of dirt at one time destroying prairie dog burrows and foraging habitat.

Due to steepness of topography surrounding the prairie dog colonies, moving wells and access roads would cause more surface disturbance and more loss of sage grouse nesting habitat. Prairie dogs are likely to re-colonize roads/pipelines and well pads.

During construction of these facilities, there is the possibility that many of the prairie dogs within these colonies may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows puts considerable stress on the animals and will cause an increase in prairie dog mortalities. During the construction of these facilities individuals are exposed more frequently to predators and have less protective cover.

Individuals that survive the excavation process will likely be displaced. As the prairie dog town grows in size, prairie dogs move from an area of high population density to an area of low population density. The expansion of the colony/town is from the center out to the edges. Male prairie dogs resort to either long-distance dispersal to new colonies (mostly as yearlings, rarely as adults) or short distance within the home colony. Female prairie dogs disperse over long distances to other colonies (as either yearlings or adults). Short-distance dispersal of females within the home colony almost never occurs (Hoogland 1995). Dispersal of prairie dogs occurs as single individuals. Both male and female prairie dogs prefer to move into an existing colony or one that has been abandoned rather than start a completely new colony. Coterie (small family group within the colony) members resist attempted invasions by conspecifics including immigrants. Dispersing prairie dogs have increased stress levels, higher exposure to predators, and are unlikely to be accepted by other colonies if they even encounter one. Both males and females actively protect their coterie territories from invading males and females (Hoogland 1995).

Two of the reservoirs occur in the middle of densely populated active prairie dog colonies. Mass immigration to surrounding colonies from those destroyed by the reservoirs would expose the prairie dogs to a higher rate of predation and an increase in stress resulting in higher mortality rate. Depending on when the construction occurs, the prairie dogs may be forced to disperse at the wrong time of the year when their body condition is below peak heath levels, thus creating more stress on the animals and resulting in a higher mortality rate. Another problem with displacement of the prairie dogs into the surrounding area is that the soil and vegetation may not be conducive to prairie dog survival.

Unlike roads and pipelines, the construction and operation of reservoirs will permanently remove habitat. By the time the reservoirs are no longer needed, the reservoirs may become hard pan, soil that has

hardened due to mineral deposits and evaporation. Prairie dogs may be unable to burrow in this type of soil compaction.

The well house and nearby power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent road may result in prairie dog road mortalities.

4.2.5.2.2. Greater sage-grouse

The 43-9 well was dropped. The well was located inside the quarter mile controlled surface use buffer of a sage grouse lek. By eliminating construction, drilling activity and human presence within a quarter mile of a sage grouse lek, breeding success should be protected.

The maximum width for the access road and pipeline corridor into the 43-10 well will not exceed 25 feet. This will help to limit the loss of sage-grouse nesting habitat.

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.

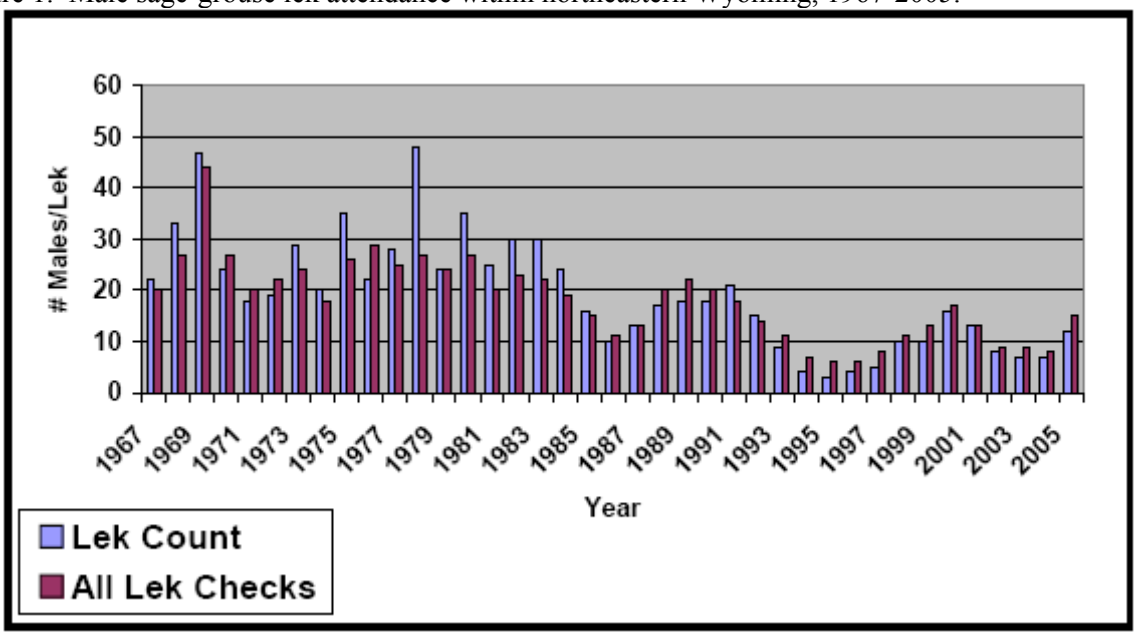
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km (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 Hollaran 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 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 (Connely 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

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipeline corridors 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. Overhead power lines provide perch sites for raptors that could

potentially result in increased mountain plover predation. CBNG infrastructure such as 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 and pipelines. 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 (USWFS) 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).

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

This project will 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, beyond CBM discharge, throughout the PRB that would add to the potential for mosquito habitat. Sources include; natural flows, livestock watering facilities, coal mining operations, and outdoor water use and features in and around communities.

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. Based on current information, we determined that no significant impacts in the spread of WNv would occur from the implementation of this project.

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, monitoring of downstream impacts within the Upper 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 reduce project area and downstream 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 16.0 gpm per well for a total maximum discharge of 208 gpm (0.46 cfs or 335 acre-feet 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 Upper Powder River drainage, the projected volume produced within the watershed area was 171,423 acre-feet in 2006 (maximum production is estimated in 2006). As such, the volume of water resulting from the production of these wells is 0.2% of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 83 gpm will infiltrate at or near the discharge points and impoundments (134 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 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 have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 580 to 1,265 feet compared to 2,300 to 2,700 feet for the Wall coal unit (maximum surface relief in the POD is 250 feet). 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

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 4.5 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Most Restrictive Proposed Limit –		2.0	1,000
Least Restrictive Proposed Limit		10.0	3,200
Upper Powder River Watershed at Arvada, WY USGS #06317000 Gauging Station Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		 4.76 7.83	 1,797 3,400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	 500 2,000 5,000	 8	
WDEQ Water Quality Requirements for WYPDES Permit			

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
At discharge point	5,000	na	7,500
At Irrigation Compliance point	na	na	Na
Predicted Produced Water Quality Wall Coal Zone	2,450	53.9	3,69

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 2450.0 mg/l TDS which is not within the WDEQ criteria for agricultural use (2000 mg/l TDS).

The quality for the water produced from the Wall target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 16.0 gallons per minute (gpm) is projected is to be produced from these 8 wells, for a total of 128 gpm for the POD. See Table 4.4. The original proposal had 13 wells (4 fee, 9 federal) and the analysis that follows uses the flow rates originally projected in the WMP.

For more information, please refer to the WMP included in this POD.

There are 11 new 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, 9 new impoundments (76.9 acre-feet) would potentially be constructed within the project area. These impoundments, all being on-channel, will disturb approximately 36.2 acres including the dam structures. Four existing impoundments (48.84 acre-feet) 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 0.07 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. Seepage 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 Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from the original proposed 13 wells (4 fee, 9 federal) was anticipated to be a total of 206 gpm or 0.46 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in Cottonwood Creek from this action (0.07 cfs) may add a maximum 0.06 cfs to the Upper Powder River flows, or less than 0.1% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the 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 3). Based on the area of the Cottonwood Creek watershed above the POD (35.1 sq mi) and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 281 wells which could produce a maximum flow rate of 4,496 gpm (10 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

1. Some of these wells have already been drilled and are producing.
2. New wells will be phased in over several years, and
3. A decline in well discharge generally occurs after several months of operation.

The potential maximum flow rate of produced water within the watershed upstream of the project area, 10 cfs, is much less than the volume of runoff estimated from the 2-year storm event at 209 cfs for Cottonwood Creek of the drainage. Therefore, the estimated flow rate of water produced from the full development in the watershed above the project area is significantly less than the natural runoff from the area.

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 WY0052388 for the discharge of water produced from this project from the WDEQ.

Permit effluent limits were set at (WYPDES page 2):

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Dissolved iron	1000 µg/l max
Dissolved manganese	630 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 identified for this permit is 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.

In-channel downstream impacts are addressed in the WMP for the Big Corral Unit Epsilon POD prepared by Lance Oil and Gas Company for WWC Engineering.

4.4.2.1. Surface Water Cumulative Effects

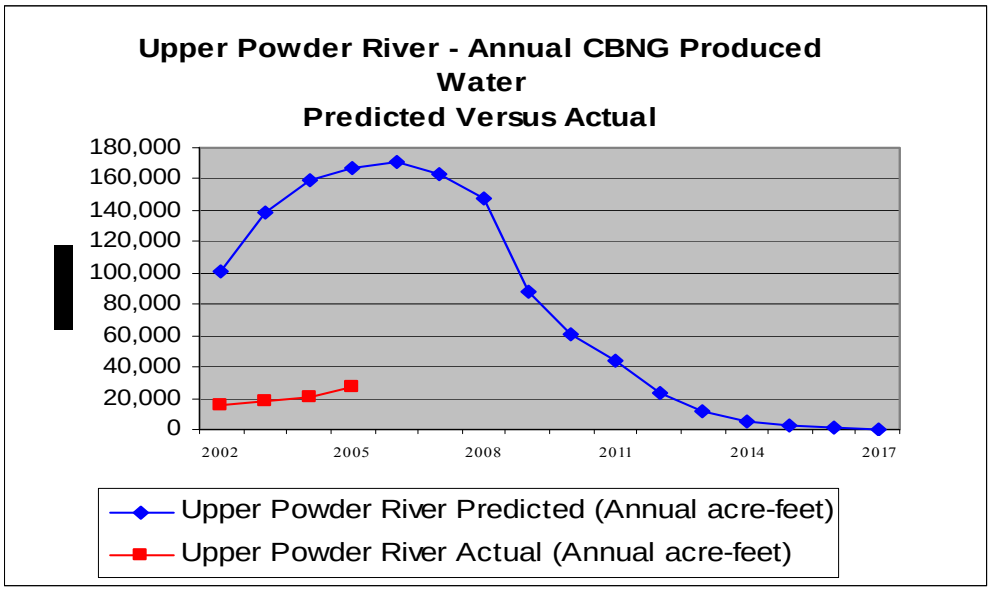
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2005, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 83,072 acre-ft of water compared to the predicted 565,096 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.4.2.1 and Figure 2 following. This volume is 14.7 % of the total predicted produced water analyzed in the PRB FEIS for the Middle Powder River watershed.

Table 4.4.2.1. Actual vs. predicted water production in the Upper Powder River watershed 2005
Data Updated 4-5-06

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,658	16.5	83,072	14.7
2006	171,423	736,519				
2007	163,521	900,040				
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	**1,285,233**					

Figure 2 Actual vs predicted water production in the Upper 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 within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 14.7% 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 monitor the volume of water discharged.

No additional mitigation measures are required.

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

4.5. Cultural Resources

There are no eligible sites within the APE of the proposed project. Following the Wyoming State Protocol Section VI (A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 2/8/07 that no historic properties exist within the APE.

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
Ethan Jahnke	Federal Permit Coordinator	Lance Oil & Gas/Anadarko	YES
Eddie T. Knudson	Surface Owner	Elk Ranch, LLC	YES
Don Malli	Representing Sheri Tietjen	Sheri D. Tietjen Revoclable Trust	YES
Mary Mondragon	Federal Permit Coordinator	Lance Oil & Gas/Anadarko	NO
Sheri D. Tietjen	Surface Owner	Sheri D. Tietjen Revoclable Trust	NO
Brian Venn	Hydrologist	WWC Engineering	YES
Sarah 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.

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