FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Lance Oil & Gas Inc.
Coulter 4 POD
ENVIRONMENTAL ASSESSMENT –WY-070-08-169

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Lance Oil & Gas Inc.'s Coulter 4 POD Coal Bed Natural Gas (CBNG) POD comprised of the following 19 Applications for Permit to Drill (APDs): with 1 APD to be pending approval following the 30 day public posting period as indicated in the following table:

	Well Name	**Well #**	**QTR**	**Sec**	**TWP**	**RNG**	**Lease**
1	COULTER 4 RAWHIDE	12-30	SWNW	30	49N	78W	WYW137927
2	COULTER 4 RAWHIDE	14-31	SWSW	31	49N	78W	WYW130297
3	COULTER 4 RAWHIDE	21-35	NENW	35	49N	79W	WYW147396
4	COULTER 4 RAWHIDE	41-35	NENE	35	49N	79W	WYW147396
5	COULTER 4 STADFELD	12-35	SWNW	35	49N	79W	WYW147396
6	COULTER 4 STADFELD	14-35	SWSW	35	49N	79W	WYW147396
7	COULTER 4 IBERLIN	14-31	SWSW	31	48N	78W	WYW134247
8	COULTER 4 INDIAN CREEK	21-6	NENW	6	48N	78W	WYW161928
9	COULTER 4 RAWHIDE	12-6	SWNW	6	48N	78W	WYW161928
10	* COULTER 4 RAWHIDE	11-1	NWNW	1	48N	79W	WYW147387
11	COULTER 4 RAWHIDE	32-1	SWNE	1	48N	79W	WYW147387
12	COULTER 4 RAWHIDE	41-1	NENE	1	48N	79W	WYW147387
13	COULTER 4 RAWHIDE	43-1	NESE	1	48N	79W	WYW147387
14	COULTER 4 WELLES	12-1	SWNW	1	48N	79W	WYW147387
15	COULTER 4 WELLES	23-1	NESW	1	48N	79W	WYW147387
16	COULTER 4 WELLES	34-1	SWSE	1	48N	79W	WYW147387
17	COULTER 4 WELLES	14-1	SWSW	1	48N	79W	WYW147387
18	COULTER 4 WELLES	14-11	SWSW	11	48N	79W	WYW147388
19	COULTER 4 WELLES	43-11	NESE	11	48N	79W	WYW147388

***Note:** The 11-1- 4879 APD is pending a 30-day public posting period ending September 26, 2008.

Wells 33-11-4879 and 34-11-4879 are not being authorized due to the high likelihood of construction and production activities at the well site causing failure and/or abandonment of a golden eagle nest.

It is my decision to approve the following right-of-way grants:

ROW Grant	**Type**	**Sections**	**TWP/RNG**
WYW169972	Gas	35	T49N, R79W
WYW169973	Road and Utilities	35	T49N, R79W
Amending WYW169666	Gas	6	T47N, R78W
WYW169667	Road and Utilities	6	T47N, R78W

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.
    - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
    - 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 Inc.
Coulter 4 POD
PLAN OF DEVELOPMENT
WY-070-08-169

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 impacts that were not covered within the PRB FEIS.

1. PURPOSE AND NEED

The purpose for the proposal is to produce coal bed natural gas (CBNG) on 7 federal oil and gas mineral leases issued to the applicant by the BLM.

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 Inc's Coulter 4 POD Plan of Development (POD) for 21coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 21 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from the Big George coal seam. Proposed well house dimensions are 3.5 ft width x 3.5 ft length x 3.5 ft height. Well house color is Covert Green, selected to blend with the surrounding vegetation. Wells are located as follows:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	COULTER 4 RAWHIDE	12-30	SWNW	30	49N	78W	WYW137927
2	COULTER 4 RAWHIDE	14-31	SWSW	31	49N	78W	WYW130297
3	COULTER 4 RAWHIDE	21-35	NENW	35	49N	79W	WYW147396
4	COULTER 4 RAWHIDE	41-35	NENE	35	49N	79W	WYW147396
5	COULTER 4 STADFELD	12-35	SWNW	35	49N	79W	WYW147396
6	COULTER 4 STADFELD	14-35	SWSW	35	49N	79W	WYW147396
7	COULTER 4 IBERLIN	14-31	SWSW	31	48N	78W	WYW134247
8	COULTER 4 INDIAN CREEK	21-6	NENW	6	48N	78W	WYW161928
9	COULTER 4 RAWHIDE	12-6	SWNW	6	48N	78W	WYW161928
10	COULTER 4 RAWHIDE	11-1	NWNW	1	48N	79W	WYW147387
11	COULTER 4 RAWHIDE	32-1	SWNE	1	48N	79W	WYW147387
12	COULTER 4 RAWHIDE	41-1	NENE	1	48N	79W	WYW147387
13	COULTER 4 RAWHIDE	43-1	NESE	1	48N	79W	WYW147387
14	COULTER 4 WELLES	12-1	SWNW	1	48N	79W	WYW147387
15	COULTER 4 WELLES	23-1	NESW	1	48N	79W	WYW147387
16	COULTER 4 WELLES	34-1	SWSE	1	48N	79W	WYW147387
17	COULTER 4 WELLES	14-1	SWSW	1	48N	79W	WYW147387
18	COULTER 4 WELLES	14-11	SWSW	11	48N	79W	WYW147388
19	COULTER 4 WELLES	43-11	NESE	11	48N	79W	WYW147388
20	*COULTER 4 WELLES	33-11	NWSE	11	48N	79W	WYW147388
21	*COULTER 4 WELLES	34-11	SWSE	11	48N	79W	WYW147388

*Not approved due to possible impacts to raptors

Right-of-way grants

ROW Grant	Type	Sections	TWP/RNG
WYW169972	Gas	35	T49N, R79W
WYW169973	Road and Utilities	35	T49N, R79W
Amending WYW169666	Gas	6	T47N, R78W
WYW169667	Road and Utilities	6	T47N, R78W

County: Johnson

Applicant: Lance Oil & Gas Inc.

Surface Owners: Simon Iberlin, Stafeld and Manuella Nicholas, Watkins Trust, Yates Petroleum's Rawhide Ranch

Project Description: The proposed action involves the following:

- Drilling of 21 total federal CBM wells in the Big George coal zone to depths of approximately 2,300 feet.

- Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays

lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.

- Well metering shall be accomplished by telemetry. Metering would entail approximately 1 visit every 6 months to each central metering facility once the field is up and running. Prior to that, each well site may be visited as often as three times a week.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: Treatment of all CBNG-produced water at the existing Indian Creek EMIT facility and discharged into the Powder River through outfall WY0053015-001, which was analyzed in the Coulter 5 POD (WY-070-EA07-123). Another water management option would be to transport produced water to Midwest and inject into the Tensleep and Madison Formations.

- An unimproved and improved road network.

- An above ground power line network will not be constructed. The proposed powerline will be buried underground. If the underground power line network is not completed before the wells are in production, then a temporary diesel generator will be placed at the proposed power drop.

- If a diesel generator is necessary then, a storage tank of 500 gallon capacity shall be located with the diesel generator. The generator could be in operation for up to 24 months. Fuel deliveries are anticipated to be 3 times per week. Noise level is expected to be 100.5 decibels at one meter distance.

- A buried gas, water and power line network, and use existing central gathering/metering 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 in the POD and individual APDs. Also see the subject POD and/or APDs for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

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

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

1. Comply with all applicable Federal, State and Local laws and regulations.
2. Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
3. Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD
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 insure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. 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 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 Coulter 4 POD POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well Name	Well #	Notes
COULTER 4 RAWHIDE	12-30	Due to efforts to minimize disturbance in sage grouse habitat the road to the 12-30-4978 was limited to a 35 ft width corridor.
COULTER 4 RAWHIDE	14-31	Due to efforts to minimize disturbance in sage grouse habitat the road to the 14-31-4978 was limited to a 35 ft width corridor.
COULTER 4 RAWHIDE	21-35	Well and road will remove sage-grouse habitat. Due to efforts to minimize disturbance in sage grouse habitat the mowing of vegetation for the access road and drilling rig area for the 21-35-4979 will be limited to a 35 ft width for corridor on roads and 35 ft radius for mowing around well head.
COULTER 4 RAWHIDE	41-35	Moved the access road, to the 41-35-4979 well, approximately 5-10ft to avoid a rock out crop. Minimize mowing around wellhead to 35 ft radius.
COULTER 4 STADFELD	12-35	The 12-35-4979 was identified in a high quality sage-grouse area. Sage-grouse mitigation measures were applied to the well including limiting corridor on roads to a 35 ft width, using only a 35 ft radius for mowing around well head, and using low profile well houses and raptor perch proofing well facilities.
COULTER 4 STADFELD	14-35	The 14-35-4979 was identified in a high quality sage-grouse area. Sage-grouse mitigation measures were applied to the well including limiting corridor on roads to a 35 ft width, using only a 35 ft radius for mowing around well head, and using low profile well houses and raptor perch proofing well facilities.
COULTER 4 IBERLIN	14-31	Road in will go through 1/4 mile CSU for sage-grouse lek. Road and well will remove sage-grouse breeding habitat. Impacts were reduced by moving the utilities outside the lek CSU. In addition, due to efforts to minimize disturbance in sage-grouse nesting habitat the road to the 14-31-4878 will be limited to 35 ft in width.
COULTER 4 INDIAN CREEK	21-6	To minimize impacts to sage-grouse habitat the pipeline and access road to the 21-6-4878 well were relocated.
COULTER 4 RAWHIDE	12-6*	Access road will go through 1/4 mile CSU for an inactive lek. Impacts were reduced by limiting mowing around well to 35 ft radius.

Well Name	Well #	Notes
COULTER 4 RAWHIDE	11-1	Moved 21-1-4879 well and access road out of the rough topography. The move turned the 21-1-4879 into the 11-1-4879. Limited mowing around well to 35 ft radius.
COULTER 4 RAWHIDE	32-1	Well and road will remove sage-grouse habitat. Limited corridor on roads to a 35 ft width.
COULTER 4 RAWHIDE	41-1	Well and road will remove sage-grouse habitat. Access road will go through 1/4 mile CSU for lek. Casing will be brought in only when needed and unloaded from trailer to minimize size of vegetation disturbance. Due to efforts to minimize disturbance in sage grouse habitat the mowing of vegetation for the access road and drilling rig area for the 41-1-4879 will be limited to a 35 ft width on roads and 35 ft radius for mowing around well head.
COULTER 4 RAWHIDE	43-1	Road in will go through 1/4 mile CSU for lek. Moved the access road to improve sight distance for road safety. This created 2 roads. To minimize impacts Lance agreed to try experimental treatment for cheat grass between old road and new road.
COULTER 4 WELLES	34-1	A slotted pad was added for stability of the drilling rig.
COULTER 4 WELLES	14-1	Well and road will remove sage-grouse habitat. Moved the 14-1-4879 well across the drainage closer to the access road. Limited the disturbance from the pad to the minimum necessary for the safety of rig.
COULTER 4 WELLES	14-11	Access in view of golden eagle nest and within ¼ mile. To reduce impacts, activity more disruptive than a pumper checking the well will be limited (between 2/1-8/1) and require BLM notification and a biological monitor.
COULTER 4 WELLES	~~23-11~~ 33-11	Moved the 23-11-4879 to an alternative site due to raptor nest. This renumbered the location to the 33-11-4879. On-sited the 33-11-4879 location on 09/10/08, well location and road were still in view. BLM biologist recommended dropping this well location since due to the high likelihood of construction and production activities at the well site causing failure and/or abandonment of a golden eagle nest.
COULTER 4 WELLES	34-11	Well 34-11 will not be authorized at the proposed location due to the high likelihood of construction and production activities at the well site causing failure and/or abandonment of a golden eagle nest.
COULTER 4 WELLES	43-11	Well and road will remove sage-grouse habitat. Limit disturbance width on roads to 35 ft.

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. 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 CBNG discharges at concentrations exceeding detectable limits.

2.3.2.2. 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. 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.

2.3.2.3. Threatened, Endangered, or Sensitive Species

2.3.2.3.1. Bald Eagle

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of the APD/POD or Sundry Notices.

2. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a BLM approved biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.

2.3.2.4. 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.

2.3.2.5. Air Quality

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

2.3.3. Site specific mitigation measures

All changes made at the onsite will be followed. They have all been incorporated into the operator's POD. All conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) shall be complied with.

Wildlife

Raptors

The following conditions will alleviate impacts to raptors:

1. **Activities at the 14-11 well other than routine pumper traffic shall require BLM notification and nest monitoring of the golden eagle nest (6221) between February 1 and July 31 each year.**

a. No surface disturbing activity shall occur within 0.5 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 timing limitation will affect the following infrastructure:

Township/Range	Section	Wells and Infrastructure
4979	**35**	**41-35**
4979	**31**	**14-31**
4879	**1**	**21-1, 41-1**
4879	**11**	**14-11, 43-11**

1) 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 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.
2) Nest productivity checks shall be completed through 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. This applies to nest(s) listed in section 3 of the EA:
    a. 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.
    b. Well metering, maintenance and other site visits within 0.5 miles of raptor nests should be minimized as much as possible during the breeding season (February 1 – July 31).

Sage Grouse

1. The following conditions will alleviate impacts to sage-grouse:
    a. No surface disturbing activities are permitted within 2 miles of Ploessers Dry Lake, Indian Creek II, III, IV, and Cat Creek 1 sage-grouse leks between March 1 and June 15, prior to completion of a greater sage-grouse lek survey**. This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
4978	31	14-31-4978,
4979	35	41-35-4979, 21-35-7-4979,12-35-4979, 14-35-4979
4878	1	21-1-4879, 41-1-4879, 32-1-4879, 43-1-4879, 34-1-4879, 23-1-4879, 12-1-4879, 14-1-4879
4878	6	21-6-4878, 12-6-4878,
4879	11	43-11-4879, 34-11-4879, 14-11-4879

1) If an active 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.
    a. Well metering, maintenance and other site visits within 2.0 miles of documented sage grouse lek sites should be minimized as much as possible during the breeding season (March 1– June 15).

b. Maximum design speed on all operator-constructed and maintained roads will not exceed 25 miles per hour **except** travel along roads within 1/2 mile of the Indian Creek IV lek. These roads will be posted at 10 mph. This will affect the road accessing the 43-1 well.
c. Lance/Anadarko will follow the recommendations presented in the sage-grouse mitigation portion of the Surface Use Plan. .

Surface Use

1. 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 Coulter 4 POD is Covert Green 18-0617 TPX.
2. Topsoil will be salvaged for use in reclamation on all areas of surface disturbance (roads, pipelines, etc.). Clearly segregate topsoil from excess spoil material. Proposed disturbance areas 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.
3. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:

   Reclamation Standards:

   C. 3 The reclaimed area shall be stable and exhibit none of the following characteristics:

   a. Large rills or gullies.
   b. Perceptible soil movement or head cutting in drainages.
   c. Slope instability on, or adjacent to, the reclaimed area in question.

   C.4. 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.5. 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:

   a. Successful onsite establishment of species included in the planting mixture or other desirable species.
   b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.

   C.6. 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.
4. 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 loss. 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 - *Cultivar*	**% in Mix**	**Lbs PLS**
Western Wheatgrass - *Rosana*	30	3.6
Bluebunch Wheatgrass – *Secar or P-7*	10	1.2
Green needlegrass - *Lodorm*	25	3.0
Slender Wheatgrass	20	2.4

Species - *Cultivar*	% in Mix	Lbs PLS
White – *Antelope* or Purple Prairie Clover – *Bismarck*	5	0.6
Prairie coneflower	5	0.6
Rocky Mountain beeplant	5	0.6
Totals	100%	12 lbs/acre

This is a recommended seed mix based on the native plant species listed in the NRCS Ecological Site descriptions, U.W. College of Ag. and seed market availability.

2.4. Summary of Alternatives

A summary of the infrastructure currently existing within the POD area (Alternative A), the infrastructure originally proposed by the operator (Alternative B), and the infrastructure within the BLM/operator modified proposal (Alternative C) are presented in Table 2.5.

Table 2.5 Summary of the Alternatives

Facility	Alternative A (No Action) Existing Acres	Alternative B (Original Proposal) Proposed Number or Acres	Alternative C (Environmental Alt.) Revised Number or Acres
Non-constructed Pads		7 sites@0.28 ac/site 1.96	(11 sites) 3.08 acres
Slotted Pads		4 sites@0.92 ac/site 3.68	(2 sites) 1.84 acres
Constructed Pads		10 sites@0.92 ac/site 9.20	(8 sites) 4.60 acres
Total	(23 sites) 2.30acres	14.84 acres	9.52 acres
Gather/Metering Facilities	(3qty) 0.5 acres	0	0
Total	1.5 acres	0	0
Monitor Wells	0	0	0
Total	0	0	0
Impoundments		0	0
On-channel			
Off-channel	1 (5 acres)		
Water Discharge Pts	(30 qty)		
Total	5.02 acres	0	0
Treatment Facilities	1	0	0
Improved Roads		(4.2 miles) 28.87 acres	(4.2 miles) 28.87 acres
No Corridor		0	0
With Corridor		28.87 acres	28.87 acres
Total	58.8 acres	28.87 acres	28.87 acres
2-Track Roads		(4.5 miles) 19.14 acres	(4.5 miles) 19.14 acres
No Corridor	1.88 acres	7.50 acres	7.50 acres

Facility	Alternative A (No Action) Existing Acres	Alternative B (Original Proposal) Proposed Number or Acres	Alternative C (Environmental Alt.) Revised Number or Acres
With Corridor Total	1.12 acres 3.20 acres	11.64 acres 19.14 acres	11.64 acres 19.14 acres
Buried Utilities No Corridor With Corridor Total	 3.9 acres 3.9 acres	 Included in above corridor	 Included in above corridor
Overhead Powerlines Total existing	0.8 acres 0.8 acres	0 0	0 0
Staging/Storage Areas Total	4 acres 4 acres	13.47 acres 13.47 acres	9.47 acres 9.47 acres
Other Disturbance Total	Approx. 10 acres 10 acres	0 0	0 0
Acres of Disturbance Total with Existing	89.52 acres 89.52 acres	80.22 acres 169.74 acres	70.90 acres 160.42 acres

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on February 4, 2008. Field inspections of the proposed Coulter 4 CBNG project were conducted on July 1 and 2, 2008 by

DATE	NAME	AGENCY
July 1, 2 Sept 10	Jennifer Spegon	BLM
July 1, 2 Sept 10	Bill Ostheimer	BLM
July 1	Clint Crago	BLM
July 1	Hilaire Peck	BLM
July 1	Ted Hamersma	BLM
July 1	J. Bunderson	BLM
July 1	Christine Sadler	BLM
July 1, 2 Sept 10	Tammi Hitt	Anadarko
July 1, 2	Joy Kennedy	Anadarko
July 1, 2	Colt Rodeman	Anadarko
July 1, 2	Craig Klaahsen	Anadarko
July 1, 2	Chuck Cornelius	Anadarko
July 1, 2	Greg Hoechst	609 Consulting
July 1, 2	Ethan Jahnke	Anadarko
July 1, 2	Rianna Chappell	Anadarko
July 1	Victoria Marques	Anadarko
July 1, 2 Sept 10	Brian Vien	609 Consulting
July 1	Carolyn Buchanan	Anadarko
July 1	LD Gilbertz Ranch Manager	Yates Petroleum's Rawhide Ranch

DATE	NAME	AGENCY
July 1, 2 Sept 10	Pricilla Welles	Watkins Trust (Landowner)
July 1, 2	Doreen Green	Anadarko
July 1	Anna Garman	Anadarko
July 1, 2 Sept 10	Clint Beaver	Anadarko

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species	X			Bill Ostheimer
Floodplains		X		Mike McKinley
Wilderness Values			X	Jennifer Spegon
ACECs			X	Jennifer Spegon
Water Resources	X			Mike McKinley
Air Quality	X			Jennifer Spegon
Cultural or Historical Values			X	Clint Crago
Prime or Unique Farmlands			X	Jennifer Spegon
Wild & Scenic Rivers			X	Jennifer Spegon
Wetland/Riparian		X		Mike McKinley
Native American Religious Concerns			X	Clint Crago
Hazardous Wastes or Solids		X		Jennifer Spegon
Invasive, Nonnative Species	X			Jennifer Spegon
Environmental Justice			X	Jennifer Spegon

3.1. Topographic Characteristics of Project Area

The Coulter 4 POD is located approximately 15 miles east of the town of Buffalo. It is accessed off I-90 from the Schoonover road exit. Schoonover Road dissects the project with eastern portions bordering drainages of Indian Creek and western portions bordering drainages of Cat Creek. The area historically has been used for cattle grazing and is currently experiencing steady incursion of CBNG development. The Coulter 4 project is surrounded by CBNG PODs with Yates Edisto POD to the north, Lance's Coulter 5 and Greater Welles PODs to the east and south, and Kennedy Oil's Imada POD to the west.

3.2. Vegetation & Soils

Ecological Site Descriptions are used to provide site and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and NRCS published soil survey information. The dominant ecological site and plant community identified in this POD is Loamy with a Mixed Sagebrush/Grass Community.

Loamy Sites occur on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10-14 inch precipitation zone. The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability.

The present plant community is a Mixed Sagebrush/Grass. Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. The site is dominated by cool season midgrasses. The major grasses include western wheatgrass, bluebunch wheatgrass, needleandthread, and little bluestem. Other grasses occurring on the state include Cusick's and Sandberg bluegrass, blue grama, and prairie junegrass.

3.2.1. Wetlands/Riparian

No wetland or riparian areas were noted during the onsite. The channels within the project area are well vegetated grassy swales of dry land species, without defined bed and bank and therefore are not indicative of a riparian environment.

3.2.2. Invasive Species

No state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of inventory maps or databases on the CBM Clearinghouse website (http://www.cbmclearinghouse.info/). The CBM Clearinghouse database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. Cheatgrass has invaded the state. Subsequent field investigations found several areas of cheatgrass. Lance also identified Russian knapweed, salt cedar, Scotch thistle, Canada thistle, common cocklebur, and buffalo bur as target species for the Coulter 4 POD.

The state-listed noxious weeds are listed in PRB FEIS Table 3-21 (p. 3-104) and the Weed Species of Concern are listed in Table 3-22 (p. 3-105).

3.1. Wildlife

Several resources were consulted to identify wildlife species that may occur in the proposed project area. Resources that were consulted include the POD wildlife reports, 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 (BHEC 2008). The consultant performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol in 2008. Habitat surveys were conducted for Ute ladies'-tresses orchid. PRB IWG accepted protocol is available on the CBM Clearinghouse website (www.cbmclearinghouse.info).

A BLM biologist conducted field visits on July 1 & 2, and September 10, 2008. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

Wildlife species common to the habitat types present are identified in the PRB FEIS (pg. 3-114). Species identified in the project area or noted as being of special importance are described below.

3.1.1. Big Game

Big game species expected to be within the project area include pronghorn antelope and mule deer. The WGFD has determined the entire project area to be Yearlong range for antelope and Winter Yearlong and Yearlong range for mule deer.

Yearlong use is when a substantial portion of a population makes general use of the habitat on a year-round basis. **Winter/Yearlong** use is when a population of animals makes general use of suitable habitat

sites within a 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. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

The project area is part of the Upper Powder River pronghorn antelope and mule deer herds. There was a 2004 population estimate of 6,200 for pronghorn antelope and 18,000 for mule deer. The population objective for the pronghorn antelope herd is 3,000 and the objective for mule deer is 18,300 (WGFD 2004).

3.1.2. Aquatics

The project area is drained by ephemeral tributaries of the Powder River. No springs were documented within the project area (BHEC 2008). Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

The Powder River Basin is one of the last free-flowing prairie stream ecosystems left in the United States, with existing flows, turbidity, and water quality within historic ranges. The Powder River supports an intact native fish community including several rare or declining species. These species have evolved life history strategies that allow them to survive in extreme conditions (Hubert 1993). Native fish species include sauger, shovelnose sturgeon, goldeye, plains minnow, sand shiner, flathead chub, plains killifish, river carpsucker, sturgeon chub, western silvery minnow, channel catfish, fathead minnow, longnose dace, mountain sucker, shorthead redhorse, longnose sucker, stonecat, white sucker and others. Six of these are designated by the WGFD as either Native Species Status (NSS) 1, 2, or 3 species. Species in these designations are considered to be species of concern, in need of more immediate management attention, and more likely to be petitioned for listing under the Endangered Species Act.

NSS1 species (sturgeon chub and western silvery minnow) are those that are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions are declining or vulnerable. NSS2 species (goldeye, shovelnose sturgeon, and sauger) are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions appear to be stable. NSS3 species (plains minnow) are widely distributed throughout their native range and appear stable; however, habitats are declining or vulnerable. For these species, the WGFD has been directed by the Wyoming Game and Fish Commission to recommend that no loss of habitat function occur. Some modification of the habitat may occur, provided that habitat function is maintained (i.e., the location, essential features, and species supported are unchanged).

The sturgeon chub was petitioned for listing under the Endangered Species Act in 2000. The sturgeon chub is a small minnow native to WY and is known to occur only in the Powder River and in one location on Crazy Woman Creek. The sturgeon chub requires large, free-flowing rivers characterized by swift flows, high variable flow regimes, braided channels, high turbidity, and sand/gravel substrates. On April 18, 2001, the U.S. Fish and Wildlife Service determined that the listing was not warranted, due to the sturgeon chub population being more abundant and better distributed throughout their range than previously believed.

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available about them. Confluence Consulting, Inc. identified the following species present within the Clear Creek and Powder River watersheds: Woodhouse's toad, Northern leopard frog, gopher snake, and garter snake (2004). Because sampling at the upper two sites on Clear Creek occurred late in the season, seasonality may have influenced the lack ofreptiles and amphibians observed at these sites.

3.1.3. 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. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

3.1.4. Raptors

Raptors species expected to occur in suitable habitats within the project area include northern harrier, golden eagle, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, bald eagle, rough-legged hawk, merlin, Cooper's hawk, northern goshawk, long-eared owl, and burrowing owl. Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities.

Twenty nine raptor nest sites were identified within 0.5 mile of the project area, of these, five nests were active in 2008 (BHEC 2008). Nine nests were either gone in 2008 (6) or black-billed magpie nests (3). The nest locations and 2008 status are in the table below.

Table 4. Documented raptor nests within the project area in 2008.

	BLM #	UTM_E	UTM_N	SCTN	TNSHP	RNG	SPECIES	SUBSTRATE	2008_
1	4389	398707	4891234	5	48	78	UNK	CTL (Cottonwood)	INACTIVE
2	1264	392764	4888870	10	48	79	RTHA	CTL	ACTIVE
3	1998	393257	4888583	10	48	79	UNK	CTL	INACTIVE
4	4855	392676	4889069	10	48	79	UNK	CTL	INACTIVE
5	4852	393550	4888443	11	48	79	AMKE	CLIFF	ACTIVE
6	6221	394147	4888370	11	48	79	GOEA	CTL	ACTIVE
7	3845	397404	4893506	30	49	78	UNK	CTL	INACTIVE
8	1270	397043	4882478	31	48	78	UNK	CTL	INACTIVE
9	2036	396555	4882788	31	48	78	UNK	CTD (Dead Cottonwood)	INACTIVE
10	2037	396908	4882711	31	48	78	UNK	Creek Bank	INACTIVE
11	3267	397895	4882105	31	48	78	UNK	CTL	INACTIVE
12	3268	397733	4882192	31	48	79	UNK	CTL	INACTIVE
13	3848	397280	4892319	31	49	78	UNK	CTL	INACTIVE
14	4444	397301	4892311	31	49	78	UNK	CTD	INACTIVE
15	3019	395277	4892965	36	49	79	RTHA	CTL	FAILED
16	3020	395133	4892940	36	49	79	UNK	CTL	INACTIVE
17	4853	396034	4891519	36	49	79	GHOW	CTD	ACTIVE
18	5135	395088	4892884	36	49	79	UNK	CTL	INACTIVE
19	6294	398040	4891894	36	49	78	GOEA	CTL	ACTIVE

UNK; Unknown. RTHA; Red-tailed hawk. AMKE; American Kestrel. GOEA; Golden Eagle. GHOW; Great-horned owl.

3.1.5. Threatened and Endangered and Sensitive Species

3.1.5.1. Threatened and Endangered Species

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

3.1.5.1.1. 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 2004, the WGFD identified six prairie dog complexes (Arvada, Sheridan, Pleasantdale, Four Corners, Linch, Kaycee, and, Thunder Basin National Grasslands) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Grenier et al. 2004).

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 1,000 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). No black-tailed prairie dog colonies were identified within the project area. Black-footed ferret habitat is not present within the project area.

3.1.5.1.2. Ute 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. Wyoming Natural Diversity Database model predicts undocumented populations may be present particularly within southern Campbell and northern Converse Counties.

Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (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. In Wyoming, *Spiranthes diluvialis* blooms from early August to early September, with fruits produced in mid August to September (Fertig 2000).

Drainages in project area are ephemeral. No springs were identified. Suitable orchid habitat was assessed and is not present within the project area (BHEC 2008).

3.1.5.2. 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. Two habitat types, prairie dog colonies and sagebrush ecosystems, specifically, are the most common among habitat types within the Powder River Basin and contain habitat components required in the life cycle of several sensitive species. These are described below in general terms. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are described in more detail. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.1.5.2.1. Sagebrush obligates

Sagebrush ecosystems support a variety of species. Sagebrush obligates are animals that cannot survive without sagebrush and its associated perennial grasses and forbs; in other words, species requiring sagebrush for some part of their life cycle. Sagebrush obligates within the Powder River Basin, listed as sensitive species by BLM Wyoming include greater sage-grouse, Brewer's sparrow, sage thrasher, and sage sparrow. Sage sparrows, Brewer's sparrows, and sage thrashers all require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Sage sparrows prefer large continuous stands of sagebrush, and Brewer's sparrows are associated closely with sagebrush habitats having abundant scattered shrubs and short grass (Paige and Ritter 1999). Other sagebrush obligate species include sagebrush vole, pronghorn antelope, and sagebrush lizard

3.1.5.2.2. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered. On August 8, 2007, the bald eagle was removed from the Endangered Species list. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In order to avoid violation of these laws and uphold the BLM's commitment to avoid any future listing of this species, all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) (USFWS 2007) shall continue to be complied with.

Bald eagle nesting habitat is generally found in 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 are often more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, carcasses of domestic sheep and big game may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

There is limited nesting and roosting substrate within one mile of proposed activities. Isolated cottonwoods along Indian, Cat, and Four-mile Creeks may attract wintering eagles. The BLM database indicates some winter bald eagle use in Four-mile creek with individuals seen perched approximately one mile east of the 14-31-4878 well location. The BLM database does not contain any eagle roost locations within one mile of the POD. Foraging eagles most likely use the entire POD area.

3.1.5.2.3. Black-tailed prairie dog

The black-tailed prairie dog was added to the list of Candidate species for federal listing on February 4, 2000 (USFWS 2000). On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog's Candidate status. BLM Wyoming considers prairie dogs as a sensitive species and continues to afford this species the protections described in the PRB FEIS. The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains. No black-tailed prairie dog colonies were found within the project area (BHEC).

3.1.5.2.4. Grouse

3.1.5.2.4.1. Greater sage-grouse

The greater sage-grouse is listed as a sensitive species by BLM (Wyoming). In recent years, several petitions have been submitted to the USFWS to list greater sage-grouse as Threatened or Endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was "not

warranted" following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse. In 2007, the U.S. District Court remanded that decision, stating that the USFWS' decision-making process was flawed and ordered the USFWS to conduct a new Status Review as a result of a lawsuit and questions surrounding the 2005 review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

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). Suitable sage-grouse habitat is present throughout the project area. Moderately dense sagebrush is present in patches throughout the project area. Sage-grouse habitat models indicate that 90% of the project area contains high quality sage-grouse nesting habitat and high quality sage-grouse wintering habitat (Walker et al. 2007). BLM records identified nine sage-grouse leks within 4 miles of the project area. The 4-mile distance was recommended by the State wildlife agencies' ad hoc committee for consideration of oil and gas development effects to nesting habitat (WGFD 2008). These nine lek sites are identified below (Table 6).

Table 6. **Occupied Sage-grouse leks within 4 miles of the project area.**

LEKNAME	COMPLEX	QQ	Q	SEC	TWN	RNG	UTME	UTMN	DISTANCE FROM PROJECT AREA (Miles)	2008 max males	2007 max males
Morris Draw	Morris Draw	NW	NW	31	49	79	386989	4893163	3.7	26	35
Cat Creek 2	Cat Creek	NE	NE	17	48	79	389918	4887878	2.2	27	40
Flying E Creek	BLM	SE	NE	11	49	79	394518	4898684	3.0	43	56
Indian Creek II	Fourmile	SE	SE	32	49	78	399325	4891435	0.65	9	15
Cat Creek 1	Cat Creek	NW	NE	9	48	79	391141	4889264	1.4	5	12
Indian Creek I	Fourmile	SW	NW	10	48	78	401971	4888778	2.7	18	30
Indian Creek III	Fourmile	SE	SE	7	48	78	398111	4888230	1.3	0	2
Indian Creek IV	Fourmile	SE	SE	1	48	79	396547	4889709	Within project area	0	0
Ploessers Dry Lake	Cat Creek	SW	SE	35	49	79	393919	4891583	Within project area	0	0

3.1.5.2.4.2. Sharp-tailed grouse

Sharp-tailed grouse inhabit short and mixed-grass prairie, sagebrush shrublands, woodland edges, and river canyons. In Wyoming, this species is found where grasslands are intermixed with shrublands, especially wooded draws, shrubby riparian area, and wet meadows.

The project area has the potential to support sharp-tailed grouse during most of the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October. Cottonwoods and junipers could provide buds and berries, respectively, to sustain grouse through the winter.

3.1.5.2.5. Mountain plover

The mountain plover was proposed for listing in 1999 (USFWS). In 2003, the USFWS withdrew a proposal to list the Mountain Plover as a Threatened species, stating that the population was larger than had been thought and was no longer declining. Mountain plovers, which are a BLM sensitive species, are typically associated with high, dry, short grass prairies (BLM 2003). Mountain plover nesting habitat is often associated with heavily grazed areas such as prairie dog colonies and livestock pastures.

Suitable mountain plover habitat is not present within the project area due to the lack of prairie dog colonies and short-grass prairie habitat.

3.2. 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
2007*	155	22	Unk	1

*Wyoming Department of Health Records September 12, 2007.

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.

3.3. Water Resources

The Coulter 4 POD project area is within an unnamed tributary to North Fourmile Creek, Cat Creek, Timber Draw, and Indian Creek drainage system. The upper reaches and main portions of the Coulter 4 POD tributary drainages consist of steep, dissected terrain with slopes at times exceeding 30%. The watersheds have slope gradients in the range of 5 to 20% throughout most of the catchment.

3.3.1. 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.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 10 registered stock water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 150 to 685 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).

3.3.2. Surface Water

The project area is within an unnamed tributary to North Fourmile Creek, Cat Creek, Timber Draw, and Indian Creek drainages, which are tributaries 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, 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 (PRB FEIS page 3-49). There were no springs determined to be within the POD boundary from literature review or as a result of the onsite.

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

3.4. Cultural Resources

A Class III inventory was conducted for the Coulter 4 project prior to on-the-ground project work (BFO project # 70080102). North Platte Archaeological Services conducted the Class III inventory following the Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48FR190) for the proposed project. Clint Crago, BFO archaeologist, reviewed the report for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined it to be adequate. The following resources are located within the Area of Potential Effect (APE).

Table 3.6 - Cultural Resource Sites Identified within the Coulter 4 project area

Site Number	Site Type	Eligibility
48JO2807	Prehistoric Stone Circle Site	Not Eligible
48JO2808	Prehistoric Campsite	Not Eligible
48JO3891	Prehistoric Stone Circle and Campsite	Not Eligible
48JO3982	Prehistoric Lithic Scatter	Not Eligible
48JO3983	Prehistoric Stone Circle Site and Campsite	Not Eligible
48JO3984	Prehistoric Stone Circle Site	Not Eligible
48JO3985	Prehistoric Campsite	Not Eligible
48JO3986	Prehistoric Campsite	Not Eligible
48JO3987	Historic Cairn	Not Eligible
48JO3988	Historic Cairn	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action (Alternative B) resulted in development of Alternative C as the preferred alternative. The changes have reduced impacts 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 21 proposed well locations, 10 can be drilled without a well pad being constructed and 11 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the 7 wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 36 x 16 feet), and compaction (from vehicles driving/parking at the drill site). The estimated short term disturbance, during the construction phase, would be approximately 9.53 acres. The total estimated long term disturbance associated with these 21wells would involve approximately 0.1 acre/well for 2.1 total acres.

Approximately 4.16 miles of improved roads would be constructed to provide access to various well locations. Approximately 2.7 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 1.76 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 would ensure land productivity/stability is regained and maximized.

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 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	10	7 @.28ac &4 @ .92ac	4.92	Short Term
Constructed Pad	11	10 @.92 acres	4.60	Short Term
Total Pad Disturbance-	---	---	---	---
Proposed During Drilling	21	Site Specific	9.53	Short Term
With Interim Reclamation	21	0.1acre/pad	2.10	Long Term
Gather/Metering Facilities	0	Site Specific	0	Long Term
Screw Compressors	0	Site Specific	0	Long Term
Monitor Wells	0	Site Specific	0	Long Term
Impoundments	0		0.0	Long Term
On-channel	0	Site Specific	0.0	
Off-channel	0		0.0	
Water Discharge Points	0		0.0	
Channel Disturbance				
Headcut Mitigation*		Site Specific	0.0	
Channel Modification		Site Specific	0.0	
Improved Roads	4.16	50' Width or Site Specific	28.7	Long Term
No Corridor				
With Corridor				
2-Track Roads	2.7	35' Width or Site Specific	11.64	Long Term
No Corridor				
With Corridor		35' Width or Site Specific		
Pipelines		35' Width or Site Specific		Short Term
No Corridor	1.76		7.5	
With Corridor				
Buried Power Cable	24	15' Width or Site	44.1	Short Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
No Corridor		Specific		
Overhead Powerlines	0.0	15' Width	0	Long Term

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

4.1.1. 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 the following measures in an Integrated Pest Management Plan (IPMP). The IPMP for the Coulter 4 POD includes the use of weed education, weed-free mulch, weed-free road surfacing, and use of weed-free seed during reclamation, and may include physical, biological and chemical controls depending on species, location, landscape and soils.

Pre-approval onsite inspections of the POD area found extensive areas of cheatgrass. Cheatgrass or downy brome (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. 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 unified control program has not been considered feasible. Lance has committed to formulate an experimental treatment program with the landowner and the BLM to try to cheatgrass in Section 1 T49 R 78 of the Coulter 4 POD.

Construction of proposed 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, spotted knapweed, diffuse knapweed, Scotch thistle, Canada thistle and perennial pepperweed. However, mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants.

4.1.2. 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 drainage, which is approximately 18.5% of the total predicted in the PRB FEIS for 2007.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The WMP for the Coulter 4 POD proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife (Alternative C – Environmentally Preferred)

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, Yearlong range for pronghorn antelope and Winter Yearlong and Yearlong range for mule deer will 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 indicates 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 mule deer avoid mineral activities, and after three years of drilling activity the deer have not become accustomed to 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. Survival 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.

Reclamation and seeding activities that occur within big game habitats during the spring will likely displace does and fawns due to the human presence in the area. This may cause reduced survival rate of does and fawns that must expend increased energies to avoid such activities.

4.2.1.1. Big Game 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 re-injected and/or discharged to the Powder River. The Wyoming Department of Environmental Quality (DEQ) regulates effluent discharge through the National Pollution Discharge Elimination System in compliance with the Federal Water Pollution Control Act and the Wyoming Environmental Quality Act. The Wyoming DEQ has established effluent limits for the protection of game and non-game, aquatic life other than fish, wildlife, and other water uses.

Altering water temperatures, flow timing and magnitude, turbidity and chemical composition of the Powder River could harm native fish species that inhabit the Powder River. Alterations could also allow for non native species to become established. Any water development that alters discharge patterns, reduces turbidity, changes water quality, modifies sediment transport, or blocks migratory routes for fish is likely to result in changes in the fish community. Additionally, altering of tributaries may have adverse effects to aquatic species. Tributaries provide spawning and nursery habitat for riverine fishes and support unique fish assemblages. Seasonal movements of riverine fishes into tributaries may be essential to the continued maintenance of several species found in the Powder River (Hubert 1993).

Change in Water Quality

Fish and amphibian species have evolved and adapted to existing conditions. Changes in water quality may have detrimental impacts on the native aquatic fauna. Major information gaps for these species include feeding habits, reproduction, specific habitat preference (pools, riffles, runs, backwaters, side channels, or a combination), and seasonal habitat use, therefore, it is difficult to fully understand how changes in water quality may affect native aquatic fauna.

The WGFD initiated a detailed fish and amphibian survey of the main-stem Powder River in 2004 to determine baseline species composition and distribution in the Basin. In accordance with the PRB FEIS, a monitoring plan was establish by the PRB Interagency Working Group. The plan calls for baseline data collection over a three year period which is intended to provide information relative to the effects upon the aquatic biota of CBNG water.

Changes in the conductivity and sodium absorption ratio may occur as increased flows move sediment from channel bottoms and potentially increase erosion of floodplains. Confluence Consulting, Inc. reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage in their report on the Powder River (2004). This report indicated that CBNG discharges could affect native species in the drainage. See Section 3.5.2 of this EA for water quality information associated with this project.

Change in Water Quantity

Native fauna in the Powder River drainage have evolved and adapted to a dynamic hydrography with high sediment loads. Changes in this flow regime (i.e., perennial flows) may seriously impact native fauna by altering their use of historical habitats for spawning, rearing, and reproduction. Alterations that impact channel morphology is an issue, and may have impacts to the aquatic biota due to changes in sediment loads, loss of habitat, and possible disruption of migration movements due to barriers created by culverts and/or head cuts.

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG water would be more noticeable during the late summer months or winter months when the mean monthly flow is smaller than during the remainder of the year. The flow attributable to project produced water is very small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to 18,065 cfs for a 100-year storm event. Addition of the produced water would facilitate beneficial uses such as livestock supply and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

The volume of water permitted for direct discharge is based upon the water quality effects related to irrigation downstream in Montana. The flow rate is permitted to mimic seasonal highs and lows and adjusted accordingly.

4.2.2.1. Aquatics Cumulative effects

WDEQ is aware of the concerns about the effects of water quality and flows relative to discharge of water directly into the Powder River. They are taking a conservative approach to permitting until more information can be obtained. 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, and pipelines. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Human activities likely displace migratory birds farther than simply the physical habitat disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

Habitat fragmentation results in more than just a quantitative loss in the total area of habitat available; the remaining habitat area is also qualitatively altered (Temple and Wilcox 1986). Ingelfinger (2004) identified that the density of breeding Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses (displacement) were much greater than the direct physical habitat losses.

Reclamation activities that occur in the spring may be detrimental to migratory bird survival. Those species that are edge-sensitive will be displaced further away from vegetative edges due to increased human activity, causing otherwise suitable habitat to be abandoned. If the interior habitat is at carrying capacity, then birds displaced from the edges will have no place to relocate. One consequence~~s~~ of habitat fragmentation is a geometric increase in the proportion of the remaining habitat that is near edges (Temple 1986). In severely fragmented habitats, all of the remaining habitat may be so close to edges that no interior habitat remains (Temple and Cary 1988). Over time, this will lead to a loss of interior habitat species in favor of edge habitat species. Other migratory bird species that utilize the disturbed areas for nesting may be disrupted by the human activity and nests may be destroyed by equipment.

The use of the proposed water treatment facilities can increase the potential for migratory bird mortality in the evaporation ponds that receive a backwash stream from the conditioning ponds. This evaporation pond will contain a concentrated brine solution. Birds entering this pond can ingest the brine and die from sodium toxicity. 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', affecting thermoregulatory and buoyancy functions, and causing the bird to die of hypothermia or drowning (Windingstad et al.2004). Effective wildlife exclusionary devices, such as netting, will be required to prevent access by migratory birds, or other options should be utilized to contain and dispose of the brine solution should sodium concentrations rise over 17,000 mg/L.
Migratory bird species within the Powder River Basin nest in the spring and early summer and are vulnerable to the same affects as sage-grouse and raptor species. Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor

nesting timing limitations are applied, nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Migratory Birds 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. No additional mitigation measures are required.

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 overheating or chilling of eggs or chicks. 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.

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.

Table 5. Infrastructure within close proximity (0.5 mile) to documented raptor nests within the Coulter 4 project area (Timing limitations will apply to this infrastructure).

BLM ID#	INFRASTRUCTURE	DISTANCE
6221	14-11, 43-11	0.25 – 0.5
1998	14-11	0.25
4852	14-11	0.5
4853	14-31, 41-1, 11-1	0.25-0.35
5770	14-31, 41-1, 11-1	0.3

Of the 21 proposed well locations, seven locations were staked within ½ mile of raptor nests. At the July 2008 onsite, the BLM recommended dropping two wells, the 23-11 and the 34-11 due to proximity (@1/4 mile) and line of sight to a Golden Eagle nest (BLM# 6221). An alternative location for the 23-11 was staked at the 33-11 location. This 33-11 location was also visited at the onsite and the BLM biologist recommended dropping this well location since it was also in view and ¼ mile from the nest.

The 34-11 location was staked 0.3 miles from and within view of the eagle nest tree. Approximately 600 feet of the new access road to this well was in full view of the nest. On September 10, 2008 the BLM biologist identified two other potential raptor nests within .025 miles and in view of the 34-11 well location. No suitable alternatives for this well location were identified in the field. The BLM biologist recommended dropping this well location. Human activities at this location have a high potential to disrupt golden eagle breeding at the 6221 nest and result in nest abandonment and/or reduced reproductive success.

The 14-11 well location was staked approximately 0.25 mile from the 6221 nest location however it was behind a ridge and out of view. The access to the 14-11 remains in view of the nest for approximately 200 feet; however this road already accesses two existing wells. To protect nesting eagles from disturbance, a condition of approval limiting activities to pumper traffic and requiring BLM notification

and monitoring for maintenance to the 14-11 will be applied. Routine pick-up traffic along the road should not interfere with breeding, however prolonged human activity at the well, or noise production may disrupt breeding activities.

Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

4.2.4.1. Raptors 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.

4.2.5. Threatened and Endangered and Sensitive Species

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered Species

Table 4.2 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.	NP	No Effect	No suitable habitat present.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	No Effect	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.

4.2.5.1.1. Black-Footed Ferret Direct and Indirect Effects

Because the project area contains no black-tailed prairie dog colonies and the project area is isolated from any prairie dog complexes, implementation of the proposed development will have **no effect** on the black-footed ferret.

4.2.5.1.2. Ute Ladies'-Tresses Orchid Direct and Indirect Effects

Suitable habitat is not present within the project area. The proposed action will have **no effect**"on Ute ladies'- tresses orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

BLM will take necessary actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22Astates: "The BLM should obtain and use the best available information

deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary."

4.2.5.2.1. Prairie dog colony obligates

No prairie dog colonies were found in the project area. (BHEC 2008)

4.2.5.2.2. Sagebrush obligates

Shrubland and grassland birds are declining faster than any other group of species in North America (Knick et al. 2003). In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats or by creating soil conditions facilitating the spread of invasive species (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100 meters of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001). Increased numbers of corvids and raptors associated with powerlines (Steenhof et al. 1993, Knight and Kawashima 1993, Vander Haegen et al. 2002) increases the potential predation impact on sage-grouse and other sagebrush-breeding birds (Knick et al. 2003)

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as a remnants surrounded by unusable environments (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Populations of sagebrush-obligate species decline because areas of suitable habitat decrease (Temple & Cary 1988), because of lower reproduction, and/or because of higher mortality in remaining habitats (Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe has the further potential to affect the conservation of shrub-obligate species because of the permanence of disturbance (Knick and Rotenberry 1995). Several decades are required to reestablish ecologically functioning mature sagebrush communities. Due to this, sagebrush obligate species may not return until after habitat reestablishment.

Table 4.3 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 may affect frog habitat.
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.
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body.	S	MIIH	Project includes overhead power.
Brewer's sparrow (*Spizella breweri*)	Basin-prairie shrub	K	MIIH	Sagebrush cover will be affected.
Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	S	MIIH	Prairie dog colony present.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Basin-prairie shrub will be affected.
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush cover will be affected. Human activity at the Indian Creek IV lek will increase.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	NP	NI	Habitat not present.
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	NP	NI	Habitat not present.
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	NP	NI	No known records in or near the project area.
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Trumpeter swan (*Cygnus buccinator*)	Lakes, ponds, rivers	S	MIIH	Reservoirs may provide migratory habitat.
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.	NP	NI	No prairie dog towns present.
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	NP	NI	Habitat not present.
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

4.2.5.2.3. Bald eagle Direct and Indirect Effects

Based on the completed and continuing raptor nesting and bald eagle winter roost surveys and marginal habitat, it is unlikely any bald eagles nest or roost within the majority of the project area. A condition of approval will be applied to roosting habitat within one mile of suitable habitat along Four-Mile Creek. This will affect the Iberlin 14-31-4878 well location.

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%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

Produced water may keep portions of the Powder River ice-free during winter months when the river would historically be frozen over. Open water during the winter may attract eagles if reliable prey is present, most likely in the form of waterfowl.

4.2.5.2.4. Grouse

4.2.5.2.4.1. Greater sage-grouse Direct and Indirect Effects

Nine sage-grouse leks are known within 4 miles of the project. The proposed action will adversely impact breeding, nesting, brood rearing, late summer, and winter habitat. Proposed project elements that are anticipated to negatively impact grouse are listed in the project impact table (Table # 4.1). Using 0.6 miles as a distance for effective sage-grouse habitat loss (Holloran et al. 2007, Aldridge and Boyce 2007), will be 166 acres from existing overhead power, 4,400 acres from roads, and 14,700 acres from 21 well locations. These numbers are not additive since each well location has an associated road and power and in many cases wells are closer than 0.6 miles to each other. Therefore, the above numbers over-represent anticipated impacts within the project area if totaled, however since most well locations are within 0.6 miles of each other the entire project area (approximately 3,570 acres within the POD boundaries) can be considered affected.

Based on the best available science, which is summarized below, the proposed action will most likely contribute to the extirpation of the two leks within the project boundary and could affect the local grouse population and contribute to the subsequent abandonment of the seven other leks within four miles of the project.

There is a high probability that Ploesers Dry Lake lek and Indian Creek IV leks will become abandoned without the Federal action. Lance/Anadarko's 34-35 Rawhide Fee well is located on the Ploesser Dry Lake lek and the Indian Creek IV lek is located just off the shoulder of Schoonover Road.

In order to minimize impacts from traffic to the Indian Creek IV lek, Lance/Anadarko has agreed to limit traffic through the lek between 9 AM and 3 PM. Lance Anadarko prepared a sage-grouse mitigation package document for the Coulter 4 POD Surface Use Plan.

A BLM designated sage-grouse focus area is located 0.5 miles to the west of the western border of the project. Impacts from the Coulter 4 POD CBNG development would most likely affect grouse within the focus area. Potential impacts to sage-grouse in the focus area may include spreading invasive plants, increased noise, increased risk of fire, and increased surface water attracting grouse to an area where they could be more susceptible to predation or West Nile Virus.

4.2.5.2.4.2. Greater sage-grouse Cumulative Effects

In addition to the direct impacts to sage-grouse habitat that will be created by the federal wells and associated infrastructure the project area does contain existing fee, state, and federal fluid mineral development. The sage-grouse cumulative impact assessment area for this project encompasses a four mile radius from the nine earlier listed sage-grouse leks. As of September 2, 2008, there are approximately 798 existing wells and associated infrastructure within four miles of these leks - an area of 177 square miles. The existing well density is approximately four wells/section across the area defined by a four miles buffer around the nine leks; however the western half of this area has little development and is included in the Buffalo BLM sage-grouse focus area. Well densities to the east of the project area are approximately eight wells per section, and to the west the density drops to one well per section. Due to this level of development there is a strong potential that the population(s) breeding at these leks (with the exception of the Morris Draw lek within the focus area) may become extirpated without the additional federal development.

There are 241 proposed wells (21 are the wells from this project) within four miles of the nine leks. With the addition of the 21 proposed wells that are not associated with this proposed action, the well density within four miles of the nine leks increases to 5 wells/section. With approval of alternative C (21 proposed well locations) the well density does not change appreciably.

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 (WGFD 2004). The PRB FEIS estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003).

The Powder River Basin Oil and Gas Project FEIS (BLM 2003) concluded that "Activities associated with the proposed project would affect sage-grouse in several ways. These effects may include: (1) increased direct mortality (including legal hunting, poaching, and collision with power lines and vehicles); (2) the introduction of new perches for raptors and thus the potential change in rate of predation; (3) direct loss or degradation of habitats; (4) indirect disturbance resulting from human activity (including harassment, displacement, and noise); (5) habitat fragmentation (particularly through construction of roads); and (6) changes in population (pg. 4-257)." The FEIS goes on to state that "implementation of several mitigation measures would reduce the extent of each impact addressed by those measures. Despite these measures, the synergistic effect of several impacts would likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its federal listing. Local populations may be extirpated in areas of concentrated development, but viability across the Project Area (Powder River Basin) or the entire range of the species is not likely to be compromised (pg. 4-270)."

The Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) included a Mitigation Monitoring and Reporting Plan (MMRP). The uncertainties as to where and at what level development was to proceed as well as the uncertainties associated with the assumptions that were used to predict impacts suggests that one-time determination of impacts that is included in the EIS may not occur as projected. The MMRP helps to continually assess the effects of the project and the adequacy of the mitigation. Such a plan/process provides a mechanism to continuously modify management practices in order to allow development while continuing to protect the environment (E-1)." In other words, development pace and patterns may not occur as predicted, and so the BLM may use the adaptive management process provided for in the BFO RMP.

Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (WGFD 2004). Greater sage-grouse habitat is being directly lost

with the addition of well sites, roads, pipelines, powerlines, reservoirs and other infrastructure in the Powder River Basin (WGFD 2005, WGFD 2004). Sage-grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. In southwestern Wyoming, yearling female greater sage-grouse avoid nesting in areas within 0.6 miles of producing well pads (Holloran et al. 2007), and in southern Alberta, brood-rearing females avoid areas within 0.6 miles of producing wells (Aldridge and Boyce 2007). Doherty et al. (2008) demonstrated that sage-grouse in the Powder River Basin avoided otherwise suitable wintering habitats once they have been developed for energy production, even after timing and lek buffer stipulations had been applied. The 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). As interpreted by coordinated effort with state fish and wildlife agencies from Montana, Colorado, Utah, South Dakota, North Dakota and Wyoming, (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008), research indicates that oil or gas development exceeding approximately 1 well pad per square mile with the associated infrastructure, results in calculable impacts on breeding populations, as measured by the number of male sage-grouse attending leks (Holloran 2005, Walker et al. 2007)

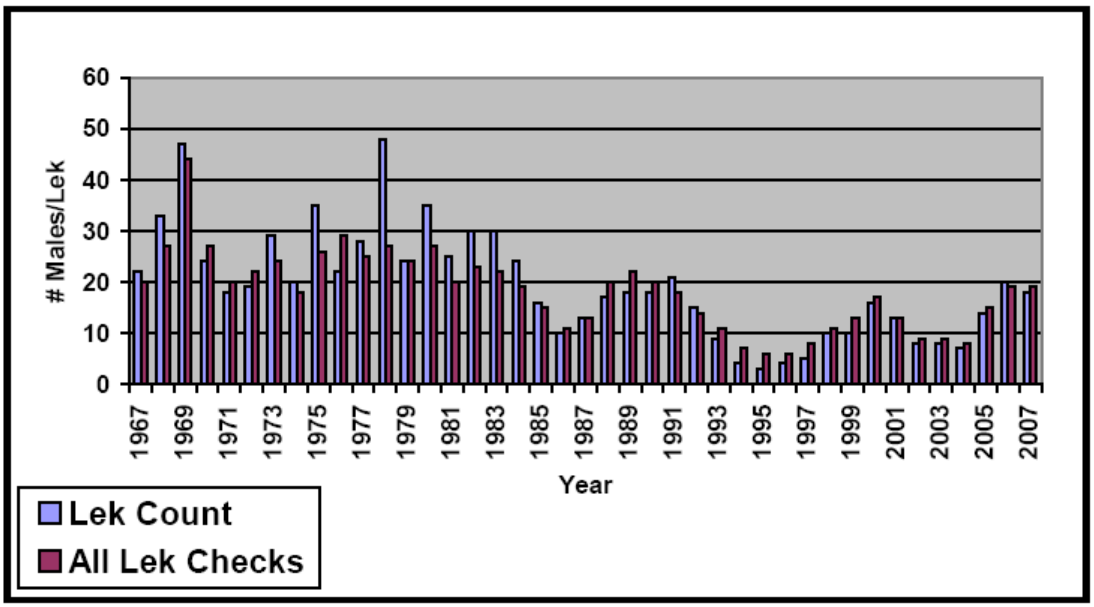
Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). In a study of greater sage-grouse population response to natural gas field development in western Wyoming, Holloran (2005) concluded that increased noise intensity, associated with active drilling rigs within 5 km (3.1 miles) of leks, negatively influenced male lek attendance. In 2002, Braun et al. documented approximately 200 CBNG facilities within one mile of sage-grouse leks. Sage-grouse numbers were found to be consistently lower for these leks than for leks without this disturbance. Direct habitat losses from the facilities themselves, roads and traffic, and the associated noise were found to be the likely reason for this finding.

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. A sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within the Powder River Basin to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size has decreased by more than 63% in the past forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). The existing development within the cumulative impacts assessment area has further fragmented the sage-grouse habitat. Disturbance created by this project will contribute to additional fragmentation.

Another concern with CBNG development is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (WGFD 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). In northeastern Wyoming and southeastern Montana, West Nile virus-related mortality during the summer resulted in an average decline in annual female survival of 5% from 2003 to 2006 (Walker et al. 2007). Powder River Basin sage-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 sage-grouse population within northeast Wyoming is exhibiting a steady long term downward trend (Figure 1) (WGFD 2005). The figure illustrates a ten-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Long-term harvest trends are similar to that of lek attendance (WGFD 2005).

Figure 1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2007.



The BFO Resource 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) (BLM 2004). BLM Wyoming adopted the two-mile recommendation in 1990 (BLM 1990). The two-mile recommendation was based on early research which indicated between 59 and 87 percent of sage-grouse nests were located within two miles of a lek (BLM 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 breeding lek (BLM 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 only 36% of their grouse nesting within 3 km of the capture lek. 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. 2007). Habitat conditions and sage-grouse biology within the Buffalo Field Office are more similar to Moynahan's north-central Montana study area than the Upper Green River area.

A two-mile timing limitation, given the long-term population decline and that less than 50% of sage-grouse are expected to nest within the limitation area, is insufficient to reverse the population decline. Moynahan and Lindberg (2004) like WAFWA (Connelly et al. 2000), recommend increasing the protective distance around sage-grouse leks. The BLM and University of Montana are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development. Thus far, this research suggests that impacts to leks from energy development are discernable out to a minimum of four miles, and that some leks within this radius have been extirpated as a direct result of energy development (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008). 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. In a typical landscape in the Powder River Basin, energy development within two miles of leks is projected to reduce the average probability of lek persistence from 87% to 5% percent (Walker et al. 2007).

Walker et al, 2007 indicates the size of a no-development buffer sufficient to protect leks would depend on the amount of suitable habitat around the lek and the population impact deemed acceptable. Also, rather than limiting mitigation to only timing restrictions, research suggests more effective mitigation strategies include, at a minimum, burying power lines (Connelly et al. 2000 b); minimizing road and well pad construction, vehicle traffic, and industrial noise (Lyon and Anderson 2003, Holloran 2005); and managing produced water to prevent the spread of mosquitoes with the potential to vector West Nile Virus in sage grouse habitat (Walker et al 2007).

The multi-state recommendations presented to the WGFD for identification of core sage grouse areas acknowledges there may be times when development in important sage grouse breeding, summer, and winter habitats cannot be avoided. In those instances they recommend, "…infrastructure should be minimized and the area should be managed in a manner that effectively conserves sagebrush habitats (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008).

4.2.5.2.5. Sharp-tailed grouse Direct and Indirect Effects

Effects similar to sage-grouse.

4.2.5.2.6. Mountain plover Direct and Indirect Effects

Suitable mountain plover habitat is not present within the project area. The project should not impact mountain plovers.

Mineral development has 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.

4.2.5.3. Sensitive Species Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

This project is likely to result in standing surface water which may potentially increase mosquito breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNv species and its effects in Wyoming.

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

Cumulatively, there are many sources of standing water, 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.

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 would reduce project area and downstream impacts from proposed water management strategies by treatment and discharge of 0.7 cfs of produced water into the Upper Powder River.

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 15 gpm per well or 315 gpm (0.7 cfs or 508.1 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). As such, the volume of water resulting from the production of these wells is 0.3% 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). However, for this action, it may be assumed that none of the produced water will infiltrate to these zones due to all of the water being treated and discharged to the Upper Powder River, or proposed to be injected into the Tensleep and Madison Formations near Midwest, Wyoming.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 150 to 685 feet compared to a 1,900 to 2,650 foot depth for the Big George. 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 (½ mile of a federal CBNG producing well) 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.

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 CBNG 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 CBNG 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	1,000
Least Restrictive Proposed Limit		10	3,200
Primary Watershed at Arvada 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 Requirement for WYPDES Permit # WY0053015 At discharge point 001	 5,000	(Dissolved Sodium) 270-530	 2,000-5,000
Predicted Produced Water Quality Big George Coal Zone	 2,350	 43.8	 3,660

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 treated water quality projected for this POD ranges from 2,000 to 5,000 mg/l TDS which may not be within the WDEQ criteria for agricultural use (2000 mg/l TDS) during some months of the year. However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The quality for the water produced from the 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 15 gallons per minute (gpm) is projected is to be produced from these 21 wells, for a total of 315 gpm for the POD. See Table 4.5.

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

There are no new discharge points proposed for this project. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

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 these 21 wells is anticipated to be a total of 315 gpm or 0.7 cfs of treated water to the Upper Powder River. 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).

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

Permit effluent limits were set at (WYPDES, Attachment A):

pH	6.5 to 9.0
TDS	5000 mg/l max
Specific Conductance	2000-5000 mg/l max
Dissolved Sodium	270-530 µg/l max
Dissolved Iron	300 µg/l max
Total Recoverable Barium	1800 µg/l max
Total Recoverable Arsenic	7 µg/l max
Chlorides	150 mg/l

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 (page 12) for the Coulter 4 POD prepared by 609 Consulting, LLC for Lance Oil & Gas Company, Inc.

4.4.2.1. Surface Water Cumulative Effects

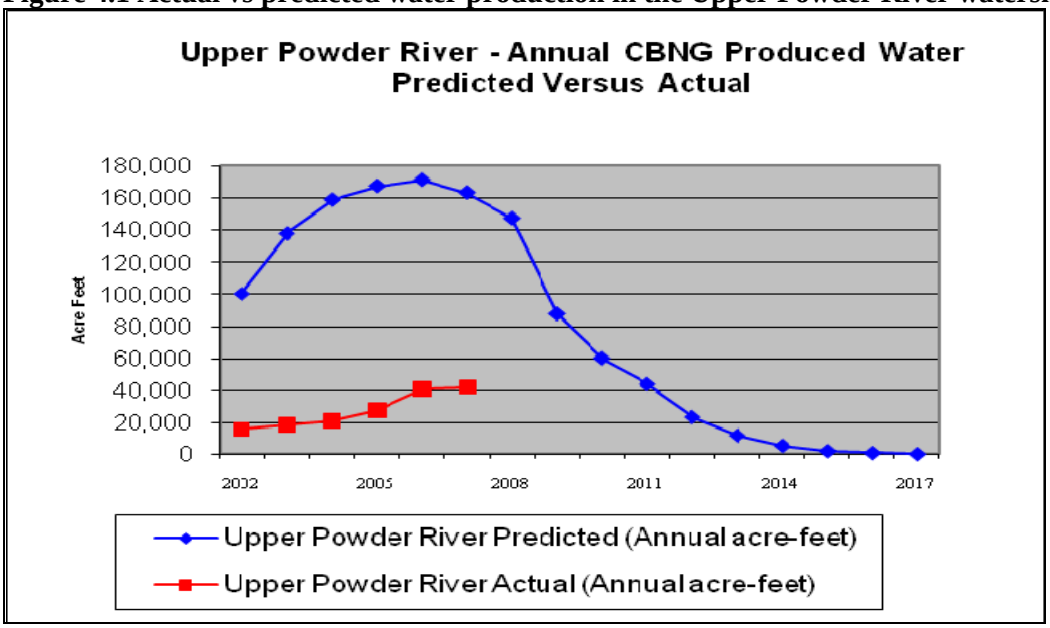
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2007 all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 166,096 acre-ft of water compared to the predicted 900,040 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 18.5% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.6 Actual vs predicted water production in the Upper Powder River watershed *2007 Data Update 3-08-08*

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	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,112	25.8	166,096	18.5
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**		**166,096**			

Figure 4.1 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. Electrical 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. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). 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 18.5% 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 watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

Site 48JO3985 will potentially be impacted by the project; however it is considered not eligible to the NRHP. No historic properties exist in the area of potential effect. On 9/30/08, the Bureau will electronically notify the Wyoming State Historic Preservation Office (SHPO), following section VI(A)(1) of the Wyoming State Protocol, of a finding of no effect to historic properties for the proposed project.

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

NAME	AGENCY	Present at Onsite
Mary Hopkins	WY State Historic Preservation Office	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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