

FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Pinnacle
Noah Draw

ENVIRONMENTAL ASSESSMENT –WY-070-EA07-156

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Pinnacle’s Noah Draw Coal Bed Natural Gas (CBNG) POD comprised of the following 42 Applications for Permit to Drill (APDs), as follows:

	Operator	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	Pinnacle	Noah Draw ND	01CC-2	NENE	2	53N	73W	WYW143549
2	Pinnacle	Noah Draw ND	01WP-2	NENE	2	53N	73W	WYW143549
3	Pinnacle	Noah Draw ND	03CC-2	NENW	2	53N	73W	WYW143549
4	Pinnacle	Noah Draw ND	03WP-2	NENW	2	53N	73W	WYW143549
5	Pinnacle	Noah Draw ND	05CC-2	SWNW	2	53N	73W	WYW143549
6	Pinnacle	Noah Draw ND	05WP-2	SWNW	2	53N	73W	WYW143549
7	Pinnacle	Noah Draw ND	09CC-2	NESE	2	53N	73W	WYW143549
8	Pinnacle	Noah Draw ND	09WP-2	NESE	2	53N	73W	WYW143549
9	Pinnacle	Noah Draw ND	12CC-2	NWSW	2	53N	73W	WYW143549
10	Pinnacle	Noah Draw ND	12WP-2	NWSW	2	53N	73W	WYW143549
11	Pinnacle	Noah Draw ND	13CC-2	SWSW	2	53N	73W	WYW143549
12	Pinnacle	Noah Draw ND	13WP-2	SWSW	2	53N	73W	WYW143549
13	Pinnacle	Noah Draw ND	15CC-2	SWSE	2	53N	73W	WYW143549
14	Pinnacle	Noah Draw ND	15WP-2	SWSE	2	53N	73W	WYW143549
15	Pinnacle	Noah Draw ND	09CC-10	NESE	10	53N	73W	WYW143549
16	Pinnacle	Noah Draw ND	09WP-10	NESE	10	53N	73W	WYW143549
17	Pinnacle	Noah Draw ND	11CC-10	NESW	10	53N	73W	WYW143549
18	Pinnacle	Noah Draw ND	11WP-10	NESW	10	53N	73W	WYW143549
19	Pinnacle	Noah Draw ND	13CC-10	SWSW	10	53N	73W	WYW143549
20	Pinnacle	Noah Draw ND	13WP-10	SWSW	10	53N	73W	WYW143549
21	Pinnacle	Noah Draw ND	15CC-10	SWSE	10	53N	73W	WYW143549
22	Pinnacle	Noah Draw ND	15WP-10	SWSE	10	53N	73W	WYW143549
23	Pinnacle	Noah Draw ND	01CC-11	NENE	11	53N	73W	WYW143549
24	Pinnacle	Noah Draw ND	01WP-11	NENE	11	53N	73W	WYW143549
25	Pinnacle	Noah Draw ND	05CC-11	SWNW	11	53N	73W	WYW143549
26	Pinnacle	Noah Draw ND	05WP-11	SWNW	11	53N	73W	WYW143549
27	Pinnacle	Noah Draw ND	07CC-11	SWNE	11	53N	73W	WYW143549
28	Pinnacle	Noah Draw ND	07WP-11	SWNE	11	53N	73W	WYW143549
29	Pinnacle	Noah Draw ND	03CC-13	NENW	13	53N	73W	WYW143549
30	Pinnacle	Noah Draw ND	03WP-13	NENW	13	53N	73W	WYW143549
31	Pinnacle	Noah Draw ND	11CC-14	NESW	14	53N	73W	WYW143549
32	Pinnacle	Noah Draw ND	11WP-14	NESW	14	53N	73W	WYW143549
33	Pinnacle	Noah Draw ND	15CC-15	SWSE	15	53N	73W	WYW3094A
34	Pinnacle	Noah Draw ND	15WP-15	SWSE	15	53N	73W	WYW3094A
35	Pinnacle	Noah Draw ND	01CC-15	NENE	15	53N	73W	WYW3094A
36	Pinnacle	Noah Draw ND	01WP-15	NENE	15	53N	73W	WYW3094A
37	Pinnacle	Noah Draw ND	03CC-15	NENW	15	53N	73W	WYW3094A
38	Pinnacle	Noah Draw ND	03WP-15	NENW	15	53N	73W	WYW3094A

	Operator	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
39	Pinnacle	Noah Draw ND	11CC-15	NESW	15	53N	73W	WYW3094A
40	Pinnacle	Noah Draw ND	11WP-15	NESW	15	53N	73W	WYW3094A
41	Pinnacle	Noah Draw ND	13CC-15	SWSW	15	53N	73W	WYW3094A
42	Pinnacle	Noah Draw ND	13WP-15	SWSW	15	53N	73W	WYW3094A

The following impoundment location was inspected and approved for use in association with the water management strategy for the POD:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease #
1	Bulkley Playa	NWSE	34	54	73	Fee

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

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

1. The Operator, in their POD, has committed to:
 - Comply with all applicable Federal, State and Local laws and regulations.
 - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
 - 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.
8. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

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
Pinnacle
Noah Draw
PLAN OF DEVELOPMENT
WY-070-EA07-156**

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on 2 valid federal oil and gas mineral leases issued to the applicant by the BLM. Analysis has determined that federal CBNG is being drained from the federal leases by surrounding fee or state mineral well development. The need exists because without approval of the Applications for Permit to Drill (APDs), federal lease royalties will be lost and the lessee will be deprived of the federal gas they have the rights to develop.

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Pinnacle’s Noah Draw Plan of Development (POD) for 44 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There are 44 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 2 wells per location. Each well will produce from 2 coal seams (Cook/Canyon, Wall/Pawnee). Proposed well house dimensions are 6 ft wide x 10 ft length x 6 ft height. Well house color is covert green, selected to blend with the surrounding vegetation. Wells are located as follows:

	Operator	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	Pinnacle	Noah Draw ND	01CC-2	NENE	2	53N	73W	WYW143549
2	Pinnacle	Noah Draw ND	01WP-2	NENE	2	53N	73W	WYW143549
3	Pinnacle	Noah Draw ND	03CC-2	NENW	2	53N	73W	WYW143549
4	Pinnacle	Noah Draw ND	03WP-2	NENW	2	53N	73W	WYW143549
5	Pinnacle	Noah Draw ND	05CC-2	SWNW	2	53N	73W	WYW143549
6	Pinnacle	Noah Draw ND	05WP-2	SWNW	2	53N	73W	WYW143549
7	Pinnacle	Noah Draw ND	07CC-2	SWNE	2	53N	73W	WYW143549
8	Pinnacle	Noah Draw ND	07WP-2	SWNE	2	53N	73W	WYW143549
9	Pinnacle	Noah Draw ND	09CC-2	NESE	2	53N	73W	WYW143549
10	Pinnacle	Noah Draw ND	09WP-2	NESE	2	53N	73W	WYW143549
11	Pinnacle	Noah Draw ND	11CC-2	NESW	2	53N	73W	WYW143549
12	Pinnacle	Noah Draw ND	11WP-2	NESW	2	53N	73W	WYW143549
13	Pinnacle	Noah Draw ND	13CC-2	SWSW	2	53N	73W	WYW143549
14	Pinnacle	Noah Draw ND	13WP-2	SWSW	2	53N	73W	WYW143549
15	Pinnacle	Noah Draw ND	15CC-2	SWSE	2	53N	73W	WYW143549
16	Pinnacle	Noah Draw ND	15WP-2	SWSE	2	53N	73W	WYW143549
17	Pinnacle	Noah Draw ND	09CC-10	NESE	10	53N	73W	WYW143549
18	Pinnacle	Noah Draw ND	09WP-10	NESE	10	53N	73W	WYW143549
19	Pinnacle	Noah Draw ND	11CC-10	NESW	10	53N	73W	WYW143549
20	Pinnacle	Noah Draw ND	11WP-10	NESW	10	53N	73W	WYW143549
21	Pinnacle	Noah Draw ND	13CC-10	SWSW	10	53N	73W	WYW143549
22	Pinnacle	Noah Draw ND	13WP-10	SWSW	10	53N	73W	WYW143549
23	Pinnacle	Noah Draw ND	15CC-10	SWSE	10	53N	73W	WYW143549
24	Pinnacle	Noah Draw ND	15WP-10	SWSE	10	53N	73W	WYW143549
25	Pinnacle	Noah Draw ND	01CC-11	NENE	11	53N	73W	WYW143549
26	Pinnacle	Noah Draw ND	01WP-11	NENE	11	53N	73W	WYW143549
27	Pinnacle	Noah Draw ND	05CC-11	SWNW	11	53N	73W	WYW143549
28	Pinnacle	Noah Draw ND	05WP-11	SWNW	11	53N	73W	WYW143549
29	Pinnacle	Noah Draw ND	07CC-11	SWNE	11	53N	73W	WYW143549
30	Pinnacle	Noah Draw ND	07WP-11	SWNE	11	53N	73W	WYW143549
31	Pinnacle	Noah Draw ND	03CC-13	NENW	13	53N	73W	WYW143549
32	Pinnacle	Noah Draw ND	03WP-13	NENW	13	53N	73W	WYW143549
33	Pinnacle	Noah Draw ND	11CC-14	NESW	14	53N	73W	WYW143549
34	Pinnacle	Noah Draw ND	11WP-14	NESW	14	53N	73W	WYW143549
35	Pinnacle	Noah Draw ND	15CC-15	SWSE	15	53N	73W	WYW3094A
36	Pinnacle	Noah Draw ND	15WP-15	SWSE	15	53N	73W	WYW3094A
37	Pinnacle	Noah Draw ND	01CC-15	NENE	15	53N	73W	WYW3094A
38	Pinnacle	Noah Draw ND	01WP-15	NENE	15	53N	73W	WYW3094A
39	Pinnacle	Noah Draw ND	03CC-15	NENW	15	53N	73W	WYW3094A
40	Pinnacle	Noah Draw ND	03WP-15	NENW	15	53N	73W	WYW3094A
41	Pinnacle	Noah Draw ND	11CC-15	NESW	15	53N	73W	WYW3094A
42	Pinnacle	Noah Draw ND	11WP-15	NESW	15	53N	73W	WYW3094A
43	Pinnacle	Noah Draw ND	13CC-15	SWSW	15	53N	73W	WYW3094A
44	Pinnacle	Noah Draw ND	13WP-15	SWSW	15	53N	73W	WYW3094A

Water Management Proposal: The following impoundments were proposed for use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease #
1	Bulkley Playa	NWSE	34	54	73	Fee
2	21-11-5373	NENW	11	53	73	WYW138436

County: **Campbell**

Applicant: **Pinnacle**

Surface Owners: **BLM, David & Rhoda Tate, Jeri Ann Freimuth**

Project Description:

The proposed action involves the following:

- Drilling of **44** total federal CBM wells in **Cook/Canyon, Wall/Pawnee** and coal zones to depths ranging from 414 to 908 feet. The Canyon/Cook wells will be commingled and the Wall/Pawnee wells will also be commingled. These wells are proposed on twin locations (two wells per site) for a total of 21 locations.

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 **2** visits per month to each **well**.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: **2** discharge points and **1** existing off-channel impoundment known as Bulkley Playa (1 off-channel pit was deleted from the WMP) that will contain all CBNG discharge from this project.
- An unimproved and improved road network.
- An above ground power line network will be constructed by **a contractor**. The proposed route **has** been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. Power line construction **has** been scheduled and **will not** be completed before the CBNG wells are producing. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the **2** power drops.

A storage tank of **1000** gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for **6** months. Fuel deliveries are anticipated to be **1** time per week. Generator volume is expected to be **120** decibels at **50** feet distance.

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

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

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

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

1. Comply with all applicable Federal, State and Local laws and regulations.
2. Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
3. 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 reduce potential impacts to natural resources. 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 Noah Draw POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

<u>Lease Number</u>	<u>Well Number</u>	<u>Qtr/Qtr</u>	<u>Section</u>	<u>TWP</u>	<u>RNG</u>	<u>COMMENTS</u>
WYW143549	01CC/WP-2	NENE	2	53N	73W	access up from Cottonwood Draw with road continuing to well 3-2 access from well 1-2, will reduce surface disturbance
WYW143549	03CC/WP-2	NENW	2	53N	73W	access from well 1-2 will reduce surface disturbance thru shallow loamy ecological site

WYW143549	05CC/WP-2	SWNW	2	53N	73W	final 300ft of access road into well will not exceed 30ft total disturbance
WYW143549	07CC/WP-2	SWNE	2	53N	73W	dropped location 7-2, will decrease fragmentation, will consider new APD to drill after 3-years and a majority of the pod is reclaimed
WYW143549	09CC/WP-2	NESE	2	53N	73W	final 300 feet of access road into this well will be kept under a maximum width of 40 feet total surface disturbance
WYW143549	11CC/WP-2	NESW	2	53N	73W	the spur access road/corridor serving this well will be kept under a maximum width of 25 feet total surface disturbance. This well was moved closer to the road thereby reducing surface disturbance and making the new location into a 12-2
WYW143549	09CC/WP-10	NESE	10	53N	73W	moved away from/out of sight of a golden eagle nest to a new location
WYW143549	11CC/WP-10	NESW	10	53N	73W	pad will have effective perimeter erosion control measures in place
WYW143549	01CC/WP-11	NENE	11	53N	73W	well site was moved closer to the access road, will reduce surface disturbance
WYW143549	05CC/WP-11	SWNW	11	53N	73W	well site was moved away from a short-eared owl nest
WYW143549	03CC/WP-13	NENW	13	53N	73W	the portion of this access road located up on the bench will be kept under maximum of 35 feet width surface disturbance
WYW143549	11CC/WP-14	NESW	14	53N	73W	access will use existing 2-track from the southeast and access will route through the sparsest sagebrush possible

WYW3094A	03CC/WP-15	NENW	15	53N	73W	access will route from the south-southwest (in line with existing power pole) and through the sparsest sagebrush possible
WYW3094A	11CC/WP-15	NESW	15	53N	73W	access for this well will avoid sagebrush
WYW138436	Pit 21-11-5373	NENW	11	53N	73W	Pit dropped due to surface owner concerns

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

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

2.3.2.2. Surface Water

1. Channel Crossings:
 - a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
 - b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
 - c) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
 - d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
3. The operator will supply a copy of the most recent permit issued by WSEO for the Bulkley Playa impoundment.

2.3.2.3. Soils

1. The Companies, on a case by case basis depending upon water and soil characteristics, will test sediments deposited in impoundments before reclaiming the impoundments. Tests will include the

standard suite of cations, ions, and nutrients that will be monitored in surface water testing and any trace metals found in the CBNG discharges at concentrations exceeding detectable limits.

2.3.2.4. Vegetation

1. Temporarily fence reseeded areas, if not already fenced, for at least two complete growing seasons to insure reclamation success on problematic sites (e.g. close to livestock watering source, erosive soils etc.).

2.3.2.5. Wetland/Riparian

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance cannot occur, the minimum number of poles necessary to cross the area will be used.
2. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.
3. No waste material will be deposited below in riparian areas, flood plains, or in natural drainage ways.
4. Soil or other material stockpiles will be located outside the active floodplain.
5. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.
6. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.6. Wildlife

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

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

2.3.2.7. Threatened, Endangered, or Sensitive Species

2.3.2.7.1. Bald Eagle

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of Sundry Notices.
2. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.8. 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.

2.3.2.9. Noise

1. Noise mufflers will be installed on the exhaust of compressor engines to reduce the exhaust noise.
2. Where noise impacts to existing sensitive receptors are an issue, noise levels will be required to be no greater than 55 decibels measured at a distance of one-quarter mile from the appropriate booster (field) compressor. When background noise exceeds 55dBA, noise levels will be no greater than 5dBA above background. This may require the installation of electrical compressor motors at these locations.

2.3.2.10. 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

General

1. All changes made at the onsite will be followed. They have all been incorporated into the operator's POD.
2. Please contact Jim Snyder – Natural Resource Specialist, @ (307) 684-1067, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COA's.

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 Noah Draw POD is Covert Green, (18-0617 TPX).

2. To minimize disturbance in sagebrush habitat, digging in wheel wells for the rig, constructing drilling pits, and trenching pipelines is the only surface disturbance authorized for the following wells and infrastructure: Noah Draw 5-2, 11-2, 13-2, 15-2, 1-11, 5-11, 7-11, 3-13, 11-14, 15-15, 1-15 and 11-15. No other blading is authorized
3. The Noah Draw wells 1-2, 9-2, 11-2, 11-10 and 13-10 locations will need a lined pit. These locations are very near drainages.
4. Due to fragile soils and or steep topography, the following Noah Draw well sites and their access roads will need additional erosion mitigation to completely reduce the potential for erosion of shallow loamy ecological sites: 5-2, 9-2, 11-2, 11-10, 15-10, and 13-15.
5. Noah Draw well 13-10 pad will use erosion mitigation to completely reduce the potential for increasing erosion of the near-by head-cut. Noah Draw well 11-10 pad will have erosion control.
6. Every effort will be made to keep the road corridor tight in sagebrush habitat. Disturbance will be reduced at the following well sites and their access roads: 3-2, 3-13, 11-14, 3-15 and 11-15. Well 3-13 road/corridor access routed thru the top bench will be no wider than 35 feet. Well 11-2 road/corridor access routed thru the North side-top of ridge will be no wider than 25 feet total disturbance. All other Noah Draw POD roads and roads with corridor will have no more than: 14 feet running width, 25 feet blading/clearing width, and 40 feet total disturbance.
7. The following well sites will have an engineered pad: 1-2, 9-2, 11-10, 13-10 and 15-10.
8. The following well sites will have a slotted pad: 3-2, 9-10, 3-15 and 13-15.
9. The following well sites will be drilled “as is”, that is no slot or pad construction: 5-2, 11-2, 13-2, 15-2, 1-11, 5-11, 7-11, 3-13, 11-14, 15-15, 1-15, and 11-15.
10. The approval of this project does not grant authority to use off lease federal lands. No surface disturbing activity, or use of off-lease federal lands, is allowed on affected leases until right-of-way grants become effective on the date in which the right-of-way grant is signed by the authorized officer of the BLM.
11. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:
 1. The reclaimed area shall be stable and exhibit none of the following characteristics: large rills or gullies, perceptible soil movement or head cutting in drainages, and/or slope instability on, or adjacent to, the reclaimed area in question.
 2. 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.
 3. 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 successful onsite establishment of species included in the planting mixture or other desirable species AND evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.

4. 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.

12. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

Loamy/Clay Loamy Sites (Includes Shallow sites):

<u>Species*</u>	<u>Lbs./Ac. PLS (pure live seed)</u>
Western Wheatgrass	4
Thickspike Wheatgrass	3
Bluebunch Wheatgrass	4
Green Needlegrass	3
Fourwing Saltbush	1
Purple or White Prairie Clover	.5
Scarlet Globemallow	.1
Total	15.6

Sandy Sites:

<u>Species*</u>	<u>Lbs./Ac. PLS</u>
Thickspike Wheatgrass	4
Bluebunch Wheatgrass	4
Needle and Thread Grass	2
Indian Ricegrass	1
Prairie Sandreed	1
Purple or White Prairie Clover	.5
Fourwing Saltbush	1
Rocky Mountain Penstemon	.1
Scarlet Globemallow	.1
Total	13.7

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

*Double this rate if broadcast seeding

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

Wildlife

1. The following conditions will minimize the impacts to raptors:
 - a. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect the following:

<i>Township/Range</i>	<i>Sec.</i>	<i>Affected Wells and Infrastructure</i>
53/73	2	Wells: 03, 05, and 15 WP and CC 2-53-73 Pits: None

Township/Range	Sec.	Affected Wells and Infrastructure
		ALL project related activities within the NW and SE 1/4s of this section.
53/73	3	Wells: None Pits: None ALL project related activities within the NE ¼ of this section.
53/73	10	Wells: 09 WP and CC 10-53-73 Pits: None ALL project related activities in the eastern ½ of this section, except the 15 WP and CC 10-53-73 wells and their proposed access/pipeline corridor.
53/73	11	Wells: 01, 05, and 07 WP and CC 11-53-73 Pits: None ALL project related activities within this ENTIRE section.
53/73	13	Wells: 11 WP and CC 13-53-73 Pits: None ALL project related activities within this ENTIRE section.
53/73	14	Wells: 01 WP and CC 14-53-73 Pits: None ALL project related activities within the east ½ of the NE ¼ of this section.

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

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE
4163	Unknown	451532E 4936247N	NESW Sec. 14 T53N, R73W	Cottonwood, live
4164	Red-tailed hawk	452012E 4937035N	SESW Sec. 11 T53N, R73W	Cottonwood, dead
4165	Northern harrier	452129E 4937376N	NWSE Sec. 11 T53N, R73W	Ground
4166	Golden eagle	451076E 4937544N	SENE Sec. 10 T53N, R73W	Cottonwood, live
4167	Short-eared owl	452101E 4937800N	SESE Sec. 11 T53N, R73W	Ground
847	Great-horned owl	452656E 4938201N	NENE Sec. 11 T53N, R73W	Cottonwood, live
827	Great-horned owl	450955E 4940026N	SESE Sec. 34 T54N, R73W	Cottonwood, live

- d. 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.

- e. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.
- 2. The following conditions will minimize the impacts to sage-grouse:
 - a. No surface disturbing activities are permitted within 2 miles of a sage grouse lek 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	Affected Wells and Infrastructure
54/73	34	Wells: None Pits: Bulkley Playa ALL project related activities within this ENTIRE section.
54/73	35	Wells: None Pits: None ALL project related activities within this ENTIRE section.
53/73	2	Wells: 01, 05, 09, 11, 13, and 15 WP and CC 2-53-73 Pits: None ALL project related activities within this ENTIRE section.
53/73	3	Wells: None Pits: None ALL project related activities within this ENTIRE section.
53/73	11	Wells: 05 WP and CC 11-53-73 Pits: 12-11-53-73 ALL project related activities within the northern ½ of this section, except the 01 and 07 WP and CC 11-53-73 wells.

- b. 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.
- c. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
- d. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15), and restricted to between 0900 and 1500 hours.
- 3. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15), and restricted to between 0900 and 1500 hours. This COA was agreed to by Pinnacle representatives present at the onsite.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on **August 24th, 2006**. Field inspections of the proposed **Noah Draw** CBNG project were conducted on **3/6/2007 8:00:00 AM** by BLM (Buffalo)-Jim Snyder, Leigh Grench, Jenny Morton, and Chris Williams. Industry participants: Jay Martini, Boe Gregson, Patrick Barker, Steve Gregersen, Brian Deurloo, Mike Peck and primary surface owner David Tate.

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			Jennifer Morton
Floodplains		X		Jim Snyder, Chris Williams
Wilderness Values			X	Jim Snyder
ACECs			X	Jim Snyder
Water Resources	X			Jim Snyder, Chris Williams
Air Quality		X		Jim Snyder
Cultural or Historical Values		X		Leigh Grench
Prime or Unique Farmlands			X	Jim Snyder
Wild & Scenic Rivers			X	Jim Snyder
Wetland/Riparian		X		Jim Snyder, Chris Williams
Native American Religious Concerns			X	Leigh Grench
Hazardous Wastes or Solids		X		Jim Snyder
Invasive, Nonnative Species	X			Jim Snyder
Environmental Justice		X		Jim Snyder

3.1. Topographic Characteristics of Project Area

The project area is located 23 miles northwest of Gillette, WY in north-central Campbell County, Township 53 North, Range 73 West, Sections 2 and 10-15, Sixth Principal Meridian. The project area is predominantly private and federal surface overlaying federal minerals. The project area is bounded by Yates' Carson POD to the northwest, CH4's Mumma POD to the south, Yates' Bridger POD approximately ¾ mile to the southeast, and Thomas Operating's Dugout Draw POD approximately one mile to the north. There is currently no CBNG development directly east, west, or north of the project area.

Elevations within the project area range from 3900 to 4250 feet above sea level. The topography consists of 60% rugged terrain with numerous prominent ridges, deep draws and rough breaks. The remaining 40% consists of rolling hills and flats cut by numerous steep to moderately steep draws. It also consists of flats mainly centered on the North Fork of Wildcat Creek. The project area is bisected primarily by the North Fork of Wildcat Creek, which runs northeast. Homestead Draw, Cottonwood Draw and Lone Tree Draw are several large ephemeral draws within the project area.

3.2. Soils and Vegetation

3.2.1. Soils

Soils within the project area were identified from the *South Campbell County Survey Area, Wyoming (WY605)*. The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 4 inches on ridges to 8+ inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area. Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 3.2.2. A detailed description can be found in the Soils folder of the electronic Noah Draw POD project file.

3.2.2. Vegetation

Ecological Site Descriptions are used to provide soils 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 Natural Resources Conservation Service published soil survey soils information. Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure, by dominant soil series are:

Loamy Sites:

This site occurs on land nearly level up to 50% slopes on landforms which include hill slopes and the associated alluvial fans and stream terraces, in the 15-17 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 unspecified sandstone. These soils have moderate permeability and may occur on all slopes.

The Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this site would be a Rhizomatous Wheatgrasses/Needleandthread/Big Bluestem Plant Community. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. A mix of warm and cool season mid-grasses dominate the state.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, sagebrush and blue grama have increased. Production of the cool season grasses have decreased.

Dominant grasses identified include: western wheatgrass, thickspike wheatgrass, and needle & threadgrass. Forbs identified include: scarlet globemallow. Other vegetative species identified at onsite: greasewood (*Sarcobatus vermiculatus*) and Wyoming big sagebrush (*Artemisia tridentata wyomingensis*).

Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs.

Shallow Loamy Sites:

This site occurs on steep slopes and ridge tops, but may occur on all slopes on landforms which include hill sides, ridges and escarpments, in the 15-17 inch precipitation zone.

The soils of this site are shallow (less than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from shale and sandstone. These soils have moderate permeability and may occur on all slopes. The main soil limitations include depth to bedrock.

The HCPC for this site would be a Rhizomatous Wheatgrasses/Needleandthread/Big Bluestem Plant Community. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. A mix of warm and cool season mid-grasses dominate the state.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, sagebrush and blue grama have increased. Production of the cool season grasses have decreased.

Dominant grasses identified include: blue grama and needle & threadgrass. Forbs identified include: scarlet globemallow. Other vegetative species identified at onsite: greasewood and Wyoming big sagebrush.

Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs.

A summary of the ecological sites within the project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

Table 3.2.2. Summary of Ecological Sites

Ecological Site	Acres	Percent
SHALLOW LOAMY (15-17NP)	1344.7	45%
SALINE UPLAND (15-17NP)	438.6	15%
LOWLAND (15-17NP)	333.3	11%
LOAMY (15-17NP)	593.4	20%
CLAYEY (15-17NP)	278.4	9%

3.2.3. Wetlands/Riparian

No wetlands areas, other than existing Bulkley Playa, were observed within the POD area. Water levels in Bulkley Playa are rising due to CBNG discharge from a fee development project, therefore fringe wetlands have not established. All channels within the POD boundary are ephemeral, and stream reaches with riparian vegetation are rare.

3.2.4. Invasive Species

The following 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/>):

- leafy spurge (*Euphorbia esula* L.)

The CBM Clearinghouse database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. Additionally, the operator or BLM confirmed the following CBM Clearinghouse identified infestations and/or documented additional weed species during subsequent field investigations:

- cheat grass (*Bromus tectorum*)

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).

3.3 Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Western Land Services (WLS). WLS performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006. Surveys for potential Ute ladies'-tresses orchid habitat were conducted on August 17, 2006.

A BLM Biologist conducted a field visit on March 6 and 7, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the Noah Draw project area include pronghorn antelope and mule deer. The project area is part of the Gillette pronghorn antelope herd unit. The 2004 estimated herd population was 13,895 with a population objective of 11,000 (WGFD 2004). Mule deer belong to the Powder River herd unit. The 2004 estimated herd population was 55,561 with a population objective of 52,000 (WGFD 2004).

The WGFD has designated nearly the entire project area as winter-yearlong range for pronghorn antelope, with the extreme north and west edges of the project area designated as yearlong range. The eastern half of the project area is designated as winter-yearlong and the western half as yearlong range for mule deer. Populations of pronghorn antelope and mule deer within their respective hunt areas are above WGFD objectives.

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

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of the Little Powder River. No natural springs were identified within the Noah Draw project area or a ½ mile radius of the project boundary (Western Land Services 2007). Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

3.3.3. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the

calendar year. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

3.3.4. Raptors

Seven raptor nest sites were identified by WLS within 0.5 mile of the project area, six of which were active in 2006 (Table 4.).

Table 4. Documented raptor nests within the Noah Draw project area in 2006.

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS IN 2006
4163	Unknown	451532E 4936247N	NESW Sec. 14 T53N, R73W	Cottonwood. live	poor	Inactive
4164	Red-tailed hawk	452012E 4937035N	SESW Sec. 11 T53N, R73W	Cottonwood, dead	excellent	Active
4165	Northern harrier	452129E 4937376N	NWSE Sec. 11 T53N, R73W	Ground	excellent	Active
4166	Golden eagle	451076E 4937544N	SENE Sec. 10 T53N, R73W	Cottonwood, live	excellent	Active
4167	Short-eared owl	452101E 4937800N	SESE Sec. 11 T53N, R73W	Ground	fair	Active
847	Great-horned owl	452656E 4938201N	NENE Sec. 11 T53N, R73W	Cottonwood, live	excellent	Active
827	Great-horned owl	450955E 4940026N	SESE Sec. 34 T54N, R73W	Cottonwood, live	excellent	Active

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

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

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

The WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Big Horn Mountains (Grenier 2003). The U.S. Fish and Wildlife Service has also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

No black-tailed prairie dog colonies were identified during site visits by WLS within the project area. One colony is present within sections 9 and 16, T53N, R73W, approximately ¼ mile west of the project area. No other prairie dog colonies are located within 1.5 km of this isolated town. There are no proposed facilities within the prairie dog colony. The project area is located approximately 10 miles east

of the nearest potential reintroduction site, the Arvada complex.

3.3.5.1.2. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered in all of the continental United States except for Minnesota, Wisconsin, Michigan, Oregon, and Washington. In these states the bald eagle was listed as Threatened. On July 12, 1995 the eagle's status was changed to Threatened throughout the United States. Species-wide populations are recovering from earlier declines, and the bald eagle was proposed for de-listing in 2000, but as yet no final decision has been made.

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

The Noah Draw project has mature trees associated with it along Wildcat Creek and at the heads of many of the major draws (Martini 2006)). No potential nests, roosts, or individuals were identified during consultants (Martini 2006) or BLM biologist's site visits, within the immediate project area or extending one mile from proposed activities.

3.3.5.1.3. Ute's Ladies Tresses Orchid

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

No springs are present. WLS conducted surveys for potential Ute ladies'-tresses orchid habitat at five locations within the project area. Surveys completed at two proposed road crossings and an existing reservoir exhibited characteristics not suitable for orchid habitat. Little associated vegetation was identified due to a high abundance and dominance of upland vegetation (i.e. crested wheatgrass and cheatgrass) within and adjacent to the channels and downstream from the reservoir. Surveys completed at two existing culvert crossings exhibited some characteristics suitable for orchid habitat including some similar vegetation and saturated soils at crossing #2. However, the majority of the characteristics are not suitable for orchid habitat. There is no flowing water in Wildcat Creek and the areas that are saturated are due to standing water; the majority of the species along the intermediate bands of vegetation between the channel and upland do not exhibit similar or not enough similar species to that of Ute ladies'-tresses habitat; the vegetation was too tall and too dense, and the soils were more clays than sands or silty sands.

3.3.5.2. Sensitive Species

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

3.3.5.2.1. Black-tailed prairie dog

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

No black-tailed prairie dog colonies exist within the project area.

3.3.5.2.2. Greater sage-grouse

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

Suitable sage-grouse habitat is present through out the project area. Two documented sage-grouse leks are present within two miles of the project area (Table 6). A peak count of 25 and 21 male sage-grouse were observed on the Williams Reservoir lek in 2000 and 2001, respectively. Pinnacle built a reservoir for fee development over this lek location in 2002. Peak counts for every year following have been nearly half the original counts or less. The grouse have been observed strutting on all sides of this reservoir. During the onsite visit, the BLM biologist observed 8 males strutting on the west side of the reservoir.

Table 6. Documented sage-grouse leks within two miles of the Noah Draw project in 2006.

Lek ID	UTM NAD83	Legal Location	Status (Peak Males) in 2006	Distance From Project Area (Miles)
Williams Reservoir	450547E 4940711N	NWSE Sec. 34 T54N, R73W	16	0.0
Dugout Draw	451827E 4943217N	SESW Sec. 23 T54N, R73W	2	1.3

3.3.5.2.3. Mountain plover

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

Most of the terrain in the project area is either too steep or covered with too dense or too tall vegetation to be considered preferred habitat for mountain plovers. The prairie dog colony located approximately ¼ mile west of the project area was surveyed for mountain plovers. No mountain plovers were observed.

3.4 West Nile Virus

West Nile virus (WNV) is a mosquito-borne disease that can cause encephalitis or brain infection.

Mosquitoes spread this virus after they feed on infected birds and then bite people, other birds, and animals. WNV is not spread by person-to-person contact, and there is no evidence that people can get the virus by handling infected animals.

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

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

Table 3.4 Historical West Nile Virus Information

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

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

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

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

control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

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

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

3.5 Water Resources

The project area is within the **Little Powder River** drainage system. The POD area is within the Wildcat Creek watershed (182 square miles), which is tributary to Horse Creek which flows into the Little Powder River.

3.5.1. Groundwater

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

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

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

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

The BLM has installed shallow groundwater monitoring wells at five impoundment locations throughout the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. The most intensively monitored site has a battery of nineteen wells which have been installed and monitored jointly by the BLM and USGS since August, 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment lies atop approximately 30 feet of unconsolidated deposits (silts and

sands) which overlies non-uniform bedrock on a side ephemeral tributary to Beaver Creek and is approximately one and one-half miles from the Powder River. Baseline investigations showed water in two sand zones, the first was at a depth of 55 feet and the second was at a depth of 110 feet. The two water bearing zones were separated by a fifty-foot thick shale layer. The water quality of the two water bearing zones fell in the WDEQ Class III and Class I classifications respectively. Preliminary results from this sampling indicate increasing levels of TDS and other inorganic constituents over a six month period resulting in changes from the initial WDEQ classifications.

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 53 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 63 to 588 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the **Wildcat Creek** drainage which is tributary to the Little Powder River primary 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 range from well vegetated grassy swales, without defined bed and bank to well defined channels that are incised into the landscape.

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 Little Powder River watershed, the EC ranges from 1,785 at Maximum monthly flow to 3,300 at Low monthly flow and the SAR ranges from 4.44 at Maximum monthly flow to 6.94 at Low monthly flow. These values were determined at the USGS station located near Weston, WY, Station ID 06324970 (PRB FEIS page 3-49).

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

3.6 Cultural Resources

Class III cultural resource inventories were conducted for the **Noah Draw** project prior to on-the-ground project work (BFO project no. 70060181 and 70060182). Western Lands Services conducted a Class III cultural resource inventory following the Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48FR190) for the project. Leigh Grench, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. No new archaeological sites were located, three isolated finds were recorded (Weston 2007).

3.7 Foot Rot

Foot rot, also called infectious pododermatitis, foul claw, or hoof rot, is an acute or chronic infection of cattle characterized by lameness, swelling, and inflammation of the skin of the coronary band and the skin

between the claws. The disease is seen most commonly in feedlot cattle or in the winter and spring months when mud, urine, and manure are the greatest problem. There is no indication that incidence of foot rot has occurred or increased anywhere in the Powder River Basin in association with coal bed methane development. It is extremely unlikely foot rot problems will occur or increase as a result of this project, therefore it will not be discussed further in this analysis.

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 21 approved twin-well locations, 12 can be drilled without a well pad being constructed, 4 will require a slotted disturbed area, and 5 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the (12) twin-well sites 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 20 x 40 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 12 wells would involve approximately 0.1 acre/well for 1.2 total acres. Estimated disturbance associated with the 4 slotted twin-well locations is 1.3 acres. The other 5 twin-well locations requiring cut & fill pad construction would disturb approximately 0.6 acres/well pad for a total of 3 acres. The total estimated disturbance for all 21 twin-well sites would be 5.5 acres. This would be a short-term impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Approximately 0.5 miles of improved roads would be constructed to provide access to various well locations. Approximately 25.96 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. No pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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

The PRB FEIS made predictions regarding the potential impact of produced water to the various soil types found throughout the Basin, in addition to physical disturbance effects. "Government soil experts state that SAR values of 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	12	0.1/acre	1.2	Long Term
Slotted Pad	4	0.3, 0.4, 0.3, 0.3	1.3	Long Term
Constructed Pad	5	0.6/site	3.0	Long Term
Gather/Metering Facilities	1	Site Specific	4.0	Long Term
Screw Compressors	1	Site Specific	1.0	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments				Long Term
On-channel	0	Site Specific	0.0	
Off-channel	1	Site Specific	137.0	
Water Discharge Points	2	Site Specific or 0.01 ac/WDP	0.4	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads				Long Term
No Corridor	2.26	28'	7.67	
With Corridor	0.5	40'	2.4	
2-Track Roads				Long Term
No Corridor	15.67	14'	26.59	
With Corridor	9.84	40'	47.68	
Pipelines				Short Term
No Corridor	0.68	40'	3.3	
With Corridor				
Buried Power Cable	0	12' Width or Site Specific	0	Short Term
No Corridor				
Overhead Powerlines	7.84	15' Width	1.18	Long Term
Additional Disturbance	0	Site Specific	0	

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

4.1.1. Wetland/Riparian

No impacts to existing wetlands or riparian areas are projected with the development of this POD. Wetland and riparian characteristics around the perimeter of the Bulkley Playa will likely develop when water levels reach somewhat constant levels.

4.1.2. Invasive Species

Utilization of existing facilities and surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle and perennial pepperweed. However, mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants.

4.1.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the **Little Powder River** drainage, which is approximately **43.2%** of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to contain all CBNG water produced by this POD in the Wildcat Creek drainage.
- The WMP for the Noah Draw commits that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, winter-yearlong and yearlong range for pronghorn antelope and mule deer would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

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

Big game animals are expected to return to the project area following construction; however, populations will likely be lower than prior to project implementation as the human activities associated with operation

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

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

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be discharged at two existing outfall facilities. These two outfalls are associated with the existing Fee related Bulkley Playa reservoir facility. If this reservoir were to discharge, it is unlikely produced water will reach a fish-bearing stream. It is unlikely downstream species would be affected.

4.2.2.1. Cumulative effects

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).

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

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

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

(4-231-235).

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

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

Table 5. Wells within close proximity to documented raptor nests within the Noah Draw project area (Timing limitations will apply to these wells).

BLM ID#	UTM (NAD 83)	SPECIES	WELL NUMBER	DISTANCE
827	450955E 4940026N	Great-horned owl	5-2-53-73	0.38
			3-2-53-73	0.48
847	452656E 4938201N	Great-horned owl	15-2-53-73	0.44
			01-11-53-73	0.12 (out of line-of-sight)
			07-11-53-73	0.45
4163	451532E 4936247N	Unknown	01-15-53-73	0.45
			11-14-53-73	0.34
4164	452012E 4937035N	Red-tailed hawk	07-11-53-73	0.48
4165	452129E 4937376N	Northern harrier	07-11-53-73	0.27
4166	451076E 4937544N	Golden eagle	09-10-53-73	0.22
			05-11-53-73	0.25

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.

The 5-11 well was moved behind a hill to remove it from line-of-sight of a golden eagle nest (4166). The 9-10 well was moved behind a ridge to remove it from line-of-sight of a golden eagle nest (4166) and the access to this well was rerouted to avoid vehicle disturbance to this nest.

4.2.4.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-221. No additional mitigation measures are required.

4.2.5. Threatened and Endangered and Sensitive Species

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

4.2.5.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat not present.
Threatened				
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	S	LAA	Project includes overhead power.
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence

- K** Known, documented observation within project area.
- S** Habitat suitable and species suspected, to occur within the project area.
- NS** Habitat suitable but species is not suspected to occur within the project area.
- NP** Habitat not present and species unlikely to occur within the project area.

Effect Determinations

Listed Species

- LAA** Likely to adversely affect
- NE** No Effect.
- NLAA** May Affect, not likely to adversely effect individuals or habitat.

4.2.5.1.1. Black-footed ferret

Because there are no black-tailed prairie dog colonies within the Noah Draw project area, implementation of the proposed development should have “no effect” on the black-footed ferret.

4.2.5.1.2. Bald eagle

Based on the raptor nesting and bald eagle winter roost surveys and lack of suitable habitat, it is unlikely bald eagles nest or communally roost within the Noah Draw project area. The proposed project should not affect bald eagle nesting or winter roosting.

There are 1.32 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee’s (1996) suggested practices and with the Service’s standards (USFWS 2002); however other features may not be in compliance. Pinnacle is proposing an additional 6.52 miles of overhead three-phase distribution lines.

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

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

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

4.2.5.1.3. Ute’s Ladies Tresses Orchid

The impoundment is located within an upland playa. No natural springs were identified within the Noah Draw project area or a ½ mile radius of the project boundary (Western Land Services 2007). Impoundment seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. Implementation of the proposed coal bed natural gas project will have “no effect” on the Ute ladies’-tresses orchid as suitable habitat is not present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (<i>Rana pipiens</i>)	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will affect existing waterways. Prairie not mountain habitat.
Spotted frog (<i>Rana pretiosa</i>)	Ponds, sloughs, small streams	NP	NI	
Birds				
Baird's sparrow (<i>Ammodramus bairdii</i>)	Grasslands, weedy fields	S	MIIH	Sagebrush cover will be affected.
Brewer's sparrow (<i>Spizella breweri</i>)	Basin-prairie shrub	S	MIIH	
Burrowing owl (<i>Athene cucularia</i>)	Grasslands, basin-prairie shrub	NP	NI	No prairie dog colonies present.
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Sagebrush cover will be affected.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush cover will be affected.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Long-billed curlew (<i>Numenius americanus</i>)	Grasslands, plains, foothills, wet meadows	NP	NI	Habitat not present.
Mountain plover (<i>Charadrius montanus</i>)	Short-grass prairie with slopes < 5%	NP	NI	Habitat not present.
Northern goshawk (<i>Accipiter gentilis</i>)	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon (<i>Falco peregrinus</i>)	cliffs	NP	NI	No nesting habitat present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (<i>Amphispiza billneata</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected.
Sage thrasher (<i>Oreoscoptes montanus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected.
Trumpeter swan (<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	S	MIH	Reservoirs may provide migratory habitat.
White-faced ibis (<i>Plegadis chihi</i>)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (<i>Oncorhynchus clarki bouvieri</i>)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (<i>Cynomys ludovicianus</i>)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIH	No facilities proposed within prairie dog town.
Fringed myotis (<i>Myotis thysanodes</i>)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (<i>Myotis evotis</i>)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat (<i>Euderma maculatum</i>)	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not present.
Swift fox (<i>Vulpes velox</i>)	Grasslands	NP	NI	Habitat not present.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Caves and mines.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Plants				
Porter's sagebrush (<i>Artemisia porteri</i>)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (<i>Cymopterus williamsii</i>)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

Presence

- K** Known, documented observation within project area.
- S** Habitat suitable and species suspected, to occur within the project area.
- NS** Habitat suitable but species is not suspected to occur within the project area.
- NP** Habitat not present and species unlikely to occur within the project area.

Project Effects

- NI** No Impact.
- MIH** May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.
- WIPV** Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
- BI** Beneficial Impact

4.2.5.2.1. Black-tailed prairie dog

No black-tailed prairie dog colonies exist within the project area.

4.2.5.2.2. Greater sage-grouse

Two documented sage-grouse leks are present within two miles of the project area (Table 6). A peak count of 25 and 21 male sage-grouse were observed on the Williams Reservoir lek in 2000 and 2001, respectively. Pinnacle built an impoundment for fee development over this lek location in 2002. Peak counts for every year following have been nearly half the earlier counts or less. The grouse have been observed strutting on all sides of this impoundment. During the onsite visit, the BLM biologist observed 8 males strutting on the west side of the impoundment. When this impoundment receives additional water from the proposed federal wells, this location will also be flooded.

The BLM was unwilling to allow federal water to be discharged into this impoundment. Pinnacle was asked to reevaluate their water management plan for alternatives to the use of this impoundment. The results of this reevaluation indicated that seven additional impoundments would need to be constructed, several of which would be located in good sage-grouse nesting and brood rearing habitat. The BLM chose to allow the use of the existing impoundment provided Pinnacle pursued additional on-site mitigation.

As mitigation for the impacts that will be caused by the use of this impoundment, Pinnacle Gas Resources withdrew the 7-2 well and relocated the 11-2 well to an existing two-track. These two modifications will reduce fragmentation of habitat approximately 1.2 to 1.5 miles from this lek site by the reduction of 0.7 mile of proposed two-track roads. Pinnacle will also perch-inhibit all existing power lines within ½ mile of the lek. This will assist in the reduction of loss of sage-grouse due to predation by raptors. Additionally, Pinnacle committed to restrict all work hours, both on the federal and fee projects in this area to between 9:00am and 3:00pm during the sage-grouse breeding season.

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

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

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

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

replication and transmission than the cooler summers of 2004 and 2005 (Cornish pers. Comm.).

The Buffalo Field Office (BFO) Resources Management Plan (BLM 2001) and the Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA), which includes the WGFD, 1977 sage-grouse guidelines (Bennett 2004). Under pressure for standardization BLM Wyoming adopted the two-mile recommendation in 1990, and instructed the field offices to incorporate the measure into their land use plans (Bennett 2004, Murkin 1990).

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

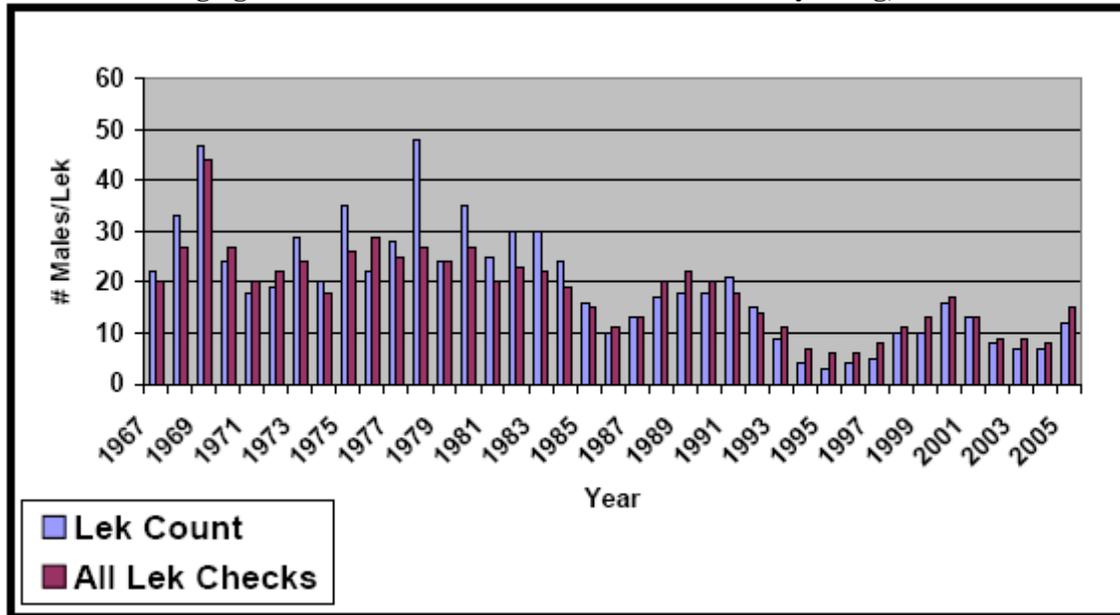
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km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

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

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

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

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



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

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

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

4.2.5.2.3. Mountain plover

The prairie dog colony located approximately ¼ mile west of the project area was surveyed for mountain plovers. No mountain plovers were observed. The project should not affect mountain plovers. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in

the PRB FEIS (4-254-255).

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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 **Little Powder River** watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should reduce project area and downstream potential impacts from proposed water management strategies.

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

The maximum water production is predicted to be **15.0** gpm per well or **555.0** gpm (**1.2** cfs or **895** acre-foot per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the **Little Powder River** drainage, the projected volume produced within the watershed area was **21,330** acre-feet in 2006 (maximum production is estimated in **2005** at **22,425** acre-feet). As such, the volume of water resulting from the production of these wells is **43.2%** of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 34% to groundwater aquifers and coal zones in the Little Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 188.7 gpm will infiltrate at or near the discharge points and impoundments (304 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 63 to 588 feet compared to 395 feet to the Cook/Canyon and 525 to the Wall/Pawnee. 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.

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

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

4.4.1.1. Groundwater Cumulative Effects:

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

Development of 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 Formation – Tongue River Member 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 –		3.0	1,000
Least Restrictive Proposed Limit		10.0	3,000
Primary Watershed at near Weston gauging station (ID 06324970)			
Historic Data Average at Maximum Flow		4.44	3,300
Historic Data Average at Minimum Flow		6.94	1,785
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirement for WYPDES Permit # WY0051764			
At discharge point	5,000	na	7,500
At Irrigation Compliance point	na	na	na
Predicted Produced Water Quality			
Commingled from Cook/Canyon & Wall/Pawnee	570	11.2	903

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 570.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS).

The quality for the water produced from the Cook/Canyon 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 5.0 gallons per minute (gpm) is projected is to be produced from these 21 wells, for a total of 105.0 gpm for the POD. See Table 4.5 .

The quality for the water produced from the **Wall/Pawnee** 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 **10.0** gpm is projected is to be produced from these **21** wells, for a total of **210.0** gpm for the POD. See Table 4.5.

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

There are 2 discharge points proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, **1** off-channel impoundment (912.8 acre-feet) would be utilized within the project area. This impoundment will disturb approximately **137.0** acres including the dam structures. The off-channel impoundment would result in evaporation and infiltration of CBNG water. Criteria identified in “Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming” (WDEQ, 2002) was used to locate these impoundments. Monitoring may be required based upon WYDEQ findings relative to “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004). All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of **0.18** cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in **2006** at a total contribution to the mainstem of the **Little Powder River** of 13 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these **21** wells is anticipated to be a total of **555.0** gpm or 1.2 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in Wildcat Creek from this action (**1.24** cfs) may add a maximum **0.19** cfs to the **Little Powder River** flows, or **1.5%** of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the **Little Powder River Watershed** (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page **6**). Based on the area of the **Wildcat Creek** watershed above the POD (**101** sq mi) and an assumed density of **one** wells per location every **80** acres, the potential exists for the development of **808** wells which could produce a maximum flow rate of **12,120** gpm (**27** cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 27 cfs, is much less than the volume of runoff estimated from the 2-year storm event of 1,049 cfs for Wildcat Creek of the drainage.

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

The operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permit (permit number WY0051764) for the discharge of water produced from this project from the WDEQ.

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

pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Dissolved iron	1000 µg/l max
Dissolved manganese	1794 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	150 µg/l max
Chlorides	230 mg/l

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

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

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

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

In-channel downstream impacts are addressed in the WMP for the Noah Draw POD prepared by Western Land Services for Pinnacle Gas Resources, 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 Little Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

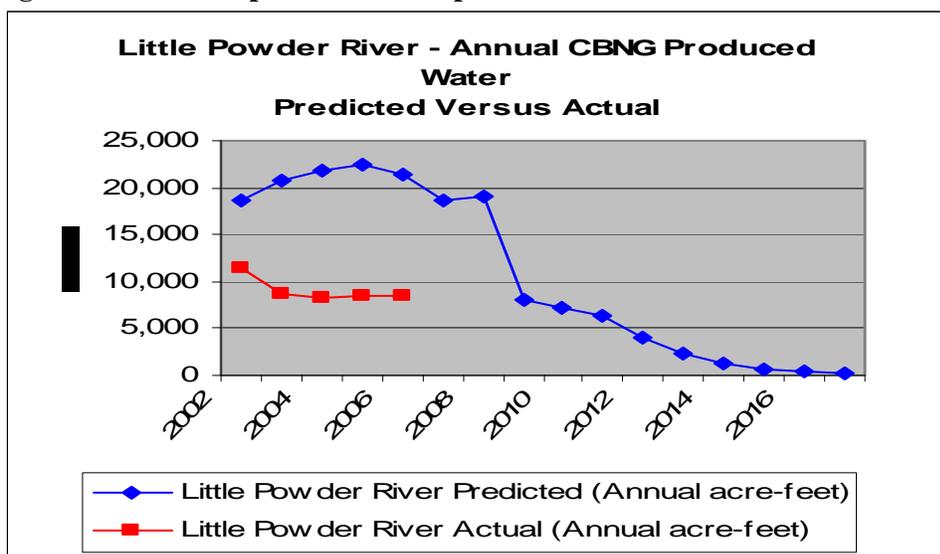
As of December 2006, all producing CBNG wells in the Little Powder River watershed have discharged a cumulative volume of 45,336 acre-ft of water compared to the predicted 105,024 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.6 and Figure 4.1 following. This volume is 43.2 % of the total predicted produced water analyzed in the PRB FEIS for the

Little Powder River watershed.

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

Year	Little Powder River Predicted (Annual acre-feet)	Little Powder River Predicted (Cumulative acre-feet from 2002)	Little Powder River Actual (Annual acre-feet)		Little Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	18,613	18,613	11,391	61.2	11,391	61.2
2003	20,822	39,435	8,767	42.1	20,158	51.1
2004	21,832	61,267	8,266	37.9	28,424	46.4
2005	22,427	83,694	8,529	38.0	36,953	44.2
2006	21,330	105,024	8,383	39.3	45,336	43.2
2007	18,607	123,631				
2008	19,121	142,752				
2009	8,016	150,768				
2010	7,124	157,892				
2011	6,439	164,331				
2012	3,930	168,261				
2013	2,340	170,601				
2014	1,335	171,936				
2015	699	172,635				
2016	350	172,985				
2017	133	173,118				
Total	173,118		45,336			

Figure 4.1 Actual vs predicted water production in the Little 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. As the two states develop a better understanding of the effects of CBM discharges through the enhanced monitoring required by the MOC, they can adjust the permitting approaches to allow more or less discharges to the Powder River drainage. Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117)

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur as a result of discharged produced CBNG water. The cumulative effects relative to this project are within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the **Little Powder River** drainage, which is approximately 43.2% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to contain all CBNG discharge water.

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 **Little Powder River** watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

The Bureau determined that no historic properties are within the area of potential effect. The Bureau electronically notified the Wyoming State Historic Preservation Officer (SHPO) following section V(A)(2) of the Wyoming State Protocol on 6/6/07 that no historic properties were identified in the proposed project area.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Mary Hopkins	Interim SHPO	Wyoming SHPO	No

6. OTHER PERMITS REQUIRED

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

7. REFERENCES AND AUTHORITIES

AHPIS, Animal and Plant Health Inspection Service. 2002. General information available online at <http://www.aphis.usda.gov/lpa/issues/wnv/wnv.html>.

Avian Power Line Interaction Committee. 1996. Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996. Edison Electric Institute. Washington, D.C. 125pp.

Bills, Thomas E. 2004. Powder River Basin Oil & Gas Project Semi-Annual Report: May 1, 2003 – October 31, 2003. BLM Buffalo Field Office. Buffalo, WY. 8pp.

Canfield, J. E., L. J. Lyon, J. M. Hillis, and M. J. Thompson. 1999. Ungulates. Chapter 6 in Effects of Recreation on Rocky Mountain Wildlife: A Review for Montana, coordinated by G. Joslin and H. Youmans. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society.

Code of Federal Regulations (CFR)

1. 40 CFR All Parts and Sections inclusive Protection of Environment. Revised as of July 1, 2004.
2. 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2006.

Cornish, Todd; Terry Creekmore; Walter Cook; and Elizabeth Williams. 2003. "West Nile Virus - Wildlife Mortality in Wyoming 2002-2003". In: The Wildlife Society Wyoming Chapter Program and Abstracts for the Annual Meeting at the Inn in Lander, WY November 18-21, 2003. Wildlife Society Wyoming Chapter. 17pp.

Geist, V. 1978. Behavior. Big Game of North America; ecology and management. Stackpole Books, Harrisburg, Pennsylvania.

Grenier, Martin. 2003. An Evaluation of Black-footed Ferret Block Clearances in Wyoming: Completion Report. Wyoming Game and Fish Department. Lander, WY. 16pp

Jalkotzy, M.G., P.I. Ross, and M.D. Nasserden. 1997. The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature. Arc Wildlife Services Ltd., Calgary, Alberta, Canada.

- Kelly Brian T. 2004. Letter to interested parties: Black-footed ferret clearance surveys. U.S. Fish and Wildlife Service (February 2, 2004). Cheyenne, WY. 4pp.
- Litzel, R. 2004. Personal communication [January 6 phone conversation with Jim Sparks]. Johnson County Weed and Pest District.
- Lowham, H.W. Streamflows in Wyoming WRIR 88-4045 U.S. Geological Survey 1988
- Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67th North American Wildlife and Natural Resources Conference.
- Marra PP, Griffing SM, McLean RG. West Nile virus and wildlife health. Emerg Infect Dis [serial online] 2003 Jul. Available from: URL: <http://www.cdc.gov/ncidod/vol9no7/03-0277.htm>.
- Martini, Jay. 2006. Pinnacle Gas Resources, Inc. Noah Draw Federal POD 2006 Wildlife Survey Report. Western Land Services. Sheridan, WY. 18pp.
- Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003
- Mooney, A. 2004. Personal Communication [January 6 phone conversation with Jim Sparks]. Campbell County Weed and Pest District.
- Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.
- Patterson, Craig T. and Stanley H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (*Haliaeetus leucocephalus*) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.
- Pinnacle Gas Resources, Inc. 2006. Project Plan of Development and Master Surface Use Plan Noah Draw Plan of Development. Sheridan, WY. 14pp.
- Rinkes, T. 2003. Personal communication [Draft notes from Annual Sage-Grouse and Sagebrush Species of Concern Meeting]. Bureau of land Management Wildlife Biologist/Sage Grouse Coordinator.
- Rogers, Brad. Personal Communication. Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Cheyenne Field Office. Cheyenne, WY.
- Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah
- Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. The Scientific Basis for Lynx Conservation: Qualified Insights. Ch16. USDA Forest Service Technical Report RMRS-GTR-30.
- The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).

- U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.
- U.S. Department of the Interior, Bureau of Land Management, Buffalo Field Office, Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office April 2001.
- U.S. Department of the Interior, Bureau of Land Management, Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. April 30, 2003.
- U.S. Fish and Wildlife Service (USFWS). 1989. Black-footed ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.
- U.S. Fish and Wildlife Service. 2002. Final Biological and Conference Opinion for the Powder River Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties (WY6633). U.S. Fish and Wildlife Service. December 17, 2002. Cheyenne, WY. 58pp.
- Walker B, Naugle D, Rinkes T. 2003. The Response of Sage Grouse to Coal-bed Methane Development and West Nile virus in the Powder River Basin: Is There a Link ? Page 6 in: Program and Abstracts for the Annual Wildlife Society Meeting, Wyoming Chapter.
- Western Land Services. 2006. Water Management Plan Noah Draw POD. Sheridan, WY. 25pp.
- Weston, Jason D. 2007. Class III Cultural Resource inventory of Noah Draw POD, Campbell County, WY. Western lands Services, Inc. (06-06/06-13/06-39) Sheridan.
- WDEQ, June 14, 2004. Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments

8. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS

Jim Snyder, Natural Resource Specialist
SUP NRS here, Supervisory Natural Resource Specialist
Chris Williams, Hydrologist
Dane Geyer, Petroleum Engineer
Becky Wilkerson, Legal Instruments Examiner
Leigh Grench, Archaeologist
Jennifer Morton, Wildlife Biologist
Gerald Queen, Geologist
Buddy Green if applicable, Assistant Field Manager, Resources
Paul Beels if applicable, Associate Field Manager, Minerals & Lands
Chris E. Hanson, Field Manager

Interdisciplinary Team Lead : **Jim Snyder**