

**FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Black Diamond Energy, Inc.
ND Unit**

ENVIRONMENTAL ASSESSMENT –WY-070-07-188

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Black Diamond Energy, Inc.’s ND Unit Coal Bed Natural Gas (CBNG) POD comprised of the following 29 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	ND UNIT NDU	12B-26*	SWNW	26	52N	78W	WYW146357
2	ND UNIT NDU	13B-26	NWSW	26	52N	78W	WYW146357
3	ND UNIT NDU	33B-26	NWSE	26	52N	78W	WYW146357
4	ND UNIT NDU	24B-26	SESW	26	52N	78W	WYW146357
5	ND UNIT NDU	44B-26	SESE	26	52N	78W	WYW146357
6	ND UNIT NDU	32B-27	SWNE	27	52N	78W	WYW146358
7	ND UNIT NDU	34B-27	SWSE	27	52N	78W	WYW146358
8	ND UNIT NDU	14B-27	SWSW	27	52N	78W	WYW146358
9	ND UNIT NDU	21B-27	NENW	27	52N	78W	WYW146358
10	ND UNIT NDU	23B-27	NESW	27	52N	78W	WYW146358
11	ND UNIT NDU	11B-28	NWNW	28	52N	78W	WYW146358
12	ND UNIT NDU	14B-28	SWSW	28	52N	78W	WYW146358
13	ND UNIT NDU	22B-28	SENW	28	52N	78W	WYW146358
14	ND UNIT NDU	23B-28	NESW	28	52N	78W	WYW146358
15	ND UNIT NDU	34B-28	SWNE	28	52N	78W	WYW146358
16	ND UNIT NDU	41B-28	NENE	28	52N	78W	WYW146358
17	ND UNIT NDU	14B-34	SWSW	34	52N	78W	WYW146358
18	ND UNIT NDU	23B-34	NESW	34	52N	78W	WYW146358
19	ND UNIT NDU	34B-34	SWSE	34	52N	78W	WYW146358
20	ND UNIT NDU	11B-34	NWNW	34	52N	78W	WYW146358
21	ND UNIT NDU	32B-34	SWNE	34	52N	78W	WYW146358
22	ND UNIT NDU	41B-34	NENE	34	52N	78W	WYW146358
23	ND UNIT NDU	14B-35	SWNW	35	52N	78W	WYW146357
24	ND UNIT NDU	21B-35	NENW	35	52N	78W	WYW146357
25	ND UNIT NDU	23B-35	NESW	35	52N	78W	WYW146357
26	ND UNIT NDU	32B-35	SWNE	35	52N	78W	WYW146357
27	ND UNIT NDU	41B-35	NENE	35	52N	78W	WYW146357
28	ND UNIT NDU	43B-35	NESE	35	52N	78W	WYW146357
29	ND UNIT NDU	34B-35	SWSE	35	52N	78W	WYW146357

The following impoundments were inspected and approved for use in association with the water management strategy for the POD. As of September 25, 2007, per correspondence from Black Diamond, the following reservoirs are now to be considered as secondary impoundments. As such, reclamation bonds will not be required prior to POD approval. However, if Black Diamond should decide to build

any of these dams, except Michelena #3, sundry notices, form 3160.5, and appropriate reclamation bonds will be submitted for review and approval by BLM prior to any construction. When proof of bonding is submitted for the Michelena #3 dam, it will be permitted for use with this POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	41-28-52-78 (Dutch #2)	NENE	28	52	78	19.9	7	WYW146358
2	44-34-52-78	SESE	34	52	78	18.9	3.5	WYW146358
3	44-35-52-78	SESE	35	52	78	20	3.2	WYW146357
4	ROBERT G STOCK	SWNW	35	52	78	47.9	6.3	WYW146357
5	34-26-52-78	SWSE	26	52	78	49.4	5.6	WYW146357
6	23-26-52-78	NESW	26	52	78	18.4	4.5	WYW146357
7	MICHELENA #3	SWNW	17	51	77	31.5	5.5	WYW146313

In addition to the listed APDs, it is my decision to approve the following right-of-way grants:

ROW Grant	Type	Sections	TWP/RNG
WYW-069802	Gas pipeline	2, 3, 12	51N/78W
WYW-169803	Access road and water pipeline	2, 3, 12	51N/78W

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

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

1. The Operator, in their POD, has committed to:
 - Comply with all applicable Federal, State and Local laws and regulations.
 - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
 - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
 - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.

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

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

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

Field Manager: _____ Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Black Diamond Energy, Inc.
ND Unit
PLAN OF DEVELOPMENT
WY-070-07-188**

INTRODUCTION

This site-specific analysis tiers into and incorporates by reference the information and analysis contained in the Powder River Basin Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS), #WY-070-02-065 (approved April 30, 2003), pursuant to 40 CFR 1508.28 and 1502.21. This document is available for review at the Buffalo Field Office. This project EA addresses site-specific resources and impacts that 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 3 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: **Black Diamond Energy, Inc.’s Nurse Draw** Plan of Development (POD) for 37 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There were 37 wells proposed within this POD, 29 are approvable. The wells are vertical bores proposed on an 80 acre spacing pattern with 1 well bore per location. The operator proposes to test the potential of all Fort Union coal formations between 850 feet and 2400 feet for methane production. Proposed well house dimensions are 4ft wide x 4ft length x 4ft height.

Wells are located as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	ND UNIT NDU	12B-26*	SWNW	26	52N	78W	WYW146357
2	ND UNIT NDU	13B-26	NWSW	26	52N	78W	WYW146357
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27	ND UNIT NDU	41B-35	NENE	35	52N	78W	WYW146357
28	ND UNIT NDU	43B-35	NESE	35	52N	78W	WYW146357
29	ND UNIT NDU	34B-35	SWSE	35	52N	78W	WYW146357
30	ND UNIT NDU	12-27	SWNW	27	52N	78W	WYW146358
31	ND UNIT NDU	43-34	NESE	34	52N	78W	WYW146358
32	ND UNIT NDU	23-27	NESW	27	52N	78W	WYW146358
33	ND UNIT NDU	12-35	SWNW	35	52N	78W	WYW146357
34	ND UNIT NDU	21-26	NENW	26	52N	78W	WYW146357
35	ND UNIT NDU	32-26	SWNE	26	52N	78W	WYW146357
36	ND UNIT NDU	43-25	NESE	25	52N	78W	WYW146357
37	NURSE DRAW	43-30	NESE	30	52N	77W	WYW134569

Water Management Proposal: The following impoundments were proposed for use in association with the water management strategy for the POD. As of September 25, 2007, per correspondence from Black

Diamond, the following reservoirs are now to be considered as secondary impoundments. As such, reclamation bonds will not be required for POD approval. However, if Black Diamond should decide to build any of these dams, except Michelena #3, sundry notices and bonds will be submitted for review and approval by BLM prior to any construction. When proof of bonding is submitted for the Michelena #3 dam, it will be permitted for use with this POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	41-28-52-78 (Dutch #2)	NENE	28	52	78	19.9	7	WYW146358
2	44-34-52-78	SESE	34	52	78	18.9	3.5	WYW146358
3	44-35-52-78	SESE	35	52	78	20	3.2	WYW146357
4	ROBERT G STOCK	SWNW	35	52	78	47.9	6.3	WYW146357
5	34-26-52-78	SWSE	26	52	78	49.4	5.6	WYW146357
6	23-26-52-78	NESW	26	52	78	18.4	4.5	WYW146357
7	MICHELENA #3	SWNW	17	51	77	31.5	5.5	WYW146313
8	MICHELENA #4	SWNW	17	52	78	12.85	6	WYW146313

Right-of-way grants

ROW Grant	Type	Sections	TWP/RNG
WYW-069802	Gas pipeline	2, 3, 12	51N/78W
WYW-169803	Access road and water pipeline	2, 3, 12	51N/78W

County: **Johnson**

Applicant: **Black Diamond Energy, Inc.**

Surface Owners: **Charles Lawrence, Robert Baumgartner, BLM**

Project Description:

The proposed action involves the following:

- Drilling of 37 total federal CBM wells in the following anticipated coal zones **Anderson/Smith, Canyon/Gates,** and **Wasatch/Wall**. The Wall coal seam is the deepest formation anticipated to be drilled and is present throughout the project area with depths of approximately 2040 to 2400 feet. Multiple seams will be produced by **co-mingling production** (a single well per location, producing from multiple coal seams).

Drilling procedures are anticipated to be initiated upon approval of the APD. The operator predicts the drilling of each well to take 3 days with and additional 1 day to complete the well. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Drilling and construction occurs year-round in the PRB. 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. Drilling and construction activities are anticipated to be completed within two years, the term of an APD.

- Well metering shall be accomplished by **telemetry**. Maintenance and checking of the well site would entail 2 visits per week to each location.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: An

existing EMIT water treatment facility with treated water discharge directly to the Powder River. Six secondary water impoundments with associated discharge points within the Crazy Woman drainage and three secondary water impoundments with associated discharge points within Kinney Draw drainage, a direct tributary to the Powder River.

- An unimproved and improved road network.
- A buried gas, water and power line network. A portion of the power line network is above ground power line that will be constructed by a contractor. If the proposed route is altered, then the new route will be proposed via a sundry application and analyzed in a separate NEPA action. Power line construction will be scheduled and completed before the CBNG wells are producing.

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

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

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

1. Comply with all applicable Federal, State and Local laws and regulations.
2. Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
3. Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD
4. Provide water analysis from a designated reference well in each coal zone.

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

2.3. Alternative C – Environmentally Preferred

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

2.3.1. Changes as a result of the on-sites

The entire Nurse Draw area has very steep topography and highly erosive soils. Black Diamond

withdrew seven APDs due to inaccessibility and rough topography with slopes greater than 25%. Another APD was dropped due to unitization issues. Black Diamond decided to commingle 3 coal zones, reducing the original three APDs per well location to one APD per location. As described below the well locations and roads were moved to reduce surface disturbance, allow for safe access, and/or to mitigate impacts to surface resources.

Well #	Changes at onsite		Sec	TwN	Rng
12-27	Black Diamond withdrew the APD for the 12-27 location due to rugged topography and not locating an accessible route to the location.	SWNW	27	52N	78W
43-34	Black Diamond withdrew the 43-34 location due to steep (greater than 25%) topography. The only access proposed was off a 15ft cliff. There is no practical alternative.	NESE	34	52N	78W
23-27	Withdrew the APD for the 23-27 location due to a raptor nest within a ¼ mile and the proximity to the 12-27 after this well was relocated due to topography.	NESW	27	52N	78W
12-35	Withdrew the APD for the 12-35 location due to rough topography.	SWNW	35	52N	78W
21-26	Withdrew the APD for the 21-26 due to slopes greater than 25%, and inability to locate a stable access road.	NENW	26	52N	78W
32-26	Withdrew the APD for the 32-26 due to slopes greater than 25%, and inability to locate a stable access road.	SWNE	26	52N	78W
43-25	The 43-25 location was withdrawn because the only road proposed was located on highly erosive soils and steep slopes.	NESE	25	52N	78W
43-30	Black Diamond withdrew the 43-30 location due to unitization issues.	NESE	30	52N	77W
32-28	Due to slopes greater than 25%, Black Diamond moved 32-28 location up the hill, shortening the access road and eliminating the need for a constructed pad on the new location.	SWNE	28	52N	78W
12-27	Due to rough topography, Black Diamond relocated the 12-27 to an area that would result in less surface disturbance.	SWNW	27	52N	78W
32-35	Due to a headcut on the west side of the access road just before reaching the 32-35 location, Black Diamond agreed to relocate the access road to east side of the pad.	SWNE	35	52N	78W
41-28	Due to the rough topography surrounding the 41-28 location, Black Diamond pulled the location back toward the main access road and relocated the pipeline.	NENE	28	52N	78W
41-34	Moved the 41-34 location approximately 60' to keep from building a constructed pad, reduced to a 30x 120 slotted pad.	NENE	34	52N	78W
34-35	Due the rough topography, moved the 34-35 location approximately 150' up toward the proposed access. Thereby shortening the access road and eliminating this portion of disturbance in rough topography.	SWSE	35	52N	78W
44-26	Black Diamond agreed to minimize the pad on the 44-26 location. The pad diagram will be kept on file.	SESE	26	52N	78W
34-27	Black Diamond relocated the spoil pile and provided	SWSE	27	52N	78W

Well #	Changes at onsite		Sec	Twn	Rng
	mitigation of water around the 34-27 location.				
21-27	Black Diamond revised the pipeline and relocated the road so the pipeline would come from the 41-28 location, reducing the amount of disturbance.	NENW	27	52N	78W
33-26	To keep disturbance out of a nearby drainage, Black Diamond minimized the constructed pad design thus allowing a 75' vegetated buffer from the drainage.	NWSE	26	52N	78W

Water Management Changes

Dam Name	Remarks	QtrQtr	Sec	Twn	Rng
Michelena #4	The proposed Michelena #4 dam was dropped by Black Diamond because of the small storage associated with a relatively large embankment.	SWNW	17	52	78
44-34-52-78	This dam will require construction oversight due to the presence of a headcut downstream, weak sandstone and weathered shale lens outcrops in the area. Construction oversight will allow for modification of the structure to adjust for issues identified during building, rather than after problems occur.	SESE	34	52	78
44-35-52-78	This dam will require construction oversight due to the presence of a headcut downstream, and the silty, highly erosive nature of the soils in the area. Construction oversight will allow for modification of the structure to adjust for issues identified during building, rather than after problems occur.	SESE	35	52	78
ROBERT G STOCK	This old existing dam is proposed for raising and increasing storage capacity. This may place water onto a weathered shale outcrop in the pool area. For this reason, construction oversight will be required. Construction oversight will allow for modification of the structure to adjust for issues identified during building, rather than after problems occur.	SWNW	35	52	78
34-26-52-78	This proposed dam has coal, sandstone and weathered shale outcrops above and below the site. If this dam is built, construction oversight will be required. Construction oversight will allow for modification of the structure to adjust for issues identified during building, rather than after problems occur.	SWSE	26	52	78
23-26-52-78	This old failed dam is in a very poor geologic area for dams. The presence of numerous coal seam, weathered shale and sandstone outcrops in the area dictate that, if this dam is re-built, construction oversight will be required. Construction oversight will allow for modification of the structure to adjust for issues identified during building, rather than after problems occur.	NESW	26	52	78

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

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 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.

2.3.2.2. Surface Water

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

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. Wetland/Riparian

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance can't 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

3. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.
4. The lower edge of 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 geomorphologic configuration and properly stabilized.
6. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.5. Wildlife

1. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
2. The Companies will 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.
3. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

2.3.2.6. 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.

2.3.2.7. Noise

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

2.3.2.8. Air Quality

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

2.3.3. Site specific mitigation measures

Surface Mitigation

1. All changes made at the onsite will be followed. They have all been incorporated into the operator’s plan of development.
2. 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 Nurse Draw POD is **Covert Green**, 18-0617 TPX.
3. Due to a headcut at the 32-35 location, Black Diamond will keep 20’ vegetated border from the headcut.
4. The 14-27 is located in a bowl at the edge of a knoll on rocky out slope. To prevent loss of soil that would not be recoverable, the edge of fill will kept 10’ from edge of the drop off. There was not much vegetation on this rocky location other than fourwing saltbrush, therefore, the operator will be required to replant fourwing salt brush at the 14-27 location to aid in reclamation
5. 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:

Clayey Seed Mix

Section 26 Wells: 12-26, 44-26, 33-26, Section 27 Wells: 12-27, 14-27, 32-27, 34-27, 21-27, 12-27, Section 28 Wells: 32-28, 22-28, 41-28, 14-28, 23-28, 34-28, 11-28		
Species	% in Mix	Lbs PLS*
<i>Western Wheatgrass</i> (Pascopyrum smithii)	35	4.2
<i>Green needlegrass</i> (Nassella viridula)	30	4.8
<i>Slender Wheatgrass</i> (Elymus trachycaulus ssp. trachycaulus)	20	1.2
<i>Prairie coneflower</i> (Ratibida columnifera)	5	0.6
<i>White or purple prairie clover</i> (Dalea candidum, purpureum)	5	0.6
<i>Rocky Mountain beeplant</i> (Cleome serrulata)	5	0.6
Totals	100%	12 lbs/acre

Loamy Seed Mix

Section 34 Wells: 41-34, 11-34, 14-34, 23-34, 32-34, 34-34, Section 35 Wells: 14-35, 41-35, 32-35, 34-35, 23-35, 43-35, 21-35		
Species	% in Mix	Lbs PLS*
Western Wheatgrass (Pascopyrum smithii)/or Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	30	3.6
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	10	1.2
Green needlegrass (Nassella viridula)	25	3.0
Slender Wheatgrass (Elymus trachycaulus ssp. trachycaulus)	20	2.4
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata)	5	0.6
Totals	100%	12 lbs/ac

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

6. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:

Reclamation Standards:

- C. 3 The reclaimed area shall be stable and exhibit none of the following characteristics:
 - a. Large rills or gullies.
 - b. Perceptible soil movement or head cutting in drainages.
 - c. Slope instability on, or adjacent to, the reclaimed area in question.
 - C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
 - C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
 - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
 - C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.
7. Prior to the pre-construction onsite for this project, the operator shall submit a certification, signed by the landowner, regarding the construction of road from the NESE of section 21 to the

SWSW of section 35, T52N R78W on Charles Lawrence’s private surface. This certification shall include the following:

- Documentation that the landowner has reviewed the design for the proposed construction for these road segments, examined the staking in the field, and is aware of the magnitude of surface disturbance that the installation will create.
- Certification that the landowner intends to retain these roads for his use after CBNG production ceases.

Civil Engineering

1. Roads shall be constructed and used according to the final maps that show the transportation routes. If the road is part of a proposed utility or pipeline corridor, then the corridor will be constructed according to drawings and typical details that show the road, utilities/pipeline, and space needed for temporary spoil and topsoil storage as submitted with the POD.
2. Due to highly erosive soils, steep slopes, and for safety purposes the roads must be built to the road standards permitted, * **prior to being accessed by drilling rigs**. All primary corridors shall be surfaced prior to placing these roads into use.
3. Adequate drainage control (e.g. water bars, lead-out ditches, etc.) must be in place before operator use of the roads begins.
4. Roads shall be constructed prior to installation of utilities and pipelines unless scheduling requirements dictate otherwise. Pre-approval shall be obtained from the BLM if utilities and pipelines are to be placed before a road is constructed.
5. The operator shall restrict travel during periods of inclement weather or spring thaw when the possibility exists for excessive surface resource damage (e.g., rutting in excess of 4-inches, travel outside two-track roadway, etc.).
6. Rutting, other road damage, and/or adjacent surface damage, including erosion from road runoff, shall be promptly repaired. If needed, fill shall be placed in low spots to prevent further damage. If road damage or adjacent surface erosion from road runoff is caused or worsened by inadequate drainage, additional drainage shall be promptly constructed. If road damage is chronic or extensive, the operator shall request by sundry to upgrade to an improved road.
7. If erosion occurs during the life of the project, the company shall promptly repair it and control it through construction of additional culverts, lead-out ditches, or other modifications as necessary.
8. The operator shall have a licensed professional engineer certify in writing to the BFO that construction of the roads and/or crossings was in conformance with the final engineering designs submitted to the BLM for review during the permitting process. Deviations from the final engineering design shall be documented in the signed certification.
9. On cut-slope sections of road and other sections of road where topography on one side of the road does not allow the use of lead-out ditches to relieve road ditch flow, cross-drains in the form of culverts, water bars, or drainage dips shall be placed according to the following minimum spacing:

Cross-Drain Spacing (feet)				
Soil Type	Road Grade 2-4%	Road Grade 5-8%	Road Grade 9-12%	Road Grade 13-16%
Highly erosive granitic or sandy	240	180	140	100
Intermediate erosive clay or clay/silt/sand	310	260	200	150
Low erosive shale or gravel	400	325	250	200

(*Please be aware you must request an extension from the BLM Reservoir Management Group if the mitigation timelines conflict with obligation requirements for the ND Unit,).

Water Management Mitigation

1. Impoundment 41-28-52-78 (Dutch #2), NENE - Due to the presence of weathered shale and sandstone outcrops, construction oversight will be required during work on this dam so that issues affecting the dam’s integrity can be addressed at that time.
2. Impoundment 44-34-52-78, SESE - There is a substantial gully and headcut downstream of this site. The presence of weak sandstone in the sides of the gully could indicate eventual leaking and/or failure due to piping. If it is built, construction oversight will be required so that issues affecting the dam’s integrity can be addressed at that time.
3. Impoundment 44-35-52-78, SESE - This is an old existing dam which will be enlarged. Silty material in the basin and the area downstream indicate that this structure has a high probability to seep and pipe. For these reasons, construction oversight is needed so that issues affecting the dam’s integrity can be addressed at that time.
4. Impoundment Robert G Stock, SWNW - This old existing dam is proposed for enlargement, which could back water onto an exposed layer of weathered shale. Construction oversight will be required for this dam so that issues affecting the dam’s integrity can be addressed at that time.
5. Impoundment 34-26-52-78, SWSE - This dam is proposed in a steep-sided gully upstream of the 23-26 dam. The presence of coal and sandstone outcrops within the pool and construction areas indicate that this site has a high probability of seeping and piping. Construction oversight will be required so that issues affecting the dam’s integrity can be addressed at that time.
6. Impoundment 23-26-52-78, NESW - This dam is an old existing failed structure. The surrounding geology is very poor with coal, sandstone and weathered shale outcrops at various levels. This site was recommended for dropping or at least placing in a very low priority. Should this dam be rebuilt, construction oversight will be required so that issues affecting the dam’s integrity can be addressed at that time.
7. Impoundment Michelena #4 – This dam was dropped from the WMP because of the small storage capacity associated with a relatively large embankment. If the operator decides to build this dam, a sundry will submitted to the BLM for review and approval.
8. Black Diamond’s water management strategy has been changed to rely solely on the EMIT treatment facility with discharge of a blend of treated and raw water directly into the Powder River. All impoundments proposed for development have been listed as “secondary” in order to avoid the need for posting of reclamation bonds prior to POD approval. Should Black Diamond choose to add any of the impoundments listed in the impoundment table above, a sundry notice will be submitted to the BLM for review. Construction is not authorized prior to receipt of appropriate reclamation bonds and BLM approval.

Wildlife Mitigation

1. The following conditions will minimize impacts to raptors;
 - a. No surface disturbance shall occur within ½ mile of all identified nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This affects the following wells and **associated infrastructure; pipelines, low water crossings, culverts, temporary access roads, discharge points, and overhead power and drops.**

Area Covered by this Mitigation	BLM ID #	UTM N	UTM E	Species
T51R78: North half of section 2, pipeline.	4901	4920251	403902	Unknown
T52R78: South 1/4 section 35,	4902	4920459	403574	Northern Harrier

Area Covered by this Mitigation	BLM ID #	UTM N	UTM E	Species
pipeline				
T52R78: Well location 43-35	3869	4919431	402643	Golden Eagle
none	3870	4919837	399766	Unknown
T51R78: East 1/2 section 11, pipeline West 1/2 section 12, pipeline	3871	4917804	404307	Unknown
none	3052	4923957	406955	Red-tailed hawk
T52R78: Southeast 1/4 section 20 road work:	3051	4924828	399210	Golden Eagle
T52R78: Well locations 23-27, 32-27, 34-27, and road work in section 27	3868	4922669	402066	Red-tailed hawk
T52R78: Section 28 well locations 11- 28, 22-28, 32-28, 23-28, 34-28, power line construction and road construction	3048	4923097	400202	Unknown
T52R78: Road construction in sections 30, 29, SESW section 20.	3047	4923712	398039	Red-tailed hawk
T52R78: Road construction in sections 29 and 30	3444	4923702	397717	Red-tailed hawk
T52R78: Well locations 41-34, 32-34, 21-35, 23-35, reservoir in west portion of section 35, powerline and road construction in section 34	3046	4921680	402848	Unknown
T52R78: Well locations 32-35, 23-35, 34-35, 43-5	3049	4920802	404068	Unknown
T52R78: Well location 43-35	3045	4921027	404787	Red-tailed hawk
T52R78: Road segment in section 36	4903	4921840	405256	Unknown
T52R78: Well locations 24-26, 13-26, 21-35	2607	4922234	403285	Red-tailed hawk
T52R78: Well location 33-26	4126	4923071	404173	Unknown
T51R78: Pipeline in east section 11 and west section 12	4364	4917725	404392	Unknown

- 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. 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 all raptor nests within ½ mile of the POD. The 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/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.
- d. Between February 1 and the completion of raptor nest productivity checks, drilling, completion, and maintenance activities requiring more than checking the well must be approved by the BLM for the following wells: 23-27
- e. Signs advising vehicles to not stop Feb1- Aug 1 will be placed on the ridge road ½ mile south and north of the 3868 nest.

- f. Where the operator ties into existing power poles, the existing pole shall be fitted to meet or exceed 2007 APLIC standards.
 - g. If nest 3868 becomes inactive in 2008 or 2009, then Black Diamond will meet with the BLM and US Fish and Wildlife Service to discuss mitigation to be in place by February 1, 2010.
2. The following conditions will minimize impacts to sage-grouse:
- a. A survey is required for sage-grouse between April 1 and May 7, annually, within the project area for the life of the project and results shall be submitted to a BLM biologist. The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
 - b. 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).

Known 2007 leks affecting the project and project elements within 2 miles.

Area Covered by this Mitigation	Lek Name	UTMN	UTME
T52R78: All of section 34, southeast of section 35, 34-35. T51R78 pipeline in section 2	Kinney Draw I	4919134	401223
T52R78: well locations 32-34, 23-34, 14-34, 34-34, staging area, stock tank and reservoir in south 34, powerline south 34 Southwest 1/4 of section 35. T51R78: pipeline section 2 and 11.	Kinney Draw II	4918361	401423
T51R78: pipeline in sections 11, 12, 18	Kinney Draw III	4919515	401734
T52R78: All of section 34. Well locations 21-35, 32-35, 43-35, reservoir 44-35, 34-35, 23-35, 12-35, 14-35. Road work south of the 23-27 turn-off, 34-27, 34-28, 14-27. T51R78: pipeline in section 2 and 11	Nurse Draw	4917725	402906
T52R78: road work in sections 19, 30, 29, 20	Thompson Creek Rd	4925200	396600

- 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. Disturbance widths on access (except for engineered, template sections or unforeseen circumstances such as rock) shall be limited to 30 feet and mowing around the well head (where no pad is needed) shall be limited to 35 feet at the following wells in order to reduce impacts to sage-grouse: 33-26, 44-26, 14-27, 11-34, 14-34, 23-34, 32-34, 23-35, 32-35, 34-35, 41-35.
3. The following conditions will minimize impacts to roosting and nesting bald eagles;
- a. Surveys for active bald eagle nests and winter roost sites will be conducted annually within suitable habitat (Crazy Woman Creek and the Powder River) by a biologist.

Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.

- b. If a roost is identified a year round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal limited activity zone of 1-mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
 - c. If a bald eagle nest is identified a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).
 - d. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.
4. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, "The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time". The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, the operator will coordinate with the BLM to determine if additional surveys will be required.

2.4. Alternatives considered but not analyzed in detail

In 2005 Black Diamond met with the BLM for assistance in preplanning wells in this rough topography. In March of 2005 Black Diamond submitted a smaller project called the Nurse Draw POD with 11 wells on two leases in the northeast corner of the current Nurse Draw Unit POD area. In the March of 2005 submittal Black Diamond did not have a safe bridge to cross over Crazy Woman Creek. In April of 2005 Black Diamond requested the Nurse Draw POD back so that they could combine the 11 wells with others located on nearby leases to minimize impacts that could have arisen from independent development. In addition, Black Diamond stated that they were exploring the possibility of directionally drilling the leases in this area, due to the extremely rough topography. Black Diamond met with the BLM late in 2005 and early 2006 in attempts to develop an approvable project. Black Diamond determined directional drilling was not economically feasible for their operations. They dropped wells in rough topography and submitted the Nurse Draw POD in November of 2006 with 111 APDs. Black Diamond decided to commingle 3 coal zones reducing the number of APDs to 1/3, from 111 to 31. Thereby reducing the size needed for constructed pads. The operator worked diligently with the BLM at the onsite to locate reasonable access routes and moved many locations to areas of least disturbance. The affected environment is described below.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on November 8, 2006 Field inspections of the proposed Nurse Draw CBNG project were conducted over six days with the follow attendees:

June 12, 2007

Jennifer Spegon, NRS, BLM
Bill Ostheimer, Biologist, BLM
Lee Harrelson, Civil Engineer, BLM
Ben Adams, Hydrologist, BLM
Jenna Foss, Consultant, Grouse Mountain

Bill Bellah, Consultant, Grouse Mountain
Liz Hunter, Civil Engineer, Kadrmas Lee & Jackson
James Slayton, Survey Team, Kadrmas Lee & Jackson
Terry Blye, Operator Rep, Black Diamond Energy, Inc.
Red Luken, Drilling Supervisor, Black Diamond Energy Inc.
Dan Lawrence, Surface Owner, Private Surface
Brad Koon, Surface Owner Guest, Private Surface

June 13, 2007

Jennifer Spegon, NRS, BLM
Ben Adams, Hydrologist, BLM
Jenna Foss, Consultant, Grouse Mountain
Bill Bellah, Consultant, Grouse Mountain
Terry Blye, Operator Rep, Black Diamond Energy, Inc.
Mr. and Mrs. Joachin Michelena, Surface Owner, Private Surface

June 19, 2007

Jennifer Spegon, NRS, BLM
Dave Skinner, NRS, BLM
Bill Ostheimer, Biologist, BLM
Arnie Irwin, Soil Scientist, BLM
Amber Bryan, Petroleum Engineer, BLM
Jenna Foss, Consultant, Grouse Mountain
Liz Hunter, Civil Engineer, Kadrmas Lee & Jackson
Red Luken, Drilling Supervisor, Black Diamond Energy Inc.
Dan Lawrence, Surface Owner, Private Surface

June 27, 2007

Jennifer Spegon, NRS, BLM
Chris Perry, Civil Engineer, BLM
Jenna Foss, Consultant, Grouse Mountain
Liz Hunter, Civil Engineer, Kadrmas Lee & Jackson
Terry Blye, Operator Rep, Black Diamond Energy, Inc.
Dan Lawrence, Surface Owner, Private Surface

July 3, 2007

Jennifer Spegon, NRS, BLM
Dave Skinner, NRS, BLM
Jenna Foss, Consultant, Grouse Mountain
Bill Bellah, Consultant, Grouse Mountain
Liz Hunter, Civil Engineer, Kadrmas Lee & Jackson
Terry Blye, Operator Rep, Black Diamond Energy, Inc.
Robert & Maureen Baumgartner, Surface Owners, Private Surface
Dan Lawrence, Surface Owner, Private Surface

September 23, 2007

Jennifer Spegon, NRS, BLM
Hilaire Peck, Civil Engineer, BLM
Jenna Foss, Consultant, Grouse Mountain
Liz Hunter, Civil Engineer, Kadrmas Lee & Jackson
Jamie Cargel, Surveyor, Kadrmas Lee & Jackson

Terry Blye, Operator Rep, Black Diamond Energy, Inc.

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

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

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

3.1. Topographic Characteristics of Project Area

The proposed Nurse Draw Unit POD is located approximately 25 miles northeast of Buffalo, Wyoming. Elevations range from 4,200 to 4,400 feet above sea level. Topography of the northern portion of the project area consists of moderate to severely steep ridges with deeply incised gully systems. The southern portion of the project area is slightly less incised with a few areas of flat sagebrush covered mesas drained by the ephemeral tributaries of Nurse Draw, Rose, Post, Mitchell and Kinney draws and several unnamed draws which are tributary to Crazy Woman Creek. No perennial streams are located in the project area. The climate in the area is semi arid, averaging 12-13 inches of precipitation per year.

The unnamed ridgelines in the Nurse Draw POD trend northwesterly. The ridges are flanked by numerous smaller erosional features down the sides of these ridges. The highly erosive soils have been weathered and washed creating large fan like incisions running downslope on these ridges to the abutting steep drainages that run parallel to the ridges, dissecting the landscape. The sharp contrast in elevated relief in this landscape has created major challenges in locating access routes and placing wells on locations which could safely be accessed and drilled within the designated 80 acre spacing.

In the Nurse Draw POD, forty percent of the area is located on slopes greater than 25%. Lease stipulations were applied to leases in this area because of severe erosion hazards and poor reclamation

potential. Of the remaining sixty percent of the POD, thirty percent is located on slopes 8-16% and the remaining thirty percent of POD lies on slopes less than 8%. The majority of access roads have been located on ridges with grades less than 12%. Well locations were placed on or near these access roads, where flatter areas occurred, as near as possible to the drilling space requirements.

Transportation

The main artery road from the NESE of section 21 to the SWSW of section 35, T52N R78W lies on a ridge that has traditionally been used as a two-track by the private surface owner’s ranching operations. Throughout the preplanning process and during field visits (onsites) for this POD the BLM, operator and private surface owner searched for possible alternative routes. However, no feasible alternatives were discovered. The affected landowner prefers the proposed main access road on this ridge since it would best serve his ranching needs.

Black Diamond is working with the landowner and other operators to allow this main artery road to be used to access leases by other operators outside the Nurse Draw POD. This preferred access route is in an area with highly erosive soils, poor reclamation potential and a private landowner who would prefer to retain the road after the CBNG development has finished utilizing the road. Therefore, the road will be analyzed as a 16 foot resource road with low traffic volumes.

3.2. Vegetation & Soils

Soils within the project area were identified from the *North Johnson County Survey Area, Wyoming*. 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. The soils and landforms of this area present distinct challenges for development. Most of the soils are identified as highly erosive, making reclamation difficult. Approximately 78 percent of the area within the boundary of the proposed action has soil mapping units with a named component identified as being highly erosive. 40 % of the area within the POD boundary has slopes greater than 25%. The Bureau of Land Management has an obligation to protect these lands from disturbance which could lead to irretrievable and irreversible impacts, as per the Record of Decision. *“Areas of highly erosive soils will be avoided when drill sites, two-track access routes, and pipeline routes are surveyed and staked in order to substantially reduce the amount of soil loss.”*

Dominate soils affected by the proposed action include:

Map Unit	Map Unit Name	Acres	Percent
684	Samday-Shingle-Badland complex, 10 to 45 percent slopes	3256	78%
708	Theedle-Kishona-Shingle loams, 3 to 30 percent slopes	309	7%
640	Forkwood-Cushman loams, 6 to 15 percent slopes	158	4%
615	Cambria-Kishona-Zigweid loams, 6 to 15 percent slopes	151	4%
639	Forkwood-Cushman loams, 0 to 6 percent slopes	124	3%
707	Theedle-Kishona loams, 6 to 20 percent slopes	99	2%
709	Theedle-Shingle loams, 3 to 30 percent slopes	55	1%
734	Kishona-Zigweid loams, gullied, 3 to 15 percent slopes	21	<1%
938	Water	5	<1%

For more detailed soil information, see the NRCS Soil Survey 719 – Northern Johnson County.

Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 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.

Map Units and Ecological Sites

MUSYM	Ecological Site
615	Loamy (10-14NP)
639	Loamy (10-14NP)
640	Loamy (10-14NP)
684	Shallow Clayey (10-14NP)
707	Loamy (10-14NP)
708	Loamy (10-14NP)
709	Shallow Loamy (10-14NP)
734	Loamy (10-14NP)
938	

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure are predominately Shallow Clayey, Loamy and miscellaneous areas described as Badlands.

Shallow Clayey Sites

This site occurs on slopes and ridge tops on landforms which include hill sides, ridges and escarpments in the 10-14" precipitation zone. The soils of this site are shallow (less than 20" to bedrock) well drained soils that formed in alluvium or residuum derived from unspecified shale. These soils have moderate to slow permeability and may occur on all slopes. The bedrock is clay shale which is virtually impenetrable to plant roots. The main soil limitations include depth to bedrock and clay content.

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 Wheatgrass, Green Needlegrass community. Potential vegetation is about 80% grasses or grasslike plants, 10% forbs, and 10% woody plants. The state is dominated by cool season midgrasses. The major grasses include rhizomatous wheatgrasses, green needlegrasses, and bluebunch wheatgrass.

The present plant community is a Mixed Sagebrush/Grass Plant Community.

Other vegetative species identified at onsite: cheatgrass, blue grama, fringed sagewort and plains pricklypear.

Loamy Sites

This site occurs on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10-14 inch precipitation zone.

The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability.

The 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, Blue Grama Plant Community. Potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, cheatgrass has invaded with western wheatgrass

and thickspike wheatgrass maintains at a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. 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. Plant diversity is low.

“Miscellaneous Areas”, Badlands

This site occurs on steep slopes and ridge tops, but may occur on all slopes which include landforms such as hillsides, ridges and escarpments. The sites are identified as miscellaneous areas and classified as Badland. Badland have essentially no soil and support little or no vegetation. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

The proposed action was designed to avoid these highly erosive soils which having a low potential for successful reclamation. The areas identified as potentially having a highly erosive map unit were identified at the onsite and avoided in the permitting process.

3.2.1. Wetlands/Riparian

Incidental wetland and riparian areas have developed within the project area due to old stock water dams. In some cases, individual cottonwood trees have grown in some of the draws. Natural wetlands and riparian areas are present along Crazy Woman Creek and Powder River proper. In these major drainages, galleries of mature cottonwood trees thrive, along with all of the flora and fauna associated with these types of areas in Wyoming.

3.2.2. 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 Wyoming Energy Resource Information Clearinghouse (WERIC) web site (www.weric.info):

- leafy spurge
- Russian knapweed
- salt cedar

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

- leafy spurge
- Russian knapweed
- salt cedar

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 Arcadis G & M performed surveys for greater sage-grouse and plains sharp-tailed grouse on April 1, 11, and 24, 2006 and in 2007 on

April 12, 24, and 30. Surveys for mountain plover nesting activity were completed on May 9, 29, and June 14 2007. The project area was ground searched for raptor nests and prairie dog colonies on April 30, May 9 and 29. Ute ladies'-tresses surveys were performed in 2005 on Crazy Woman Creek at the bridge. Bald eagle winter roost surveys were performed on December 5, January 3 and February 20 2007 on Crazy Woman Creek and December 7, January 9, and February 15 2007 on the Powder River.

A BLM biologist conducted field visits on June 12, and 13, 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 project area include pronghorn antelope and mule deer. The project area is part of the Ucross pronghorn antelope herd unit. The 2004 estimated herd population was 4145 with a population objective of 2500. Mule deer belong to the Powder River herd unit. Mule deer populations have been increasing since 1998 with a 2004 population estimate of 55,561 animals, and a herd objective of 52,000 (WGFD 2004).

The project area is yearlong range for pronghorn and winter yearlong range for mule deer. **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. **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. 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 Crazy Woman Creek and the Upper Powder River. One permitted spring was identified near the Dutch #2 reservoir. However, at the time of field work, there was not enough water to estimate flow or collect a sample.

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

NSS1 species (sturgeon chub and western silvery minnow) are those that are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions are declining or vulnerable. NSS2 species (goldeye, shovelnose sturgeon, and sauger) are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions appear to be stable. NSS3 species (plains

minnow) are widely distributed throughout their native range and appear stable; however, habitats are declining or vulnerable. For these species, the Wyoming Game and Fish Department has been directed by the Wyoming Game and Fish Commission to recommend that no loss of habitat function occur. Some modification of the habitat may occur, provided that habitat function is maintained (i.e., the location, essential features, and species supported are unchanged).

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

Seventeen raptor nest sites were identified by Arcadis biologists (Arcadis 2006, 2007) and BLM within 0.5 mile of the project area, of these six nests were active in 2007.

Table 3.2. Documented raptor nests within the project area in 2007.

BLM NEST BLM ID #	UTM NAD 83		LEGAL LOCATION				2007 NEST STATUS	SPECIES	NEST SUBSTRATE
	UTM N	UTM E	QQ	S	T	R			
4901	4920251	403902	NWNE	2	51	78	INACTIVE	UNKNOWN	CTL
4902	4920459	403574	NENW	2	51	78	OCCUPIED	NOHA	GHS
3869	4919431	402643	NESE	3	51	78	INACTIVE	GOEA	CTD
3870	4919837	399766	SWNW	4	51	78	UNKNOWN	UNKNOWN	JUL
3871	4917804	404307	NESE	11	51	78	INACTIVE	UNRA	JUL
3052	4923957	406955	SWSE	19	52	77	ACTIVE	RETA	CTL
3051	4924828	399210	SWNE	20	52	78	ACTIVE	GOEA	CTL
4126	4923071	404173	SENE	26	52	78	UNKNOWN	UNKNOWN	JUL
3868	4922669	402066	NWSE	27	52	78	ACTIVE	RETA	CTL
3048	4923097	400202	SENW	28	52	78	UNKNOWN	UNKNOWN	JUL
3047	4923712	398039	NWNW	29	52	78	ACTIVE	RETA	CTL
3444	4923702	397717	NENE	30	52	78	ACTIVE	RETA	CTL
3046	4921680	402848	SWNW	35	52	78	INACTIVE	UNKNOWN	CTD
3049	4920802	404068	SESE	35	52	78	INACTIVE	UNKNOWN	CTD
3045	4921027	404787	NWSW	36	52	78	ACTIVE	RETA	CTD
4903	4921840	405256	NWNE	36	52	78	UNKNOWN	UNKNOWN	CTL
3669	4920892	404830	NESW	36	52	78	GONE	UNKNOWN	CTL
2607	4922234	403285	SESW	26	52	78	UNKNOWN	Red-tailed hawk	
4126	4923071	404173	SENE	26	52	78	INACTIVE	UNKNOWN	
4364	4917725	404392	NESE	11	51	78	UNKNOWN	UNKNOWN	

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

Within the BLM Buffalo Field Office there are two 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).

The project area contains 14 prairie dog colonies totaling 117 acres. Within two miles of the POD boundary there are over 3,000 acres of prairie dog colonies mapped on the BLM database. This large complex is along Crazy Woman Creek. The closest identified potential reintroduction site is approximately 15 miles to the north-east at Arvada (Oakleaf 1988). The project is predominantly on steep breaks above the Crazy Woman floodplain. In addition to the mapped towns, there are prairie dog towns located on the mesa between Crazy Woman Creek and the Powder River. These towns begin about a mile south of the project and were not mapped in the wildlife reports. A rough examination of aerial photography from 2000 shows the towns occupy approximately 1/4-1/2 of a section or 160-320 acres. The landowner poisons prairie dogs. In summary, the project area itself does not provide sufficient habitat for black-footed ferrets. There is sufficient ferret habitat within 2 miles of the project boundary.

3.3.5.1.2. 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 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

The project area is drained by tributaries of Crazy Woman Creek and the Powder River. Suitable orchid habitat is present along both of these watercourses. Crazy Woman Creek, adjacent to the project, was surveyed for the orchid in 2005. No orchids were found. (Arcadis 2006).

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. 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. On August 8, 2007, the bald eagle was removed from the Endangered Species list. Although no longer protected under the Endangered Species Act, the bald eagle remains under protection by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. In order to avoid violation of these laws and uphold the BLM's commitment to avoid any future listing of this species, all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) shall continue to be complied with.

Bald eagle nesting habitat is generally 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 project area has suitable nesting and roosting habitat along Crazy Woman Creek and the Powder River. No known nests or roosts are within one mile of project infrastructure; however the BLM database indicates wintering eagles are frequently seen along Crazy Woman Creek and the Powder River. Large black-tailed prairie dog colonies along Crazy Woman Creek likely provide forage for eagles.

3.3.5.2.2. 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. In the project area, fourteen prairie dog towns, totaling 117.88 acres, were mapped by Arcadis (Arcadis 2006).

Prairie dogs colonies create a biological niche or habitat for many species of wildlife (King 1955, Reading 1989). Agnew (1986) found that bird species diversity and rodent abundance were higher on prairie dog towns than on mixed grass prairie sites. Several studies (Agnew 1986, Clark 1982, Campbell and Clark 1981 and Reading 1989) suggest that richness of associated species on black-tailed prairie dog colonies increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of numerous prey species (Clark 1982, Agnew 1986, Agnew 1988).

In South Dakota, forty percent of the wildlife taxa (134 vertebrate species) are associated with prairie dog

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

3.3.5.2.3. 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). Sage-grouse are listed as a sensitive species by BLM (Wyoming). In recent years, seven petitions have been submitted to the U.S. Fish and Wildlife Service (FWS) to list greater sage-grouse as threatened or endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was “not warranted” following a Status Review. The decision document supporting this outcome noted the need to continue and expand conservation efforts for sage-grouse. Suitable sage-grouse habitat is present throughout the project area. BLM records identified **five** sage grouse lek(s) within 3 miles of the POD. These leks are identified below.

Table 3.3. Occupied sage-grouse leks surrounding the project area.

Lek Name	2007 Status	High males counted 2007	UTMN	UTME	QQ	S	T	R
Kinney Draw I	Inactive	0	4919134	401223	SESE	4	51	78
Kinney Draw II	Active	68	4918361	401423	SWNW	10	51	78
Kinney Draw III	Inactive	0	4919515	401734	NESW	3	51	78
Nurse Draw	Active	10	4917725	402906	NWSW	11	51	78
Thompson Creek Rd	Inactive	0	4925200	396600	SESE	13	52	79

3.3.5.2.4. 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. Suitable mountain plover habitat is present within the project area in prairie dog towns. The POD was protocol surveyed for mountain plover in 2007 with none found (Arcadis 2007).

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
2007	155	22	unk.	1

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 primarily in Nurse Draw and various other unnamed tributaries to Crazy Woman Creek. Small portions of the project area fall into Kinney and Mitchell draws which are direct tributaries to the Powder River.

3.5.1. Groundwater

Wyoming Department of Environmental Quality (WDEQ) water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for Total Dissolved Solids (TDS) and the classes of groundwater; 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 PRB EIS Record of Decision 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 related to groundwater, the plan identified the following (PRB EIS ROD page E-4):

- The effects of infiltrating 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 CBNG impoundments
- Shallow groundwater wells would be installed and monitored where necessary

As stated in the MMRP, an Interagency Working Group has been established to implement an adaptive management approach. BLM is working with the WDEQ and the Interagency Working Group regarding the monitoring information being collected and assessed to determine if changes in mitigation are warranted.

The BLM 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 had a battery of nineteen wells which were installed and monitored jointly by the BLM and USGS starting in August of 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment site, which has since been reclaimed, lies atop approximately 30 feet of unconsolidated deposits (silts and sands) which overlie non-uniform bedrock on a side ephemeral tributary to Beaver Creek and is approximately one and one-half miles from the Powder River. Baseline investigations showed water in two sand zones, the first was at a depth of 55 feet and the second was at a depth of 110 feet. The two water bearing zones were separated by a fifty-foot thick shale layer. The water quality of the two water bearing zones fell in the WDEQ Class III and Class I classifications respectively. Preliminary results from this sampling indicated 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.

The WDEQ implemented requirements for monitoring shallow groundwater of Class III or better quality under unlined CBNG water impoundments effective August 1, 2004. The intent is to identify locations where the impoundment of water could potentially degrade any existing shallow groundwater aquifers. These investigations are conducted where discharged water will be detained in existing or proposed impoundments. If shallow groundwater is detected and the water quality is determined to fall within the Class III or better class of use (WDEQ Chapter 8 classifications for livestock use), operators are required to install batteries of 1 to 3 wells, develop a monitoring plan and monitor water levels and quality. The results of these investigations have yet to be analyzed and interpreted.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 13 registered stock and domestic water wells within one mile of the POD boundary with depths ranging from 290 to 1200 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 primarily in Nurse Draw and various other unnamed tributaries to Crazy Woman Creek. Small portions of the project area fall into Kinney and Mitchell draws which are direct tributaries to the Powder River. All of the drainages within the project area are ephemeral (flowing only in response to a precipitation event or snow melt – PRB FEIS Chapter 9 Glossary). The channels grade rapidly from uplands along the divide between the drainages to steep, deeply incised gully systems characteristic of the Powder River Basin along the river breaks. These gullies eventually transition to well vegetated grassy swales as they approach the main channel bottoms. Crazy Woman Creek and the Powder River, neither of which are directly within the area of development, are perennial to intermittent streams.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in $\mu\text{mhos/cm}$) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "...illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Upper Powder River, the EC ranges from 1797 $\mu\text{mhos/cm}$ at Maximum monthly flow to 3400 $\mu\text{mhos/cm}$ at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were measured at the USGS station located on the Powder River at Arvada, Wyoming. For Crazy Woman Creek, the EC ranges from 1066 $\mu\text{mhos/cm}$ at Maximum monthly flow to 1937 $\mu\text{mhos/cm}$ at Low monthly flow and the SAR ranges from 1.29 at Maximum monthly flow to 2.26 at Low monthly flow. These values were measured at the USGS station located on Crazy Woman Creek at Upper Station near Arvada, Wyoming (FEIS page 3-49).

The operator has identified a natural spring within this POD boundary at T52N, R78W, Sec 28. The spring was not flowing at the time of field investigations. Therefore, no background flow and water quality determinations were made.

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

A Class III inventory was conducted for the Nurse Draw project prior to on-the-ground project work (BFO project # 70060221). Arcadis U.S. Inc. conducted the Class III inventory following the Archeology and Historic Preservation: Secretary of the Interior’s Standards and Guidelines (48FR190) for the proposed project. Clint Crago, BFO archaeologist, reviewed the report for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined it to be adequate. The following resources are located within the project area.

Table 3.4 Cultural Resource Sites Identified within the Nurse Draw project area

Site Number	Site Type	National Register Eligibility
48JO1903	Historic Corral	Not Eligible
48JO3679	Prehistoric Camp	Not Eligible
48JO3680	Prehistoric Camp	Not Eligible
48JO3681	Historic Ranch	Not Eligible
48JO3682	Prehistoric Camp	Unevaluated
48JO3683	Historic Cabin	Not Eligible
48JO3684	Lithic Scatter	Not Eligible
48JO3695	Prehistoric Camp	Unevaluated
48JO3696	Lithic Scatter	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator’s plans and BLM applied mitigation. Of the 29 proposed well locations, 16 can be drilled without a well pad being constructed, 4 can be drilled with a slotted pad, and 9 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the 16 wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 100 x 100 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 16 wells would involve approximately 0.1 acre/well for 1.6 total acres. The 4 well requiring a slot of 120 x 30 feet to level the cut surface for the rig would also involve close to 0.14 acres each for a total of .56 acres, and the remaining 9 wells requiring cut & fill pad construction would disturb approximately .63 acres/well pad for a total of 5.7 acres. The total estimated disturbance for all 29 wells would be 7.86 acres.

Approximately 5.3 miles of improved roads would be constructed to provide access to various well locations. Approximately 6.6 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in “disturbance corridors.”

Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 6.1 miles of pipeline would be constructed outside of corridors.

The main artery road from the NESE of section 21 to the SWSW of section 35, T52N R78W has been designed, upgrading the existing primitive road, to a crowned and ditched road to insure safe access. The road traverses steep slopes and highly erosive soils on private surface. Reclamation success for this roadway is questionable. The landowner has stated that he intends to retain this road as access to his property after CBNG production is depleted. The operator will be required to provide a certification from the landowner that he has reviewed the design, examined the extent of disturbance proposed, and intends to retain the road after the operator reclaims the well sites.

The effects to soils resulting from well pad, access roads and pipeline construction may include:

- Mixing of soil horizons occurs where construction on roads, pipelines or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Loss of soil vegetation cover, biologic crusts, organic matter and productivity.
- Soil Erosion would also affect soil health and productivity. Erosion rates are site specific and are dependant on soil, climate, topography and cover.
- Soil Compaction is the collapse of soil pores resulting in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Modification of hill slope hydrology.

These impacts, singly or in combination, would increase the potential for valuable soil loss due to increased water and wind erosion, invasive/noxious/poisonous plant spread, invasion and establishment, and increased sedimentation and salt loads to the watershed system. 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., low water crossings, waterbars, water wings, culverts, headcut mitigation etc.) would ensure land productivity/stability is regained and maximized. Proposed stream crossings, including culverts and low water crossings are shown on the MSUP, engineered road diagrams 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	16	0.1 acre per location	1.6	Long Term
Slotted Pad	4	.14 acre per location	.56	
Constructed Pad	9	.63 acre per location	5.7	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0.0	Long Term
Impoundments				Long Term
On-channel	0	Site Specific	0.0	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	1	Site Specific or 0.01 ac/WDP	0.1	
Channel Disturbance				Long Term
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads	5.3			Long Term
No Corridor	0.7	40' Width	3.5	
With Corridor	4.6	60' Width	32.8	
2-Track Roads	6.6			Long Term
No Corridor	4.2	25 Width	12.6	
With Corridor	2.4	42' Width	12.4	
Pipelines	9.2			Short Term
No Corridor	6.1	25' Width	18.3	
With Corridor	3.1	20' Width	0.4	
Buried Power Cable	0	12' Width or Site Specific	0	Short Term
Overhead Powerlines	4.7	15' Width	8.5	Long Term
Additional Disturbance Staging Areas	2	150' x150'	1.02	Short Term

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

4.1.1. Wetland/Riparian

Riparian and wetland areas are not well developed within this POD’s boundaries. Those that exist are the result of the temporary water holding ability of the old existing dams constructed in this area. True wetland and riparian areas become evident as one moves downstream to Crazy Woman Creek and the Powder River. The FEIS states that “Continuous high stream flows into wetlands and riparian areas

would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges. Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas.” (PRB FEIS Page 4-175). Treated water discharge from this project directly into the Powder River is not likely to measurably affect the water quality or flow regime of the river.

4.1.2. Invasive Species

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

1. Education, through communication with the landowners to address their concerns for weed treatment.
2. Prevention will be incorporated by cleaning equipment, maintaining weed free buffers, minimizing disturbance, use of certified weed free seed and mulch, maintaining records of weed infestations and eliminating new infestations before they establish and spread.
3. Treatment methods will be managed based on size, age and density of the infestation in accordance with regulation and private surface owner consent.
4. When necessary, to aid in re-vegetation, undesirable vegetation may be removed prior to seeding by chemical or mechanical methods.
5. Monitoring for noxious weeds will continue for the duration of the POD.

Cheatgrass or downy brome (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) are known to exist in the affected environment. These two species are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible.

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

4.1.3. Cumulative Effects

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

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and

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

- They are proportional to the actual amount of cumulatively produced water in the **Upper Powder River** drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 17% of that total (see section 4.4.2.1).
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into the Powder River from the treatment facility. A willingness on the part of the operator to construct and/or rehabilitate impoundments in the Crazy Woman Creek and Mitchell Draw watersheds, if necessary, for handling water produced from this development, to prevent significant volumes of water from flowing into the Powder River.
- The WMP for the Nurse Draw proposes that produced water will not contribute significantly to flows in the Powder River.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, mule deer winter-yearlong, and pronghorn antelope yearlong range 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.

Clearing snow from project roads may impact big game distribution (as well as livestock distributions) in snowy winters. Currently there is not a snow-cleared trail leading from Crazy Woman Creek to the mesa

between Crazy Woman Creek and the Powder River. How this change, if it were to occur, may affect the mule deer and/or pronghorn population in the project area is not known. Groomed roads in Yellowstone National Park have facilitated big game movements in winter (Gates et. al. 2005)

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 piped to the Black Diamond EMIT treatment facility for treatment and discharge to the Powder River. If reservoirs are to be added to this water management strategy, sundry notices will be submitted by the operator for further analysis and approval by the BLM.

The Wyoming Department of Environmental Quality (DEQ) regulates effluent discharge through the National Pollution Discharge Elimination System (formerly NPDES, now WYPDES) in compliance with the Federal Water Pollution Control Act and the Wyoming Environmental Quality Act. The Wyoming DEQ has established effluent limits for the protection of game and non-game, aquatic life other than fish, wildlife, and other water uses.

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

Change in Water Quality

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

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

Changes in the conductivity and sodium absorption ratio may occur as increased flows move sediment from channel bottoms and potentially increase erosion of floodplains. Confluence Consulting reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage in their recently released report on the Powder River. This report indicated that CBNG discharges could affect native species in the drainage.

The operator did not submit a water quality analysis sample for EMIT discharge to the Powder River. However, the WYPDES permit for the treatment facility limits the EC to a daily maximum of 2500 $\mu\text{mhos/cm}$ and a monthly average of 2000 $\mu\text{mhos/cm}$ March through October and 2500 $\mu\text{mhos/cm}$ November through February.

Change in Water Quantity

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

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG treated water would be more noticeable during the late summer or winter months when the mean monthly flow is smaller than during the remainder of the year. An addition of approximately 10 cfs per day, the authorized total treated discharge from two widely separated facility discharge points, of project treated water to an average flow of 30 cfs into the Powder River is likely to affect its hydraulic regime and alter surface water quality. The flow attributable to project produced water is, however, very small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to more than 18,000 cfs for a 100-year storm event. Addition of the treated produced water would, to some small degree, facilitate beneficial uses such as livestock and wildlife supply and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

Wyoming Game and Fish (G&F) submitted comments to WDEQ on EMIT Water Discharge Technologies' application for WYPDES. Initially, EMIT applied for a treated discharge volume of 50 cfs to accommodate much of their development along the Powder River. Because of G&F concerns, WDEQ settled on a much reduced permitted volume of 12.9cfs allocated among three different and spatially separated discharge groups. WDEQ felt that that reduced volume would protect aquatic life standards until additional information could be collected to provide a better understanding of the dynamics of the aquatic system.

4.2.2.1. Cumulative effects

WDEQ is aware of the concerns about the effects of water quality and flows relative to discharge of treated water directly into the Powder River. They are taking a conservative approach to permitting until more information can be obtained and their watershed based permitting approach is implemented. Long term water quality and flow monitoring, that would be required in the NPDES permit, would ensure that effluent limitations are met. Under permitted conditions, it is not anticipated that existing downstream water uses would be affected. The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247. No additional mitigation measures are required.

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

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

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

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

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

Table 4.2. Project elements within 1/2 mile of documented raptor nests within the project area (Timing limitations will apply to these project elements).

BLM ID #	UTM N	UTM E	Species	Project elements w/in 0.5 mile of raptor nests
4901	4920251	403902	Unknown	North half of section 2 pipeline.
4902	4920459	403574	Northern Harrier	south 1/4 section 35 pipeline
3869	4919431	402643	Golden Eagle	43-35
3870	4919837	399766	Unknown	none
3871	4917804	404307	Unknown	pipeline in east 1/2 section 11 and west 1/2 section 12
3052	4923957	406955	Red-tailed hawk	none
3051	4924828	399210	Golden Eagle	SE 1/4 Section 20 road work:
3868	4922669	402066	Red-tailed hawk	23-27, 32-27, 34-27, road work in section 27
3048	4923097	400202	Unknown	11-28, 22-28, 32-28, 23-28, 34-28, powerline construction, road construction in section 28
3047	4923712	398039	Red-tailed hawk	road construction in section 30, 29, sesw sec 20.
3444	4923702	397717	Red-tailed hawk	road construction in section 30, 29
3046	4921680	402848	Unknown	41-34, 32-34, 21-35, 23-35, reservoir in w. section 35, powerline, road construction in section 34
3049	4920802	404068	Unknown	32-35, 23-35, 34-35, 43-5
3045	4921027	404787	Red-tailed hawk	43-35
4903	4921840	405256	Unknown	road segment in section 36

BLM ID #	UTM N	UTM E	Species	Project elements w/in 0.5 mile of raptor nests
2607	4922234	403285	Red-tailed hawk	24-26, 13-26, 21-35
4126	4923071	404173	Unknown	33-26
4364	4917725	404392	Unknown	pipeline in east section 11 and west section 12

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. At the onsite, Black Diamond dropped one well and moved another to minimize impacts to nest # 3868. Well 23-27 and the access was moved out of view of the 3868 nest, however the well is 500 feet from the nest. A condition of approval restricting disturbance activities at this well during the breeding season will increase the likelihood of nest success. Pumper traffic should not disturb nesting birds but pulling units, back-hoes, or prolonged work at the well may cause abandonment. Traffic on the planned resource road along the ridge 200 feet the east of nest 3868 has even greater potential to disrupt breeding. The nest is clearly visible from, and sits below, the proposed road. Due to its proximity and visibility this red-tailed hawk pair may not tolerate CBNG traffic associated with a POD resource road even though the road construction occurred while the pair was in their winter range. Minimizing traffic during the breeding season, particularly during nest initiation and pre-fledging, would minimize the impacts from traffic. There are non-federal wells that would be serviced by this road, so limiting traffic would only apply to the traffic to and from Federal wells. Therefore, road signs asking drivers to not stop in the nest area may be the best approach to minimize traffic impacts. Black Diamond at this time has no alternatives to the proposed road that meet their needs. It is likely that despite efforts to protect this nest it will not remain an active red-tailed hawk nest. Black Diamond has agreed to coordinate with the BLM and USFWS to mitigate the nest if it is abandoned.

The main access road and bridge across Crazy Woman Creek are 0.13 miles from an active golden eagle nest (BLM # 3047), and 0.1 miles from an active red-tailed hawk nest (BLM# 3868). These nests are outside the POD boundary and more than 0.5 miles from any proposed construction. Lance/Anadarko, as part of their Highland Unit Gamma POD, will monitor these nests. Access to Highland Unit Gamma and Nurse Draw PODs combined 48 wells may result in either or both of these nests to become inactive, or abandoned if initiated. If POD related traffic were to disturb golden eagle nesting, then restrictions on travel may be necessary. Eagle responses to POD related traffic should be monitored. (The term “disturb” under the Bald and Golden Eagle Protection Act was recently defined via a final rule published in the Federal Register on June 5, 2007 (72 Fed. Reg. 31332). “Disturb” means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.) BLM conditions of approval are only applied to surface disturbing activities; therefore traffic (if it is a disturbance) is not regulated.

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 two species that are Threatened or Endangered under the Endangered Species Act. Potential project effects to Threatened and Endangered Species are provided in Table 4.3. and 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	Two small prairie dog towns present.
Threatened Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NLAA	No known populations, discharge to perennial streams.

Presence

K Known, documented observation within project area.

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

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

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

Effect Determinations

LAA Likely to adversely affect

NE No Effect.

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

4.2.5.1.1. Black-footed ferret

The proposed development will have **no effect** on the black-footed ferret. The species is not present in the action area and future recovery efforts, if they occur, will not be impacted. The proposed action will impact prairie dog colonies with a road and pipeline through one town, a road skirting one town, and pipelines through two others. The majority land owner Dan Lawrence actively poisons prairie dog colonies.

4.2.5.1.2. Ute's Ladies'-Tresses Orchid

The POD was surveyed for suitable habitat and surveys for the plant were performed in any suitable habitat that could be impacted by the proposed action or its produced water with the exception of the Powder River. Although the Powder River has suitable habitat and produced water will be treated and discharged the potential for adverse effects to the orchid are discountable. The water discharged as a result of this proposed action will pass through an EMIT facility located at the mouth of Kinney Draw. This EMIT facility is currently treating water at capacity and will continue to do so with the addition of the proposed project. Impacts to the orchid from this EMIT facility were analyzed in Black Diamond's Michelena POD (WY-070-055-295). The species has not been found in the Powder River watershed. Since produced water will be discharged into potentially suitable habitat of the Powder River. The proposed action **may affect, is not likely to adversely affect**, Ute ladies'-tresses orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (<i>Rana pipiens</i>)	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will affect existing waterways. Prairie not mountain habitat.
Spotted frog (<i>Rana pretiosa</i>)	Ponds, sloughs, small streams	NP	NI	
Birds				
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	K	MIIH	Overhead power proposed, occupied habitat present.
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	K	MIIH	Species seen at onsite. Sagebrush cover will be affected.
Burrowing owl (<i>Athene cunicularia</i>)	Grasslands, basin-prairie shrub	S	MIIH	Prairie dog colony present.
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	K	MIIH	Species seen at onsite. Grassland/prairie dogs will be impacted.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Species seen at onsite. 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.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
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.
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	K	MIH	Species heard at onsite. 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	MI	Prairie dog towns will not be affected.
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.

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

Presence

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

Project Effects

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

4.2.5.2.1. Bald eagle

There are 4.7 miles of proposed overhead distribution lines within the project area. All proposed power will be constructed in compliance with the 2006 Avian Power Line Interaction Committee's (APLIC) suggested practices and with the Service's standards (USFWS 2007). There is existing power in the project area serving ranch operations and conventional oil wells. These older lines may not be in compliance with current APLIC standard. Where Black Diamond proposes to tie into these existing lines, the existing pole that is used shall be upgraded to meet 2006 APLIC standards.

The presence of overhead power lines and roads may adversely affect foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through August 14, 2007, Service Law Enforcement salvage records for northeast Wyoming identified that 180 raptors, including 1 bald eagle, 106 golden eagles, 1 unidentified eagle, 28 hawks, 44 owls and 8 unidentified raptors and 1 great-blue heron were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2007). Of the 180 raptors electrocuted 58 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Roads present a collision hazard, primarily from bald eagles scavenging on carcasses resulting from other road related wildlife mortalities. Collision risk increases with automobile travel speed. Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%). The proposed project will increase traffic on State Highways 387 and 50, which may result in bald eagle / vehicle strikes in the winter when migratory eagles are in the area.

Use of the Crazy Woman Creek crossing and travel, particularly semi-truck traffic, along the road through sections 19, 30, 29, 20, 21, may disrupt roosting or foraging eagles. Although no roosts have been identified in this specific area, analysis of the BLM data shows bald eagles do use the mature cottonwoods along the creek during the winter. If POD related traffic were to disturb bald eagle roosting or foraging, then restrictions on travel may be necessary. Eagle responses to POD related traffic should be monitored. (The term "disturb" under the Bald and Golden Eagle Protection Act was recently defined via a final rule published in the Federal Register on June 5, 2007 (72 Fed. Reg. 31332). "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.) BLM conditions of approval are only applied to surface disturbing activities; therefore traffic (if it is a disturbance) is not regulated.

4.2.5.2.2. Black-tailed prairie dog

The proposed action may kill individual black-tailed prairie dogs during road and pipeline construction within prairie dog towns. After the construction phase, some prairie dogs will be struck and killed by vehicles. The BLM protects prairie dog towns wherever possible, however the towns present on this

project are on private surface and the surface owner actively poisons them. Changing project roads to completely avoid prairie dog towns would most likely increase the landowners distaste for the species, resulting in greater persecution. As planned, the project uses existing 2-tracks through prairie dog towns, or skirts the edge for new roads.

4.2.5.2.3. Greater sage-grouse

Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, power lines, reservoirs and other infrastructure. 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). Limiting disturbance widths on access and limiting mowing around the well at the following wells will reduce impacts to sage-grouse: 14-27, 14-34, 23-34, 32-34, 11-34, 14-27, 23-35, 34-35, 32-35, 41-35, 44-26, 33-26.

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). Table 4.5 identifies known leks within 2 miles of the project and elements of the project that may affect sage-grouse nesting. Timing limitations will be applied to those elements.

Table 4.5 Known leks within 2 miles of the project and portions of the project that may be affected.

Lek Name	UTMN	UTME	Project elements
Kinney Draw I	4919134	401223	T52R78: All of section 34, southeast of section 35, 34-35. T51R78 pipeline in section 2

Lek Name	UTMN	UTME	Project elements
Kinney Draw II	4918361	401423	T52R78: 32-34, 23-34, 14-34, 34-34, staging area, stock tank and reservoir in south 34, powerline south 34, sw 1/4 of 35. T51R78: pipeline section 2 and 11.
Kinney Draw III	4919515	401734	T51R78: pipeline in section 11, 12, 18
Nurse Draw	4917725	402906	T52R78: All of section 34. 21-35, 32-35, 43-35, reservoir 44-35, 34-35, 23-35, 12-35, 14-35. Road work south of the 23-27 turn-off, 34-27, 34-28, 14-27. T51R78: pipeline in section 2 and 11
Thompson Creek Rd	4925200	396600	T52R78: road work in sections 19, 30, 29, 20

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.

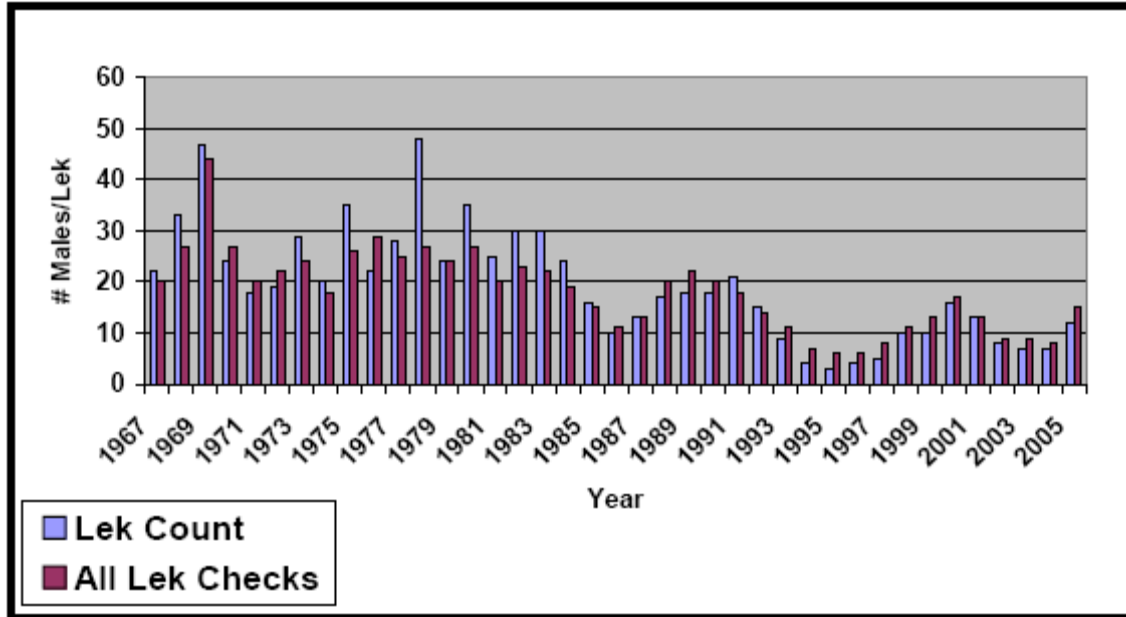
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km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

The operator worked with the BLM to avoid breeding and nesting habitats wherever possible. If impacts were unavoidable then they were minimized.

4.2.5.2.4. Mountain plover

Suitable mountain plover habitat exists in the project area. The project should not affect mountain plovers since none were found during protocol surveys (Arcadis 2007) and timing restrictions in place for raptors and grouse cover most of the POD. These restrictions will inadvertently protect nesting plovers.

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

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

The maximum water production is predicted to be **30.0** gpm per well or **870.0** gpm (**1.9** cfs or **1373** acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the **Crazy Woman Creek** drainage, the projected volume produced within the watershed area was **21,036** acre-feet in 2007 (maximum production is

estimated in 2006 at 21,135 acre-feet). As such, the volume of water resulting from the production of these wells is 6.5% of the total volume projected for 2007. For the Upper Powder River drainage, the projected volume produced within the watershed area was 163,521 acre-feet in 2007 (maximum production is estimated in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells is 0.8% of the total volume projected for 2007. These volumes of produced water are within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 290 to 1200 feet compared to 870 to 2400 feet for the targeted coal zones. 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 CBNG producing well.

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

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

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

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the Powder River for SAR, and EC, the average value measured at selected USGS gaging 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 operator's WYPDES permits, 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, μ mhos/cm
Most Restrictive Proposed Limit –		3	1000
Least Restrictive Proposed Limit		10	3000
Crazy Woman Creek at Upper Station nr Arvada			
Historic Data Average at Maximum Flow		1.29	1066
Historic Data Average at Minimum Flow		2.26	1937
Powder River at Arvada, Wyoming			
Historic Data Average at Maximum Flow		4.76	1797
Historic Data Average at Minimum Flow		7.83	3400
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 # WY0051934, EMIT disch			
Daily Maximum at outfall	5000	Not Stated	2500
Monthly Average at outfall—Mar-Oct			2000
Monthly Average at outfall—Nov-Feb			2500
WDEQ Water Quality Requirement for WYPDES Permit # WY0053147, discharge to Michelena #3 reservoir			
Daily Maximum at outfall	5000	Not Stated	7500
Predicted Produced Water Quality			
Upper Canyon	3150	49.4	4950
Lower Canyon	3540	46.1	5350
Smith	1800	40.5	2790
Anderson	3530	58.8	5140
Wasatch, Gates and Wall will be provided when acquired			

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 3540.0 mg/l TDS which is not within the WDEQ criteria for agricultural use (2000 mg/l TDS). If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The quality for the water produced from the targeted coal zones from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 30.0 gallons per minute (gpm) is projected to be produced from each of these 29 wells, for a total of 870.0 for the POD. See Table 4.5 .

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

There is 1 discharge point presently authorized for this project. It is the existing discharge point for Black Diamond’s EMIT water treatment facility, discharges directly into the Powder River, and has been appropriately sited and utilizes an appropriate water energy dissipation design. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

It is proposed that all water produced from this project will be piped to BLACK DIAMOND’s existing water treatment facility near the mouth of Kinney Draw. Water will be treated, blended with raw water, then discharged directly into the Powder River. Discharged water quality parameters outlined in the WYPDES permit for outfall WY0051934-001, located in the NENE portion of section 21, township 51 north, range 77 west will be adhered to. Should a problem with the treatment facility occur, all wells will be shut in until the plant again is able to process water.

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 Crazy Woman Creek of 3 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 29 wells is anticipated to be a total of 870 gpm or 1.9 cfs to treatment. Therefore, there should be no contribution of produced water to Crazy Woman Creek. 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 did not provide an analysis of the potential development in the watershed above the project area. However, based on the area of the Crazy Woman watershed above the POD (900 sq mi) and an assumed density of one well per location every 80 acres, the potential exists for the development of 7200 wells which could produce a maximum flow rate of 216,000 gpm (482 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.
4. A portion of the 900 sq mi Crazy Woman watershed is located in and around the Big Horn Mountains and are known to not contain coal seams and associated gas.

The operator has obtained two Wyoming Pollutant Discharge Elimination System (WYPDES) permits from the WDEQ, one for discharge of treated produced water directly to the Powder River through EMIT Technologies’ permit and one for discharge of produced water to the Michelena #3 reservoir. If the operator decides to construct the impoundments listed near the beginning of this document, sundry notices will be submitted to BLM for review, analysis and approval prior to beginning construction. The Michelena #3 dam can be permitted for this action when proof of reclamation bond submittal to the appropriate bonding agency (BLM) has been received by the Buffalo BLM office.

Permit effluent limits are set in Part I, page 2 of the following permits:

WY0051934--Outfalls 001-010 (discharging to Powder)	Daily Max	Monthly
-----	at the outfall	Average
		at the outfall
Chlorides, mg/l	150	
Dissolved Iron, µg/l	250	
Dissolved Manganese, µg/l	630	

WY0051934--Outfalls 001-010 (discharging to Powder) -----	Daily Max at the outfall	Monthly Average at the outfall
pH, standard units	6.5 - 9.0	
Dissolved Sodium, mg/l, March-October	270	
Dissolved Sodium, mg/l, November-February	350	
Specific Conductance, µS/cm, March-October	2500	2000
Specific Conductance, µS/cm, November-February	2500	2500
Sulfates, mg/l	3000	
Total Arsenic, µg/l	7	
Total Barium, µg/l	1800	
Total Dissolved Solids, mg/l	5000	
Total Radium 226, pCi/l	1	
Total Flow, MGD -- Outfalls 002, 006-008, 010	3.23	
Total Flow, MGD -- Outfalls 001, 003	6.47	
Total Flow, MGD -- Outfalls 004, 005, 009	3.23	

WY0053147--Discharge to Michelena #3 Dam -----	Daily Max at the outfall
Chlorides, mg/l	46
Dissolved Iron, µg/l	1000
Dissolved Manganese, µg/l	650
pH, standard units	6.5 - 9.0
Specific Conductance	7500
Sulfates, mg/l	3000
Total Arsenic, µg/l	7
Total Barium, µg/l	1800
Total Dissolved Solids, mg/l	5000
Total Radium 226, pCi/l	3
Total Recoverable Aluminum, µg/l	750
Total Flow, Million Gallons per Day (MGD)	0.52

The WYPDES permits also address existing downstream concerns, such as irrigation use, by not allowing discharge of untreated water to Crazy Woman Creek’s tributaries or to the Powder River. The designated points of compliance identified for these permits are **the ends of their respective pipes**.

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.

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 **Crazy Woman Creek and Upper Powder River** watersheds. These data were obtained from the

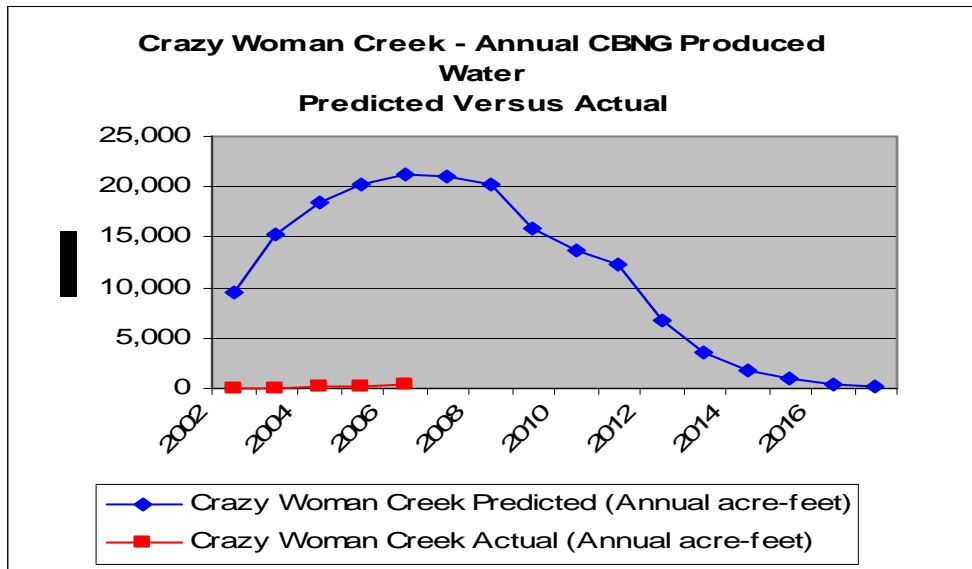
Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2006, all producing CBNG wells in the **Crazy Woman Creek** watershed have discharged a cumulative volume of **635** acre-ft of water compared to the predicted **84,427** acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is **0.8** % of the total predicted produced water analyzed in the PRB FEIS for the **Crazy Woman Creek** watershed.

Table 4.6 Actual vs predicted water production in the Crazy Woman Creek watershed 2006 Data Update 3-16-07

Year	Crazy Woman Creek Predicted (Annual acre-feet)	Crazy Woman Creek Predicted (Cumulative acre-feet from 2002)	Crazy Woman Creek Actual (Annual acre-feet)		Crazy Woman Creek Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	9,449	9,449	4	0.0	4	0.0
2003	15,185	24,634	1	0.0	5	0.0
2004	18,418	43,052	126	0.7	130	0.3
2005	20,240	63,292	113	0.6	243	0.4
2006	21,135	84,427	392	1.9	635	0.8
2007	21,036	105,463				
2008	20,279	125,742				
2009	15,962	141,704				
2010	13,716	155,420				
2011	12,240	167,660				
2012	6,731	174,391				
2013	3,629	178,020				
2014	1,881	179,901				
2015	910	180,811				
2016	422	181,233				
2017	150	181,383				
Total	181,383		635			

Figure 4.1 Actual vs predicted water production in the Crazy Woman Creek watershed



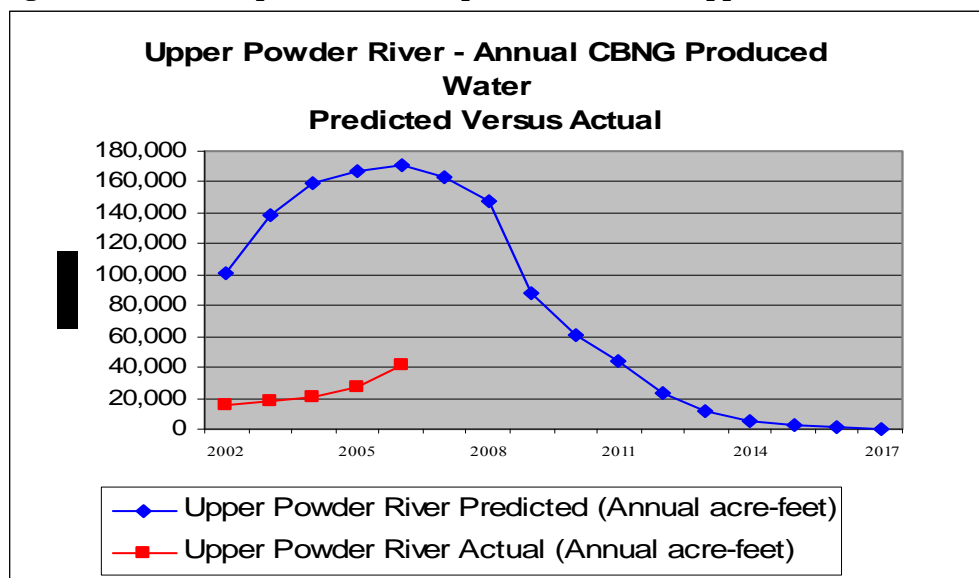
As of December 2006, all producing CBNG wells in the **Upper Powder River** watershed have discharged a cumulative volume of **123,984** acre-ft of water compared to the predicted **736,519** acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.2 and Table 4.7 following. This volume is **17%** of the total predicted produced water analyzed in the PRB FEIS for the **Upper Powder River** watershed.

Table 4.7 Actual vs predicted water production in the Upper Powder River watershed 2006 Data Update 3-16-07

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040				
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	1,285,233		123,984			

Figure 4.2 Actual vs predicted water production in the Upper Powder River watershed



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. 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) However, current litigation between Wyoming and Montana will likely affect the quantity and quality of water operators will be allowed to discharge to the Powder River.

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

1. They are proportional to the actual amount of cumulatively produced water in the **Upper Powder River** drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 15% of that total (see section 4.4.2.1).
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

Refer to the PRB FEIS, Volume 2, page 4-115 – 117 and table 4-13 for cumulative effects relative to the **Powder River** water at the Montana state line and page 4-117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

Sites 48JO1903 and 48JO3696 will be impacted by the project; however both are considered not eligible to the National Register of Historic Places. On 9/18/07, the Bureau electronically notified the Wyoming State Historic Preservation Office (SHPO), following section V1(A)(1) of the Wyoming State Protocol, of a finding of No Effect to historic properties.

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 WY SHPO	Wyoming SHPO	No
Brad Rogers	Wildlife Biologist	US Fish & Wildlife Service	Yes
Jennifer Spegon	NRS	BLM	Yes
Bill Ostheimer	Biologist	BLM	Yes
Lee Harrelson	Civil Engineer	BLM	Yes
Chris Perry	Civil Engineer	BLM	Yes
Dave Skinner	NRS In training	BLM	Yes
Arnie Irwin	Soil Scientist	BLM	Yes
Ben Adams	Hydrologist	BLM	Yes
Jenna Foss	Consultant	Grouse Mountain	Yes
Bill Bellah	Consultant	Grouse Mountain	Yes
Liz Hunter	Civil Engineer	Kadmas Lee & Jackson	Yes
James Slayton	Survey Team	Kadmas Lee & Jackson	Yes
Terry Blye	Operator Rep	Black Diamond Energy Inc.	Yes
Red Luken	Drilling Supervisor	Black Diamond Energy Inc.	Yes
Dan Lawrence	Surface Owner	Private Surface	Yes
Brad Koon	Surface Owner Guest	Private Surface	Yes
Mr. and Mrs. Joachin Michelena	Surface Owner	Private Surface	Yes

6. OTHER PERMITS REQUIRED

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

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