

FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD

For

Petro-Canada Resources (USA) Inc.

SS DRAW

ENVIRONMENTAL ASSESSMENT –WY-070-EA07-088

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Petro-Canada Resources (USA) Inc.'s SS Draw Coal Bed Natural Gas (CBNG) POD comprised of the following 60 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr	Sec.	Twp	Rng	Lease #
1	SS DRAW FED	2-21CA	NENW	2	52N	75W	WYW146813
2	SS DRAW FED	2-21CO	NENW	2	52N	75W	WYW146813
3	SS DRAW FED	2-21LA	NENW	2	52N	75W	WYW146813
4	SS DRAW FED	2-21WA	NENW	2	52N	75W	WYW146813
5	SS DRAW FED	2-23CA	SWNW	2	52N	75W	WYW146813
6	SS DRAW FED	2-23CO	SWNW	2	52N	75W	WYW146813
7	SS DRAW FED	2-23LA	SWNW	2	52N	75W	WYW146813
8	SS DRAW FED	2-23WA	SWNW	2	52N	75W	WYW146813
9	SS DRAW FED	3-11CA	NENE	3	52N	75W	WYW146813
10	SS DRAW FED	3-11CO	NENE	3	52N	75W	WYW146813
11	SS DRAW FED	3-11LA	NENE	3	52N	75W	WYW146813
12	SS DRAW FED	3-11WA	NENE	3	52N	75W	WYW146813
13	SS DRAW FED	3-13CA	SWNE	3	52N	75W	WYW146813
14	SS DRAW FED	3-13CO	SWNE	3	52N	75W	WYW146813
15	SS DRAW FED	3-13LA	SWNE	3	52N	75W	WYW146813
16	SS DRAW FED	3-13WA	SWNE	3	52N	75W	WYW146813
17	SS DRAW FED	3-21CA	NENW	3	52N	75W	WYW146813
18	SS DRAW FED	3-21CO	NENW	3	52N	75W	WYW146813
19	SS DRAW FED	3-21LA	NENW	3	52N	75W	WYW146813
20	SS DRAW FED	3-21WA	NENW	3	52N	75W	WYW146813
21	SS DRAW REESE	3-23CA	SWNW	3	52N	75W	WYW146813
22	SS DRAW REESE	3-23CO	SWNW	3	52N	75W	WYW146813
23	SS DRAW REESE	3-23LA	SWNW	3	52N	75W	WYW146813
24	SS DRAW REESE	3-23WA	SWNW	3	52N	75W	WYW146813
25	SS DRAW REESE	3-31CA	NESW	3	52N	75W	WYW146813
26	SS DRAW REESE	3-31CO	NESW	3	52N	75W	WYW146813
27	SS DRAW REESE	3-31LA	NESW	3	52N	75W	WYW146813
28	SS DRAW REESE	3-31WA	NESW	3	52N	75W	WYW146813
29	SS DRAW REESE	3-33CA	SWSW	3	52N	75W	WYW146813
30	SS DRAW REESE	3-33CO	SWSW	3	52N	75W	WYW146813
31	SS DRAW REESE	3-33LA	SWSW	3	52N	75W	WYW146813
32	SS DRAW REESE	3-33WA	SWSW	3	52N	75W	WYW146813
33	SS DRAW FED	3-41CA	NESE	3	52N	75W	WYW146813
34	SS DRAW FED	3-41CO	NESE	3	52N	75W	WYW146813
35	SS DRAW FED	3-41LA	NESE	3	52N	75W	WYW146813
36	SS DRAW FED	3-41WA	NESE	3	52N	75W	WYW146813
37	SS DRAW REESE	3-43CA	SWSE	3	52N	75W	WYW146813
38	SS DRAW REESE	3-43CO	SWSE	3	52N	75W	WYW146813
39	SS DRAW REESE	3-43LA	SWSE	3	52N	75W	WYW146813

	Well Name	Well #	Qtr	Sec.	Twp	Rng	Lease #
40	SS DRAW REESE	3-43WA	SWSE	3	52N	75W	WYW146813
41	SS DRAW LARAMORE	4-11CA	NENE	4	52N	75W	WYW138313
42	SS DRAW LARAMORE	4-11CO	NENE	4	52N	75W	WYW146813
43	SS DRAW LARAMORE	4-11LA	NENE	4	52N	75W	WYW138313
44	SS DRAW LARAMORE	4-11WA	NENE	4	52N	75W	WYW138313
45	SS DRAW LARAMORE	4-21CA	NENW	4	52N	75W	WYW138313
46	SS DRAW LARAMORE	4-21CO	NENW	4	52N	75W	WYW138313
47	SS DRAW LARAMORE	4-21LA	NENW	4	52N	75W	WYW138313
48	SS DRAW LARAMORE	4-21WA	NENW	4	52N	75W	WYW138313
49	SS DRAW LARAMORE	10-11CA	NENE	10	52N	75W	WYW146813
50	SS DRAW LARAMORE	10-11CO	NENE	10	52N	75W	WYW146813
51	SS DRAW LARAMORE	10-11WA	NENE	10	52N	75W	WYW146813
52	SS DRAW FLOYD	15-13CO	SWNE	15	52N	75W	WYW139679
53	SS DRAW FLOYD	21-11CO	NENE	21	52N	75W	WYW139679
54	SS DRAW FLOYD	21-41CO	NESE	21	52N	75W	WYW139679
55	SS DRAW FLOYD	22-23CO	SWNW	22	52N	75W	WYW139679
56	SS DRAW FLOYD	22-23WA	SWNW	22	52N	75W	WYW139679
57	SS DRAW FLOYD	22-31WA	NESW	22	52N	75W	WYW139679
58	SS DRAW FED	25-31CA	NESW	25	52N	75W	WYW146813
59	SS DRAW ECHETA UNIT	35-43C0	SWSE	35	52N	75W	WYW139681
60	SS DRAW ECHETA UNIT	35-43WA	SWSE	35	52N	75W	WYW139681

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

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

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

(BLM), Buffalo Field Office, April 2001.

8. Based on current information, it was determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

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

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

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

Field Manager: _____ Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
For
Petro-Canada Resources (USA) Inc.
SS DRAW
PLAN OF DEVELOPMENT
WY-070-EA07-088**

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 4 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: Petro-Canada Resources (USA) Inc.’s SS Draw Plan of Development (POD) for 62 coal bed natural gas wells and associated infrastructure.

Proposed Well Information: There are 62 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 1 to 4 wells per location. Wells are located as follows:

	Well Name	Well #	Qtr	Sec.	Twn.	Rng.	Lease #
1	SS DRAW FED	2-21CA*	NENW	2	52N	75W	WYW146813
2	SS DRAW FED	2-21CO	NENW	2	52N	75W	WYW146813
3	SS DRAW FED	2-21LA	NENW	2	52N	75W	WYW146813
4	SS DRAW FED	2-21WA	NENW	2	52N	75W	WYW146813
5	SS DRAW FED	2-23CA	SWNW	2	52N	75W	WYW146813
6	SS DRAW FED	2-23CO	SWNW	2	52N	75W	WYW146813
7	SS DRAW FED	2-23LA	SWNW	2	52N	75W	WYW146813
8	SS DRAW FED	2-23WA	SWNW	2	52N	75W	WYW146813
9	SS DRAW FED	3-11CA	NENE	3	52N	75W	WYW146813
10	SS DRAW FED	3-11CO	NENE	3	52N	75W	WYW146813
11	SS DRAW FED	3-11LA	NENE	3	52N	75W	WYW146813
12	SS DRAW FED	3-11WA	NENE	3	52N	75W	WYW146813
13	SS DRAW FED	3-13CA	SWNE	3	52N	75W	WYW146813
14	SS DRAW FED	3-13CO	SWNE	3	52N	75W	WYW146813
15	SS DRAW FED	3-13LA	SWNE	3	52N	75W	WYW146813
16	SS DRAW FED	3-13WA	SWNE	3	52N	75W	WYW146813
17	SS DRAW FED	3-21CA	NENW	3	52N	75W	WYW146813
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24	SS DRAW REESE	3-23WA	SWNW	3	52N	75W	WYW146813
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26	SS DRAW REESE	3-31CO	NESW	3	52N	75W	WYW146813
27	SS DRAW REESE	3-31LA	NESW	3	52N	75W	WYW146813
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44	SS DRAW LARAMORE	4-11WA	NENE	4	52N	75W	WYW138313
45	SS DRAW LARAMORE	4-21CA	NENW	4	52N	75W	WYW138313
46	SS DRAW LARAMORE	4-21CO	NENW	4	52N	75W	WYW138313
47	SS DRAW LARAMORE	4-21LA	NENW	4	52N	75W	WYW138313

	Well Name	Well #	Qtr	Sec.	Tw.	Rng.	Lease #
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50	SS DRAW LARAMORE	10-11CO	NENE	10	52N	75W	WYW146813
51	SS DRAW LARAMORE	10-11WA	NENE	10	52N	75W	WYW146813
52	SS DRAW FLOYD	15-13CO	SWNE	15	52N	75W	WYW139679
53	SS DRAW FLOYD	21-11CO	NENE	21	52N	75W	WYW139679
54	SS DRAW FLOYD	21-41CO	NESE	21	52N	75W	WYW139679
55	SS DRAW FLOYD	22-23CO	SWNW	22	52N	75W	WYW139679
56	SS DRAW FLOYD	22-23WA	SWNW	22	52N	75W	WYW139679
57	SS DRAW FLOYD	22-31WA	NESW	22	52N	75W	WYW139679
58	SS DRAW FED	23-33WA	SWSW	23	52N	75W	WYW139678
59	SS DRAW FED	25-31CA	NESW	25	52N	75W	WYW146813
60	SS DRAW ECHETA UNIT	35-11CA	NENE	35	52N	75W	WYW139681
61	SS DRAW ECHETA UNIT	35-43C0	SWSE	35	52N	75W	WYW139681
62	SS DRAW ECHETA UNIT	35-43WA	SWSE	35	52N	75W	WYW139681

County: Campbell

Applicant: Petro-Canada Resources (USA) Inc.

Surface Owners: BLM, Deer Track Ranch, Robert & Patricia Laramore, Floyd Land and Livestock, Eaton Brothers, Inc., Dixie Reece

Project Description:

The proposed action involves the following:

- Drilling of 62 federal CBM wells in Wall, Canyon and Anderson coal zones to average depths of approximately 1,140 feet.

Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.

- Well metering shall be accomplished by telemetry and individual well visitation. Metering would entail approximately 4 visits per month to each well.
- A Water Management Plan (WMP) that involves using existing infrastructure approved in the North Shell Draw PODS (EA # WY-070-00-049, WY-070-00-112, WY-070-04-268, WY-070-05-270 and WY-070-05-366) and Twenty-Mile POD (EA # WY-070-05-270) within the Upper Powder River watershed.
- An unimproved and improved road network.
- An above ground power line network to be constructed by a contractor. The proposed route has not been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. Power line construction has not been scheduled and will not be completed before the CBNG wells are producing

- A buried gas, water and power line network, and 0 central gathering/metering facilities and 0 compression facilities.

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

Implementation of committed mitigation measures contained in the 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.

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 SS Draw POD are listed below.

2.3.1. Changes as a result of the on-sites

	Name	Well #	TwN	Rng	Sec.	Qtr.Qtr.	Comments
1	SS Draw	2-21CA	52N	75W	2	NENW	Use existing access road from the north. To reduce erosion, reclaim pipeline immediately after construction is complete. Ensure soils are stable and all potential erosion has been mitigated. No vehicular traffic is to be allowed along pipeline route.
2	SS Draw	2-21CO	52N	75W	2	NENW	
3	SS Draw	2-21LA	52N	75W	2	NENW	
4	SS Draw	2-21WA	52N	75W	2	NENW	

	Name	Well #	TwN	Rng	Sec.	Qtr.Qtr.	Comments
5	SS Draw	3-11CA	52N	75W	3	NENE	Rock rip rap will be required on downstream end of 60" culvert of engineered road design. Ensure size of rock correlates with velocity of water coming out of culvert.
6	SS Draw	3-11CO	52N	75W	3	NENE	
7	SS Draw	3-11LA	52N	75W	3	NENE	
8	SS Draw	3-11WA	52N	75W	3	NENE	
9	SS Draw	3-21CA	52N	75W	3	NENW	Two track access road/pipeline corridors moved to the south to avoid sagebrush area and utilize existing segment of two track.
10	SS Draw	3-21CO	52N	75W	3	NENW	
11	SS Draw	3-21LA	52N	75W	3	NENW	
12	SS Draw	3-21WA	52N	75W	3	NENW	
13	SS Draw	3-31CA	52N	75W	3	NESW	Minimize width of disturbance as much as possible on template road. Total width of disturbance for spot upgrades should not exceed 35 ft.
14	SS Draw	3-31CO	52N	75W	3	NESW	
15	SS Draw	3-31LA	52N	75W	3	NESW	
16	SS Draw	3-31WA	52N	75W	3	NESW	
21	SS Draw	3-41CA	52N	75W	3	NESE	Minimize width of disturbance as much as possible on template road. Total width of disturbance for spot upgrades should not exceed 35 ft.
22	SS Draw	3-41CO	52N	75W	3	NESE	
23	SS Draw	3-41LA	52N	75W	3	NESE	
24	SS Draw	3-41WA	52N	75W	3	NESE	
29	SS Draw	4-21CA	52N	75W	4	NENW	Well location moved to ridge top north of original well site due to red-tailed hawk nest in area.
30	SS Draw	4-21CO	52N	75W	4	NENW	
31	SS Draw	4-21LA	52N	75W	4	NENW	
32	SS Draw	4-21WA	52N	75W	4	NENW	
33	SS Draw	10-11CA	52N	75W	10	NENE	Head cut mitigation may be required. Keep 20 ft. buffer between toe of fill and edge of headcut. Ensure all water is drained away from headcut. Low water crossing or culvert may be needed on access road corridor south of 10-11 well.
34	SS Draw	10-11CO	52N	75W	10	NENE	
35	SS Draw	10-11WA	52N	75W	10	NENE	
36	SS Draw	23-33WA	52N	75W	23	SWSW	Operator pulled well from POD. Engineered road and pad necessary. Very difficult to reclaim, fragile soils, steep slopes (greater than 25%).
37	SS Draw	35-11CA	52N	75W	35	NENE	Operator pulled well from POD. Engineered road necessary. Extreme- fragile soils- ridge top- steep slopes- Very difficult to reclaim (greater than 25% slopes).

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

1. In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed and revised a guidance document, "Compliance Monitoring and Siting Requirements for Unlined Impoundments Containing Coalbed Methane Produced Water" (September, 2006) which can be accessed on their website. For all WYPDES permits the BLM will require that operators comply with the latest DEQ standards and monitoring guidance.

2.3.2.2. Surface Water

Channel Crossings:

1. Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
2. Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
3. 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.
4. Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
5. 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.
6. 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.
7. 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.
8. The operator will supply a copy of the complete approved Chapter 3 permit to construct associated with treatment facilities to BLM as they are issued by WDEQ.

2.3.2.3. Soils

1. The Companies, on a case by case basis depending upon water and soil characteristics, will test sediments deposited in impoundments before reclaiming the impoundments. Tests will include the standard suite of cations, ions, and nutrients that will be monitored in surface water testing and any trace metals found in the 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 when the ground is frozen during the winter.
3. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.

4. 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 geomorphological 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. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
2. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
3. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

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

2.3.2.6.2. Black-footed Ferret

1. Prairie dog colonies will be avoided wherever possible.

2.3.2.6.3. Mountain Plover

1. A mountain plover nesting survey following U.S. Fish and Wildlife Service protocol is encouraged prior to construction initiation, as project modifications can be made if necessary to protect nesting plovers and natural gas production. If requested in writing, then authorization may be granted for construction activities to occur between August 1 and March 15, outside the mountain plover breeding season. A mountain plover nesting survey following U.S. Fish and Wildlife Service protocol shall be conducted during the first available survey period (May 1 – June 15). Additional measures such as monitoring and activity restrictions may be applied if mountain plovers are documented.
2. A disturbance-free buffer zone of 0.25 mile will be established around all occupied mountain plover nesting habitat between March 15 and July 31.
3. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ½ mile of occupied mountain plover nesting habitat.
4. Construction of ancillary facilities (for example, compressor stations, and processing plants) will not be located within ½ mile of known nesting areas. The threats of vehicle collision to adult plovers and their broods will be minimized, especially within breeding aggregation areas.
5. Where possible, roads will be located outside of plover nesting areas.

6. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.
7. Creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.
8. When above ground markers are used on capped and abandoned wells they will be identified with markers no taller than four feet with perch inhibiting devices on the top to avoid creation of raptor hunting perches within 0.5 mile of nesting areas.
9. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

2.3.2.6.4. Ute Ladies'-tresses Orchid

1. Companies operating in areas identified with weed infestations or suitable Ute ladies'- tresses orchid habitat will be required to submit an integrated pest management plan prior to APD approval. Mitigation will be determined on a site-specific basis and may include such measures as spraying herbicides prior to entering areas and washing vehicles before leaving infested areas. Infestation areas of noxious weeds have been identified through the county Weed and Pest Districts and are available at the Buffalo BLM office.

2.3.2.7. Visual Resources

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

2.3.2.8. Noise

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

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

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

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 SS Draw POD is Covert Green, 18-0617 TPX.
3. The approval of this project does not grant authority to use off lease federal lands. No access, surface disturbing activity, or use of off-lease federal lands, is allowed on affected leases until right-of-way grants become effective on the date in which the right-of-way grant is signed by the authorized officer of the BLM.
4. No vehicular traffic is allowed on the pipeline corridor between the 2-23 well and the 2-21 well.
5. Rock rip rap will be required on downstream end of 60” culvert of engineered road design associated with well 3-11. Ensure size of rock correlates with velocity of water coming out of culvert.
6. Keep 20 ft. buffer between toe of fill and edge of headcut near well 10-11. Ensure all water is drained away from headcut. Low water crossing or culvert may be needed on access road corridor south of 10-11 well.
7. 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:

A. Seed Mix:	
Species- Cultivar	LBS PLS/ACRE
Western Wheatgrass	4.8
Green Needlegrass	4.0
Bluebunch Wheatgrass	2.2
Slender Wheatgrass	2.2
American Vetch	0.6
Prairie Coneflower	0.6
Purple Prairie Clover	0.6
Total	15.0

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.

8. Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed. Complete fall seeding after September 15 and prior to prolonged ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.
9. Due to close proximity to drainages, sandy and fragile soils, the operator will line the drilling pits.
10. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12” or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according

to the following spacing:

Grade Drainage Spacing

2-4% 310 ft
5-8% 260 ft
9-12% 200 ft
12-16% 150 ft

11. Disturbance areas mentioned below have fragile soils and erosive conditions that shall be stabilized in a manner which eliminates erosion until a self-perpetuating non-weed native plant community has stabilized the site. Stabilization efforts shall be finished within 30 days (or sooner) of the completion of construction activities.

Well site(s): **10-11**

Pipeline segments associated with well(s): **2-21**

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

Reclamation Standards:

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

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

B. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.

C. Vegetation canopy cover (on un-forested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:

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

D. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

13. No pesticide spraying will be authorized on federal lands prior to the approval of a Pesticide Use Plan submitted by the operator to the Buffalo Field Office.
14. All roads, pads, impoundments and locations where engineered construction will occur will be completely slope staked for the pre-construction meeting.
15. Primitive roads (2-tracks) with a utility corridor will not exceed a disturbance width of 25 feet, and the corridors without an access road will not exceed a disturbance width of 10 feet.

16. Utility corridors will be expediently reclaimed following construction and maintained in a professional and workmanship manner avoiding tire rutting, settling and erosion.
17. Mowing at the well site where a constructed pad is not approved as designed will be minimized to a 30 foot radius of the well stake.

Cultural Resources

18. Archaeological Monitoring: All earth moving activity in the following area will be monitored by an archeologist who meets or exceeds the qualification standards recommended by the Secretary of the Interior. The Bureau has identified this area as containing the potential for buried cultural deposits. The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of work.
19. All earth moving activities within alluvial deposits of Twenty Mile Creek in T52N R75W Sections 10 and 11. The determination of the exact monitoring areas is based on the discretion of the archeological monitor, although, all alluvial deposits within the drainage must be monitored.

Wildlife

20. The following conditions will minimize impacts to nesting and roosting bald eagles:
 - a. No surface disturbing activity shall occur within one mile of bald eagle habitat (Wild Horse Creek in SW Section 16, T52N, R75W) annually from November 1 through April 1, prior to a winter roost survey or from February 1 through August 15, prior to a nesting survey. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
52/75	15	ALL project related activities within the west ½ of this section.
52/75	16	ALL project related activities within this ENTIRE section.
52/75	21	Wells: 21-11CO and 21-41CO ALL project related activities within this ENTIRE section.
52/75	22	Well: 22-23 ALL project related activities within the NW ¼ of this section.

- b. If a roost is identified and construction has not been completed, a year round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimum disturbance buffer 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 nest is identified and construction has not been completed, 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.
21. The following conditions will minimize impacts to raptors:
 - a. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
53/75	33	ALL project related activities within this ENTIRE section.
52/75	3	Wells: 3-23CA, CO, LA, WA; 3-31CA, CO, LA, WA; 3-33CA, CO, LA, WA; and 3-43CA, CO, LA, WA ALL project related activities within the SW ¼ and SWNW, SENW, NWSE, and SWSE ¼ ¼s of this section.
52/75	4	Wells: 4-21CA, CO, LA, WA
52/75	10	ALL project related activities within this ENTIRE section, <i>except</i> the 10-11 wells and their directly associated infrastructure.
52/75	15	Well: 15-13CO
52/75	21	Wells: 21-11CO and 21-41CO
52/75	25	Well: 25-31CA
52/75	35	Wells: 35-43CO, WA

- 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 the SS Draw POD listed in the table below. 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.

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE
2628	Red-tailed hawk	432948E 4920266N	NWNE Sec. 2 T51N, R75W	Cottonwood, dead
26	Unknown	432184E 4921225N	SWNW Sec. 35 T52N, R75W	Unknown
2629	Red-tailed hawk	432714E 4921103N	NESW Sec. 35 T52N, R75W	Cottonwood, live
2631	Red-tailed hawk / Golden eagle	432102E 4923153N	SWNW Sec. 26 T52N, R75W	Cottonwood, live
2609	Unknown	432099E 4923154N	SWNW Sec. 26 T52N, R75W	Cottonwood, live
2636	Red-tailed hawk / Great horned owl	430005E 4924300N	NWSE Sec. 21 T52N, R75W	Cottonwood, dead
2637	Unknown	431273E 4923472N	NENW Sec. 27 T52N, R75W	Cottonwood, dead
2639	Red-tailed hawk / Great-horned owl	431993E 4921546N	SENE Sec. 34 T52N, R75W	Cottonwood, live
2420	Red-tailed hawk / Great horned owl	430064E 4923869N	SWSE Sec. 21 T52N, R75W	Cottonwood, dead

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE
3640	Red-tailed hawk	431799E 4921650N	NENE Sec. 34 T52N, R75W	Cottonwood, live
3666	Red-tailed hawk	430295E 4923665N	SESE Sec. 21 T52N, R75W	Cottonwood, live
2614	Red-tailed hawk	434056E 4922085N	SWSW Sec. 25 T52N, R75W	Cottonwood, live
2611	Northern harrier	433272E 4922850N	SWNE Sec. 26 T52N, R75W	Ground, hillside
2613	Red-tailed hawk	434039E 4922265N	SWSW Sec. 25 T52N, R75W	Cottonwood, live
2612	Great-horned owl	434031E 4922258N	SWSW Sec. 25 T52N, R75W	Cottonwood, dead
4188	Red-tailed hawk	430480E 4923420N	NENE Sec. 28 T52N, R75W	Cottonwood, dead
None	Unknown	431540E 4926932N	SWSE Sec. 10 T52N, R75W	Cottonwood, live
4455	American kestrel	432023E 4921595N	NENE Sec. 34 T52N, R75W	Cottonwood, dead
2632	Red-tailed hawk	429986E 4926489N	SWNE Sec. 16 T52N, R75W	Cottonwood, live
2671	Golden eagle / Red-tailed hawk	430348E 4921738N	NENE Sec. 33 T52N, R75W	Cliff
2770	Golden eagle / Red-tailed hawk	434188E 4929528N	SENE Sec. 1 T52N, R75W	Cottonwood, live
3798	Red-tailed hawk	429480E 4299990N	NENW Sec. 4 T52N, R75W	Cottonwood, live
None	Great-horned owl	430487E 4928480N	NWNW Sec. 10 T52N, R75W	Juniper, live
None	Red-tailed hawk	429853E 4925026N	NWNE Sec. 21 T52N, R75W	Cottonwood, live

22. A mountain plover nesting survey is desired in suitable habitat prior to commencement of surface disturbing activities in the prairie dog towns. If the survey is not conducted prior to commencement of surface disturbing activities, it shall be conducted during the first breeding season following POD approval. No surface disturbing activities are permitted in suitable prairie dog colonies, from March 15-July 31, until a mountain plover nesting survey has been conducted for the current breeding season. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
52/75	2	Wells: 2-23CA, CO, LA, WA The access / pipeline corridor west of the 2-23 wells within this section.
52/75	3	Wells: 3-11CA, CO, LA, WA; 3-23CA, CO, LA, WA The access / pipeline corridor directly associated with the 3-11 wells. The access / pipeline corridor directly associated with the 3-43 wells. ALL project related activities within the SWNW ¼ of this section.
52/75	10	ALL project related activities within the SESW ¼ of this section.

52/75	11	ALL project related activities within the NESW and NWSW ¼ ¼ of this section.
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- a. If a mountain plover is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).
 - b. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.
 - c. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.
23. The following conditions will minimize impacts to sage-grouse:
- a. No surface disturbing activities are permitted within 2 miles of a sage grouse lek between March 1 and June 15, prior to completion of a greater sage grouse lek survey. This condition will be implemented on an annual basis for the duration of surface disturbing activities. This timing limitation will affect the following:

Township/Range	Section	Affected Wells and Infrastructure
52/75	2	Wells: 2-21CA, CO, LA, WA; 2-23CA, CO, LA, WA ALL project related activities within the north ½ of this section.
52/75	3	Wells: 3-11CA, CO, LA, WA; 3-13CA, CO, LA, WA; 3-21CA, CO, LA, WA; 3-23CA, CO, LA, WA; 3-31CA, CO, LA, WA; 3-43CA, CO, LA, WA ALL project related activities within the north ½ of this section.
52/75	4	Wells: 4-11CA, CO, LA, WA ALL project related activities within the NENE ¼ ¼ of this section.
52/75	25	Well: 25-31CA

- b. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
 - c. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
24. All other conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) shall be complied with.
25. In the SS Draw WMP, Table 6 it states that the Eaton 25-1 and Eaton 30-1 reservoirs are flow through, but in the previously approved POD North Shell Draw 3, Additions 2 on page 10 of the WMP it states that “The previously approved reservoirs will be operated such that they completely contain the CBNG water discharged to them while maintaining adequate freeboard for runoff.” Therefore, the Eaton 25-1 and Eaton 30-1 reservoirs will be full-containment and a subsequent sundry must be submitted requesting the reservoirs be flow through systems, which will require an

inspection of the channel that substantiates no significant adverse impacts would result from flow through discharge of produced water.

26. Please contact Amy Shepperson, Natural Resource Specialist, @ (307) 684-1119, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on September 11, 2006. Field inspections of the proposed SS Draw CBNG project were conducted on June 26, 27, 2007 by:

NAME	TITLE	AGENCY
Amy Shepperson	Natural Resource Specialist	BLM
Clint Crago	Archeologist	BLM
Jenny Morton	Wildlife Biologist	BLM
Rusty Roush	Landman	Petro-Canada
Eric	Driller	Petro-Canada
Aaron Grosch	Engineer	P.E. Grosch Construction
Doug	Production	Petro-Canada
Ed	Construction	Petro-Canada
Shawn	Drilling Assistant	Petro-Canada
Candy Laramore	Landowner	---

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

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

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

3.1. Topographic Characteristics of Project Area

The SS Draw POD area is located approximately 20 miles northwest of Gillette, Wyoming on Echeta Road and 15 miles southeast of Arvada, Wyoming. The project area is currently on 80 acre spacing.

The topography of the project area is dominated by numerous ridges and steep draws. The topography levels out with more rolling hills and flat areas along the Wild Horse and Twentymile Creek drainages. Some of the steep draws have active headcuts and erosion due to storm events. There are numerous outcroppings of sandstone and scoria in many of the draws and ridges, as well as areas of exposed soil along the steeper slopes and higher ridge tops. Elevation of the project area ranges from 3920 to 4660 feet above sea level. There is existing CBNG development in the area with the majority of the activity occurring within the last couple of years. The primary use of the project area is livestock grazing.

3.2. Vegetation & Soils

Soils within the project area were identified from the *North Campbell County Survey Area, Wyoming (WY705)*. The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards and published in 2004. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 4 inches on ridges to 8+ inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area.

The map units identified for the soils within this project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

Map Unit Symbol	Map Unit Name	Map Unit Acres	Map Unit %
134	DEEKAY-OLDWOLF LOAMS, 0 TO 6 PERCENT SLOPES	2.20	0%
183	MOORHEAD-LEITER CLAY LOAMS, 0 TO 6 PERCENT SLOPES	20.80	1%
184	MOORHEAD-LEITER CLAY LOAMS, 6 TO 15 PERCENT SLOPES	250.89	10%
217	THEEDLE-SHINGLE LOAMS, 3 TO 30 PERCENT SLOPES	26.96	1%
225	UCROSS-IWAIT-FAIRBURN LOAMS, 3 TO 30 PERCENT SLOPES	1324.46	52%
253	ABSTED-ARVADA-SLICKSPOTS COMPLEX, 0 TO 6 PERCENT SLOPES	43.16	2%
267	CROMACK-SAMSIL CLAY LOAMS, 3 TO 15 PERCENT SLOPES	84.18	3%
275	ECHETA-MOORHEAD CLAY LOAMS, 0 TO 6 PERCENT SLOPES	32.12	1%
278	FAIRBURN-SAMSIL-BADLAND COMPLEX, 10 TO 45 PERCENT SLOPES	651.80	26%
285	HAVERDAD-BORUFF COMPLEX, 0 TO 3 PERCENT SLOPES	16.38	1%
299	OLDWOLF-FAIRBURN LOAMS, 3 TO 15 PERCENT SLOPES	9.84	0%
330	ULM CLAY LOAM, 6 TO 10 PERCENT SLOPES	58.06	2%
334	VONALF-XEMA-MITTENBUTTE FINE SANDY LOAMS, 3 TO 30 PERCENT SLOPES	29.49	1%

Loamy Sites:

These sites occur on land nearly level up to 50% slopes on landforms which include hill slopes and the associated alluvial fans and stream terraces, in the 15-17 inch precipitation zone.

The soils of these sites are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from unspecified sandstone. These soils have moderate permeability and may occur on all slopes.

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

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

Dominant grasses identified include: rhizomatous wheatgrasses and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and Sandberg bluegrass. Forbs identified include: Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Other vegetative species identified at onsite: Fringed sagewort, plains pricklypear and winterfat.

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 grasses, and miscellaneous forbs.

Shallow Loamy Sites:

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

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

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

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

3.2.1. Wetlands/Riparian

No wetland/riparian areas were noted during the onsite within the POD boundary. The channels within the project area are well vegetated grassy swales of dry land species, generally without defined bed and bank and therefore are not indicative of a riparian environment. However, discharge of produced water may enhance wetland/riparian areas adjacent to channels. Also, the potential exists for further periodic inundation of Wild Horse Creek in the lower reaches, with increased flows.

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

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

- Canada thistle was observed in the project area during the on-site.

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 Hayden-Wing Associates (HWA). HWA performed surveys for bald eagles, sharp-tailed grouse, greater sage-grouse, raptor nests, and prairie dog colonies according to protocol in 2006 and 2007. Surveys were conducted for Ute ladies'-tresses orchid habitat on May 9 and 10, 2007. No formal surveys have been completed within the project area for mountain plovers.

A BLM biologist conducted field visits on June 26, 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 SS Draw project area include pronghorn antelope mule deer, white-tailed deer, and elk. The WGFD has determined that the project area contains Winter range for pronghorn antelope, Winter-Yearlong for mule deer and Yearlong for mule deer. Although no part of the project area is designated range for elk, designated parturition range for the Fortification elk herd unit is located approximately 1.6 miles and designated yearlong range is located approximately 0.4 mile southwest of this project. No data points from collared elk have been recorded within the project area and no observations have been documented, however elk are likely to use or move through the project area.

Winter use is when a population or portion of a population of animals uses the documented suitable habitat sites within this range annually, in substantial numbers only during the winter period. **Winter-Yearlong** use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Yearlong** use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions. **Parturition Areas** are documented birthing areas commonly used by females. It includes calving areas, fawning areas, and lambing grounds. These areas may be used as nurseries by some big game species.

Pronghorn antelope within the project area belong to the Gillette herd unit. The 2004 estimated herd population was 13,985 with a population objective of 11,000. Mule deer within the project area belong to the Powder River herd unit. The 2004 estimated herd population was 55,561 with a population objective of 52,000. White-tailed deer within the project area belong to the Powder River herd unit. The 2004 estimated herd population was 12,716 with a population objective of 8000. Populations of pronghorn antelope, mule deer, and white-tailed deer within their respective hunt areas are above WGFD objectives.

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 Twentymile Creek, an ephemeral tributary of Wild Horse Creek, tributary to the Powder River, which bisects the north-central portion of the project area in an east and west direction. 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). Species observed by HWA include northern harrier, American kestrel, Say's phoebe, western kingbird, western meadowlark, lark sparrow, Brewer's sparrow, Brewer's blackbird, lark bunting, and European starling.

3.3.4. Raptors

Twenty-nine raptor nest sites were identified by HWA (2007) and BLM within 0.5 mile of the project area (Table 4), of these eleven nests were active in 2007.

Table 4. Documented raptor nests within the SS Draw project area in 2005, 2006 and 2007.

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION IN 2007	STATUS 2005	STATUS 2006	STATUS 2007
2628	Red-tailed hawk	432948E 4920266N	NWNE Sec. 2 T51N, R75W	Cottonwood, dead	Gone	Active	Active	Gone
26	Unknown	432184E 4921225N	SWNW Sec. 35 T52N, R75W	Unknown	Gone	Historic	Gone	Gone
2629	Red-tailed hawk	432714E 4921103N	NESW Sec. 35 T52N, R75W	Cottonwood, live	Gone	Inactive	Gone	Gone
2631	Red-tailed hawk / Golden eagle	432102E 4923153N	SWNW Sec. 26 T52N, R75W	Cottonwood, live	Unknown	Active	Active	Not located
2609	Unknown	432099E 4923154N	SWNW Sec. 26 T52N, R75W	Cottonwood, live	Gone	Inactive	Gone	Gone
2636	Red-tailed hawk / Great horned owl	430005E 4924300N	NWSE Sec. 21 T52N, R75W	Cottonwood, dead	Good	Active	Active	Active
2637	Unknown	431273E 4923472N	NENW Sec. 27 T52N, R75W	Cottonwood, dead	Unknown	Inactive	Inactive	Not located
2639	Red-tailed hawk / Great-horned owl	431993E 4921546N	SENE Sec. 34 T52N, R75W	Cottonwood, live	Excellent	Active	Active	Active
2420	Red-tailed	430064E	SWSE Sec.	Cottonwood,	Good	Inactive	Inactive	Active –

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION IN 2007	STATUS 2005	STATUS 2006	STATUS 2007
	hawk	4923869N	21 T52N, R75W	dead				occupied by Great horned owl
3640	Red-tailed hawk	431799E 4921650N	NENE Sec. 34 T52N, R75W	Cottonwood, live	Fair	Active	Inactive	Inactive
3666	Red-tailed hawk	430295E 4923665N	SESE Sec. 21 T52N, R75W	Cottonwood, live	Gone	Gone	Gone	Gone
2614	Red-tailed hawk	434056E 4922085N	SWSW Sec. 25 T52N, R75W	Cottonwood, live	Excellent	Active	Active	Inactive
2611	Northern harrier	433272E 4922850N	SWNE Sec. 26 T52N, R75W	Ground, hillside	Gone	Active	Inactive	Gone
2613	Red-tailed hawk	434039E 4922265N	SWSW Sec. 25 T52N, R75W	Cottonwood, live	Poor	Unknown	Inactive	Inactive
2612	Great-horned owl	434031E 4922258N	SWSW Sec. 25 T52N, R75W	Cottonwood, dead	Fair	Inactive	Active	Inactive
4188	Red-tailed hawk	430480E 4923420N	NENE Sec. 28 T52N, R75W	Cottonwood, dead	Fair	Discovered in 2006	Active	Active – Canada goose
None	Unknown	431540E 4926932N	SWSE Sec. 10 T52N, R75W	Cottonwood, live	Fair	Discovered in 2006	Inactive	Inactive
4455	American kestrel	432023E 4921595N	NENE Sec. 34 T52N, R75W	Cottonwood, dead	Unknown	Discovered in 2006	Active	Inactive
2632	Red-tailed hawk	429986E 4926489N	SWNE Sec. 16 T52N, R75W	Cottonwood, live	Unknown	Active	Inactive	Not located
2671	Golden eagle / Red-tailed hawk	430348E 4921738N	NENE Sec. 33 T52N, R75W	Cliff	Unknown	Active	Active	Not located
2770	Golden eagle	434188E 4929528N	SENE Sec. 1 T52N, R75W	Cottonwood, live	Unknown	Active	Active	Not located
3798	Red-tailed hawk	429480E 4299990N	NENW Sec. 4 T52N, R75W	Cottonwood, live	Excellent	Discovered in 2007	Discovered in 2007	Active
None	Great-horned owl	430487E 4928480N	NWNW Sec. 10 T52N, R75W	Juniper, live	Good	Discovered in 2007	Discovered in 2007	Active
None	Red-tailed hawk	429853E 4925026N	NWNE Sec. 21 T52N, R75W	Cottonwood, live	Good	Discovered in 2007	Discovered in 2007	Active

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

Within the BLM Buffalo Field Office there are 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).

Eleven black-tailed prairie dog colonies, totaling 176.1 acres in size, were identified during site visits by HWA within the project area. Four additional colonies, totaling 741.9 acres in size, are located within 1.5 km of these colonies. The project area is located along the southern edge of the Arvada complex, the nearest potential reintroduction area. Black-footed ferret habitat of sufficient size is not present within the SS Draw project area.

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.

Wild Horse Creek and its tributaries are ephemeral. No springs are located within the project area. During 2004, surveys were conducted to identify areas of suitable habitat and for the occurrence of Ute ladies'-tresses (ULT) within the central and south section of the SS Draw project area. No ULTs were found during 2004 and the potential habitat was determined to be unsuitable (HWA 2004). During 2005, the southeastern portion of the north section of the project area was surveyed for suitable habitat. No ULT plants were found and the habitats in the areas surveyed were determined to be unsuitable for the species (HWA 2005a). During 2007, surveys were conducted in the northern portion of the project area, along Twentymile Creek to its confluence with Wild Horse Creek and along Wild Horse Creek in the southern portion of the project area. No ULT plants were found and the habitats in the areas surveyed were determined to be unsuitable for the species (HWA 2007). Suitable orchid habitat is not present within the SS Draw project area.

3.3.5.2. Sensitive Species

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

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*).

3.3.5.2.1. Bald eagle

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

Bald eagle nesting habitat is generally found in areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles 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 SS Draw project has mature trees associated with it scattered throughout the project area. Groves of cottonwood trees exist along Wild Horse Creek within Sections 7, 8, 16, and 17, T52N, R75W, located along the western edge of the project area. Bald eagle observations have been documented along Wild Horse Creek in SWNW (2 adults) and SWSE (1 adult) Section 16 and NESW (1 adult) Section 27, T52N, R75W. No potential nests were identified during consultant (HWA 2006) or BLM biologist site visits, within the immediate project area or extending one mile from proposed activities.

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.

Eleven black-tailed prairie dog colonies were identified during site visits by HWA within the project area.

Table 6. Black-tailed prairie dog colonies documented in the SS Draw project area.

Legal location	Approximate size (acres)	Status
NWSE Section 35, T52N, R75W	35	Active
SWSW Section 2 and NWNW Section 11, T52N, R75W	6.6	Active
SWSW Section 2 and SESE Section 3, T52N, R75W	1.7	Active
SWSW Section 3, T52N, R75W	8.8	Active
SESW Section 10 and NENW Section 15, T52N, R75W	37.9	Active
Western Section 11, T52N, R75W	42.4	Active
SWNW Section 2, T52N, R75W	1.6	Active
SWNW Section 2 and SENE Section 3, T52N, R75W	8.6	Active
NWNW Section 2 and NENE Section 3, T52N, R75W	19.0	Active
SWNE Section 3, T52N, R75W	5.0	Active
ENE ¼ Section 11, T52N, R75W	9.5	Active
Total	176.1	176.1 – Active

3.3.5.2.3. Greater sage-grouse

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.

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003). Suitable sage-grouse habitat is present through out the project area. Three documented sage-grouse leks are present within three miles of the project area (Table 7).

Table 7. Documented sage-grouse leks within three miles of the SS Draw project in 2006 and 2007.

Lek ID	UTM NAD83	Legal Location	Peak Males 2006	Peak Males 2007	Distance From Project Area (Miles)
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Twentymile	433945E 4924673N	SWNW Sec. 24 T52N, R75W	5	0	0.9
Laramore	432409E 4932197	SWSW Sec. 26 T53N, R75W	10	18	1.2
Colton	437309E 4930528	SESW Sec. 32 T53N, R74W	3	Unknown (not surveyed)	2.7

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 within the majority of the prairie dog towns and along the floodplain of Wild Horse Creek. No mountain plover surveys have been completed within the project area.

3.4. West Nile Virus

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

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

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

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007	119	20	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 within Wild Horse Creek watershed of the Upper Powder River drainage system. Wild Horse Creek watershed has a slope gradient in the range of 4% to 8% throughout most of the catchment with a meandering mainstem (sinuosity>1.5) exhibiting a well-defined low flow channel bottom. The main stem is characterized by a moderately incised channel on average 3 to 6 feet deep and 8 to 12 feet wide. The incised channel is surrounded by a well-developed floodplain with a dendritic tributary system.

3.5.1. Groundwater

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

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

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

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

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

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 267 registered stock and domestic water wells within the upper portion of the Wild Horse Creek watershed with depths ranging from 18 to 5,580 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the Wild Horse Creek drainage which is tributary to the Upper Powder River primary watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in $\mu\text{mhos/cm}$) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11. (PRB FEIS page 3-49). These water quality parameters “illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is

used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Upper Powder River, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located at Arvada (PRB FEIS page 3-49).

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

3.6. Cultural Resources

Previous and current Class III inventories were conducted for the SS Draw project prior to on-the-ground project work (BFO project #'s 709900313, 70990314, 70000018, 70050190, and 70070005). Metcalf Archaeological Consultants, Platte Valley Management Company, Powers Elevation Co, Inc. and Pronghorn Archaeological Services conducted the previously approved inventories. Pronghorn Archaeological Services conducted the current Class III inventory following the Archeology and Historic Preservation: Secretary of the Interior’s Standards and Guidelines (48FR190) for the proposed project. Clint Crago, BFO archaeologist, reviewed the report for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined it to be adequate. The following resources are located within the Area of Potential Effect (APE).

Table 3.5 Cultural Resource Sites Identified within the SS Draw project area

Site Number	Site Type	National Register Eligibility
48CA746	Homestead	Not Eligible
48CA3362	Prehistoric Lithic Scatter	Not Eligible
48CA3363	Prehistoric Lithic Scatter	Not Eligible
48CA5248	Homestead	Not Eligible
48CA5251	Homestead	Not Eligible
48CA6325	Historic Windmill and Stock Watering Area	Not Eligible
48CA6326	Stock Watering Area	Not Eligible
48CA6327	Historic Windmill and Stock Watering Area	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action (Alternative B) resulted in development of Alternative C as the preferred alternative. The changes have reduced impacts to the environment which will result from this action. The environmental consequences of Alternative C are described below.

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator’s plans and BLM applied mitigation. Of the 60 proposed wells at 20 different locations, 9 wells are on existing or reclaimed conventional well pads, 44 wells can be drilled without a well pad being constructed, 3 wells will require slot pads and 4 wells will require constructed (cut & fill) well pads.

Surface disturbance associated with the drilling of the 44 wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these wells would involve approximately 8.6 total acres. The other wells requiring pad construction would disturb approximately 2.5 acres. The total estimated disturbance for all 60 wells would be approximately 11.1 acres.

Approximately 0.45 miles of improved roads would be constructed to provide access to various well locations. Approximately 9.28 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 0.58 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Non-constructed Pad	44	Site Specific	8.3	Long Term
Constructed Pad	4	Site Specific	0.4	
Existing Pad	9	Site Specific	1.0	
Slot Pads	3	Site Specific	1.4	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells		0.1/acre		Long Term
Impoundments	0		0.0	Long Term
On-channel	0	Site Specific		
Off-channel	0	Site Specific		
Water Discharge Points	0	Site Specific or 0.01 ac/WDP		
Channel Disturbance Headcut Mitigation*		Site Specific		

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Channel Modification		Site Specific		
Improved Roads With Corridor	0.45	40' Width	2.18	Long Term
2-Track Roads No Corridor	0.29	12' Width	0.424	Long Term
With Corridor	8.99	20' Width	14.34	
Pipelines No Corridor	0.58	10' Width	0.71	Short Term
Buried Power Cable No Corridor	0.0	12' Width or Site Specific	0.0	Short Term
Overhead Powerlines	1.88	15' Width	3.42	Long Term

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

4.1.1. Wetland/Riparian

The PRB FEIS identified effects to gallery forests of mature cottonwood trees stating that “(they) may be lost by bank undercutting caused by the increased surface water flows in channels.” Included in the ROD is programmatic mitigation “which may be appropriate to apply at the time of APD approval if site specific conditions warrant.”(ROD page A-30). One of the conditions included in that section addresses the impact to trees in A.5.8-2: “To reduce adverse effects on existing wetlands and riparian areas, water discharge should not be allowed if increased discharge volumes or subsequent recharge of shallow aquifers will inundate and kill woody species, such as willows or cottonwoods.”(ROD Page A-32).

“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).

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment. The channels within the project area are well vegetated grassy swales of dry land species, generally without defined bed and bank and therefore are not indicative of a riparian environment. Water is proposed to be discharged to Twentymile Creek and Wild Horse Creek through existing previously approved outfalls, which may further enhance wetland/riparian areas, impact woody species and add to the cumulative produced water flowing in Wild Horse Creek.

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. Co-operation and consultation with Campbell County Weed and Pest, the University of Wyoming, WERIC Clearinghouse and a licensed commercial applicator licensed by the State of Wyoming to patrol and spray noxious weeds existing within the project area or new infestations establishing in newly disturbed areas.
2. Monitoring of the project area to identify and implement control efforts of new infestations of noxious and/or invasive species.
3. Education of field personnel in the identification and impacts that noxious and invasive plants on the environment.

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 at this time.

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.

The operator submitted an integrated pest management plan developed in coordination with the Campbell County Weed and Pest District. The goal of the plan is to minimize impacts on the current plant community and to avoid promoting the encroachment of these invasive species throughout the project area. In addition, Petro-Canada will submit a Pesticide Use Proposal (PUP) form WY-04-9222-1 to the BLM for the chemical treatment of noxious weeds. A COA has been applied to this approval that no surface disturbance will be authorized on federal lands prior to the approval of a Pesticide Use Plan submitted by the operator to the Buffalo Field Office.

4.1.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 16.8% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.

- The commitment by the operator to monitor the volume of water flowing into Wild Horse Creek and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Upper Powder River Watershed.
- The WMP for the SS Draw proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

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

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

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

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

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be discharged into existing and previously approved impoundments in surrounding projects. If a reservoir were to discharge, it is unlikely produced water will reach a fish-bearing stream. It is unlikely downstream species would be affected.

4.2.2.1. Cumulative effects

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 displace migratory birds farther than simply the physical habitat disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males’ ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

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

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

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

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

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

Table 5. Infrastructure within close proximity to documented raptor nests within the SS Draw project area (Timing limitations will apply to this infrastructure).

BLM ID#	UTM (NAD 83)	SPECIES	WELL / PIT NUMBER	DISTANCE (MILES)
3798	429480E 4299990N	Red-tailed hawk	4-21CA, CO, LA, WA	0.17
None	430487E	Great-horned owl	3-33 CA, CO, LA, WA	0.25

BLM ID#	UTM (NAD 83)	SPECIES	WELL / PIT NUMBER	DISTANCE (MILES)
	4928480N			
None	429853E 4925026N	Red-tailed hawk	21-11WA 21-41CO, LA	0.30 0.48
2636	430005E	Red-tailed hawk	21-41CO, LA 22-23CO, WA	0.16 0.46
2420	430064E 4923869N	Red-tailed hawk	21-41CO, LA	0.29
2612	434031E 4922258N	Red-tailed hawk	25-31CA	0.42
None	432761E 4920660N	Red-tailed hawk	35-43CO, WA	0.28
2628	432948E 4920268N	Red-tailed hawk	35-43CO, WA	0.16

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a one-half mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation to be located greater than one-quarter mile from occupied raptor nests.

The 4-21CA, CO, LA, WA wells were proposed approximately 500' from an active red-tailed hawk nest. During the onsite visit, the pair of red-tailed hawks associated with this nest flushed from the nest, circled overhead, and continually emitted distress calls. We moved to a new location, approximately 430' northeast and up the ridge. At that time, the hawks stopped their distress calls, though they did not settle back on the nest. The well will be located at this new location approximately 830' from the nest. The new location should reduce the likelihood of nest abandonment or failure.

21-41CO and 35-43CO, WA wells are proposed within ¼ mile of active red-tailed hawk nests. These wells are proposed on existing CBNG well pads and will not add any additional impact to the red-tailed hawks. Timing limitations will still be applied to these wells to avoid disturbing the hawks while on the nest.

4.2.4.1. Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are two species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat of insufficient size.
Threatened				
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence

K Known, documented observation within project area.

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

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

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

Effect Determinations

Effect Determination

LAA Likely to adversely affect

NE No Effect.

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

4.2.5.1.1. Black-footed ferret

Because the black-tailed prairie dog colonies within and adjacent to the SS Draw project area are of insufficient size for supporting ferrets and are isolated from any prairie dog complexes, implementation of the proposed development should have no effect on the black-footed ferret.

4.2.5.1.2. Ute's Ladies Tresses Orchid

Suitable habitat is not present within the SS Draw project area. Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. Implementation of the proposed coal bed natural gas project will have "no effect" on the Ute ladies' - tresses orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (<i>Amphispiza billneata</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected.
Sage thrasher (<i>Oreoscoptes montanus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected.
Trumpeter swan (<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	S	MIH	Reservoirs may provide migratory habitat.
White-faced ibis (<i>Plegadis chihi</i>)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (<i>Oncorhynchus clarki bouvieri</i>)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (<i>Cynomys ludovicianus</i>)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIH	Prairie dog towns will 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.
Swift fox (<i>Vulpes velox</i>)	Grasslands	NP	NI	Habitat not present.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Caves and mines.	NP	NI	Habitat not present.

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

Presence

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

Project Effects

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

4.2.5.2.1. Bald eagle

Bald eagle winter roost habitat exists along Wild Horse Creek. Several observations have been documented throughout this area, though not concentrated in a single location. Steps have been taken to minimize loss if eagles do use the area such as buried power lines, roads designed for minimal speeds, and timing restrictions placed on operations within areas suitable for bald eagle roosting and nesting. Construction of the proposed project should not impact bald eagle nesting or winter roosting provided Petro-Canada complies with all mitigation included to alleviate impacts to bald eagles.

There are 1.77 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Petro-Canada is proposing additional overhead three-phase distribution lines. There are currently 5.2 miles of improved roads within the project area, with additional improved roads proposed.

The presence of overhead power lines 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%).

4.2.5.2.2. Black-tailed prairie dog

Five prairie dog colonies will be impacted by project infrastructure. Two of the colonies are located on lands administered by the BLM. The road/pipeline routes within the colonies were proposed on the edges of the towns and the wells were proposed outside of the colonies. A colony along an existing road will be impacted in the short term by the installation of pipeline along the road. The fourth colony, located entirely on private surface will be impacted by a road and a set of four wells. The landowner objected to relocating the infrastructure and wells to avoid this colony.

Well houses and power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent roads may result in prairie dog mortalities from vehicle strikes.

4.2.5.2.3. Greater sage-grouse

There are three sage-grouse leks located within three miles of the project area. Approximately 4.4 acres of sagebrush will be directly lost due to infrastructure associated with this project. Approximately 430

acres of previously undisturbed sage-grouse habitat will be fragmented by the roads, pipeline, and wells associated with the northeastern portion of the project area.

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

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

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

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

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

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

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

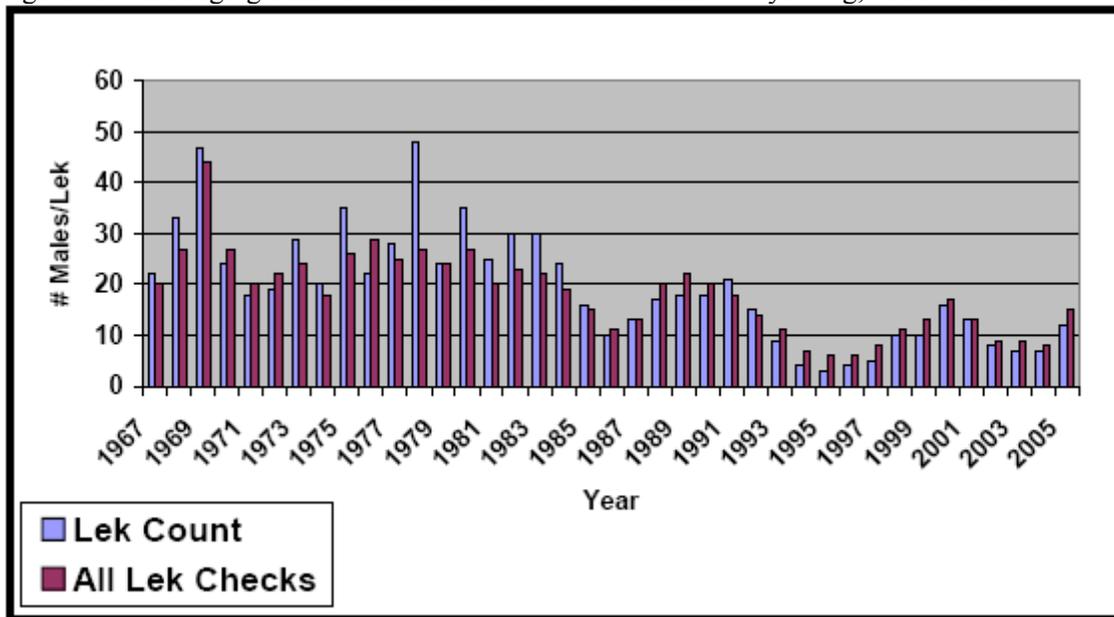
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with

assistance from other partners including the U.S. Department of Energy and industry are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development. Habitat conditions and sage grouse biology within the Buffalo Field Office is probably most similar to Moynahan's north-central Montana study area.

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

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

Figure 1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



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

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

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

4.2.5.2.4. Mountain plover

Suitable mountain plover habitat is present within the project area. Suitable habitat within the project area should be surveyed according to protocol prior to surface disturbing activities to avoid impacts to nesting mountain plovers.

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors and roads may be attractive to plovers while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. The existing overhead power lines adjacent to and within the project area provide perch sites for raptors potentially resulting in increased mountain plover predation. CBNG infrastructure such as the well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

Cumulatively, there are many sources of standing water, beyond CBM discharge, throughout the PRB that would add to the potential for mosquito habitat. Sources include; natural flows, livestock watering facilities, coal mining operations, and outdoor water use and features in and around communities.

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), 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 an average of 17 gpm per well (60 wells) or 1020.0 gpm (2.27 cfs or 1,645 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper

Powder River drainage, the projected volume produced within the watershed area was 171,423 acre-feet in 2006. As such, the volume of water resulting from the production of these wells is 0.96% of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 408 gpm will infiltrate at or near the discharge points and impoundments (658 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 18 to 5,580 feet compared to depths from 600 to 2,100 feet to the Wall, Canyon, Cook, and Lower Anderson 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 federal CBNG producing well) of the proposed wells.

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

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

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

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ

has developed a guidance document, “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004, and is currently being revised as the “Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments” which should be approved by June, 2006. Approximately 800 new impoundments have been investigated to date with 102 impoundments in 52 permits that have gone into compliance monitoring. The Wyoming DEQ has established an Impoundment Task Force which is in the process of drafting an “Impoundment Monitoring Plan” to investigate the potential for existing impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments should begin in the spring of 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

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

Table 4.5 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit –		2	1,000
Least Restrictive Proposed Limit		10	3,200
Powder River at Arvada Gauging station			
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	3,400
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 # 0051985			
At discharge point	5,000	6	7,500

Predicted Values	TDS, mg/l	SAR	EC, μ mhos/cm
Predicted Produced Water Quality			
Wall Coal Zone	960	9.7	1,470
Canyon Coal Zone	630	12.9	963
Anderson Coal Zone	630	13.6	964
Cook Coal Zone	1,030	14.0	1,660

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 960.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The quality for the water produced from the Wall target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 30.0 gallons per minute (gpm) is projected is to be produced from these 16 wells, for a total of 480.0 gpm and 1,020.0 gpm for the POD. See Table 4.5.

The quality for the water produced from the Canyon target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 15.0 gpm is projected is to be produced from these 14 wells, for a total of 210.0 and 1,020.0 gpm for the POD. See Table 4.5.

The quality for the water produced from the Lower Anderson target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 15.0 gpm is projected is to be produced from these 18 wells, for a total of 270.0 gpm and 1,020.0 gpm for the POD. See Table 4.5.

The quality for the water produced from the Cook target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 5.0 gpm is projected is to be produced from these 12 wells, for a total of 60.0 gpm and 1,020.0 gpm for the POD. See Table 4.5.

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

To manage the produced water, existing infrastructure will be used and no new impoundments will be constructed within the project area. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.34 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific; case-by-case basis as they are no longer needed for disposal of

CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 60 wells is anticipated to be a total of 1,020.0 gpm or 2.27 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in Upper Powder River from this action (0.34 cfs) may add a maximum 0.27 cfs to the Upper Powder River flows, or 0.40 % of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Upper Powder River (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 5). Based on the area of the Upper Wild Horse Creek, Twentymile Creek, Rough Draw, TMC Trib-1, Spring Draw, and SS Draw watersheds above the POD (249.3 sq mi) and an assumed density of 4 wells per location every 80 acres, the potential exists for the development of 7,977 wells which could produce a maximum flow rate of 139,608 gpm (311 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 311 cfs, is much less than the volume of runoff estimated from a 2-year storm event for Upper Wild Horse Creek, Twentymile Creek, Rough Draw, TMC Trib-1, Spring Draw, and SS Draw watersheds of the drainage with 1,649 cfs (Lowham Peak Discharge) and 852 cfs (Miller Peak Discharge).

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

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

Permit effluent limits were set at (WYPDES WYW0051985):

pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Radium 226	1 pCi/l max
Dissolved iron	1,000 µg/l max
Dissolved manganese	650 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	46 mg/l

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The designated points of compliance identified for this permit are ICP1 (SWNE, Sec. 17,

T52N, R75W), TRIB1 (SWSW, Sec. 15, T54N, R77W), UPR (SWSE, Sec. 16, T54N, R77W), and DPR (NWSE, Sec. 34, T55N, R77W).

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 permit domestic and stock water wells within the circle of influence of the proposed CBNG wells.

In-channel downstream impacts are addressed in the WMP for the SS Draw POD prepared by Western Water Consultants for Petro-Canada Resources (USA), Inc.

4.4.2.1. Surface Water Cumulative Effects

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

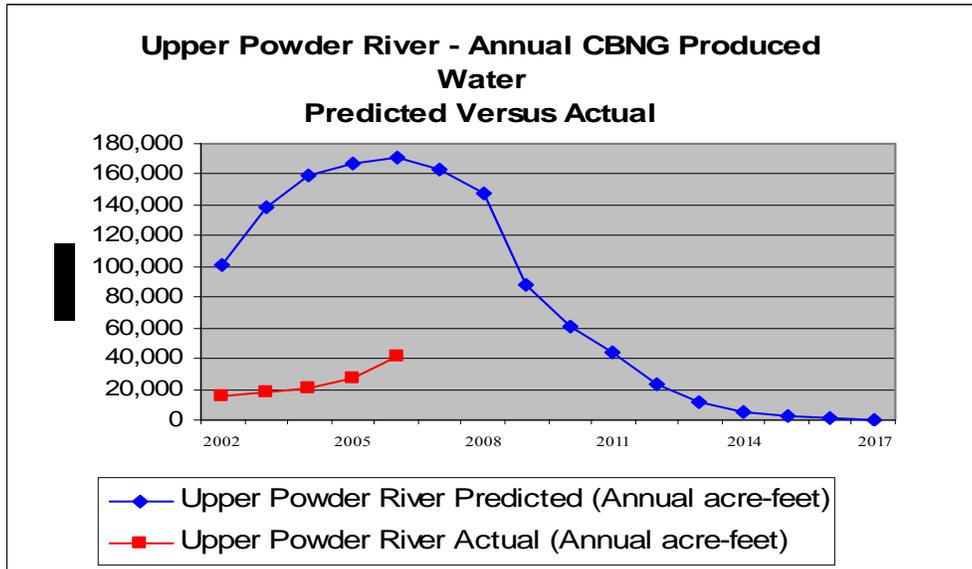
As of March 2007, all producing CBNG wells in the watershed have discharged a cumulative volume of 123,984 acre-ft of water compared to the predicted 736,519 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 16.8 % of the total predicted produced water analyzed in the PRB FEIS for the watershed.

Table 4.6 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				

2015	2,242	1,283,835			
2016	1,032	1,284,867			
2017	366	1,285,233			
Total	1,285,233		123,984		

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



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

The PRB FEIS states, “Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ’s (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117)

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 16.8% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

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

4.5. Cultural Resources

Sites 48CA5248 and 48CA5251 will be impacted by the project; however both are considered not eligible to the National Register of Historic Places (NRHP). The Bureau will require an archaeological monitoring condition for all construction activities along Twentymile Creek due to a high potential for buried cultural deposits. On 9/12/07, the Bureau electronically notified the Wyoming State Historic Preservation Office (SHPO), following section VI(A)(1) of the Wyoming State Protocol, of a finding of No Effect to historic properties.

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	Wyoming Interim SHPO	Wyoming SHPO	No

6. OTHER PERMITS REQUIRED

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

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