FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Yates Petroleum Corporation
Lazurite POD
ENVIRONMENTAL ASSESSMENT –WY-070-EA09-095

DECISION: BLM's decision is to approve a combination of alternatives C and D as summarized below and described in the attached EA and authorize Yates Petroleum Corporation's Lazurite Coal Bed Natural Gas (CBNG) Plan of Development (POD) comprised of the following 46 Applications for Permit to Drill (APDs):

	WELL NAME	WELL #	QTR	SEC	TWP	RNG	LEASE
1	LAZURITE CS	5	NESE	17	49N	79W	WYW147393
2	LAZURITE CS	6	NWSE	17	49N	79W	WYW147393
3	LAZURITE CS	2	NENW	17	49N	79W	WYW147393
4	LAZURITE CS	3	SWNW	17	49N	79W	WYW147393
5	LAZURITE CS	4	SWNE	17	49N	79W	WYW147393
6	LAZURITE OLIVINE CS	3	NESE	23	49N	79W	WYW147395
7	LAZURITE OLIVINE CS	2	SWNE	23	49N	79W	WYW147395
8	LAZURITE OLIVINE CS	4	SWSE	23	49N	79W	WYW147395
9	LAZURITE OLIVINE CS	1	NENE	23	49N	79W	WYW147395
10	LAZURITE OLIVINE CS	5	NESE	24	49N	79W	WYW147395
11	LAZURITE OLIVINE CS	6	NESW	24	49N	79W	WYW147395
12	LAZURITE OLIVINE CS	7	SWSW	24	49N	79W	WYW147395
13	LAZURITE OLIVINE CS	8	SWSE	24	49N	79W	WYW147395
14	LAZURITE TOURMALINE CS	1	NENE	15	49N	79W	WYW147392
15	LAZURITE TOURMALINE CS	4	SWNE	15	49N	79W	WYW147392
16	LAZURITE TOURMALINE CS	5	NESE	15	49N	79W	WYW147392
17	LAZURITE TOURMALINE CS	8	SWSE	15	49N	79W	WYW147392
18	LAZURITE TOURMALINE CS	6	NESW	15	49N	79W	WYW147392
19	LAZURITE TOURMALINE CS	7	SWSW	15	49N	79W	WYW147392
20	LAZURITE TOURMALINE CS	2	NENW	15	49N	79W	WYW147392
21	LAZURITE TOURMALINE CS	3	SWNW	15	49N	79W	WYW147392
22	LAZURITE BERYL CS	1*	NENE	8	49N	79W	WYW147391
23	LAZURITE BERYL CS	2	NENW	8	49N	79W	WYW147391
24	LAZURITE BERYL CS	3	SWNW	8	49N	79W	WYW147391
25	LAZURITE BERYL CS	5	NESE	8	49N	79W	WYW147391
26	LAZURITE BERYL CS	6	NESW	8	49N	79W	WYW147391
27	LAZURITE BERYL CS	7	SWSW	8	49N	79W	WYW147391
28	LAZURITE BERYL CS	8	SWSE	8	49N	79W	WYW147391
29	LAZURITE BERYL CS	4	SWNE	8	49N	79W	WYW147391
30	LAZURITE BERYL CS	9	NENE	9	49N	79W	WYW147391
31	LAZURITE BERYL CS	11	NESE	9	49N	79W	WYW147391

	WELL NAME	WELL #	QTR	SEC	TWP	RNG	LEASE
32	LAZURITE BERYL CS	14	SWSE	9	49N	79W	WYW147391
33	LAZURITE BERYL CS	10	SWNE	9	49N	79W	WYW147391
34	LAZURITE BERYL CS	12	NESW	9	49N	79W	WYW147391
35	LAZURITE BERYL CS	13	SWSW	9	49N	79W	WYW147391
36	LAZURITE BERYL CS	16	NENW	10	49N	79W	WYW147391
37	LAZURITE BERYL CS	17	SWNW	10	49N	79W	WYW147391
38	LAZURITE BERYL CS	19	SWNE	10	49N	79W	WYW147391
39	LAZURITE BERYL CS	22	SWSE	10	49N	79W	WYW147391
40	LAZURITE BERYL CS	15	NENE	10	49N	79W	WYW147391
41	LAZURITE BERYL CS	18	SWNE	10	49N	79W	WYW147391
42	LAZURITE BERYL CS	20	NESW	10	49N	79W	WYW147391
43	LAZURITE BERYL CS	21	SWSW	10	49N	79W	WYW147391
44	LAZURITE CS	1	NENE	17	49N	79W	WYW147393
45	LAZURITE JADEITE CS	1	NENW	9	49N	79W	WYW137303
46	LAZURITE JADEITE CS	2	SWNW	9	49N	79W	WYW137303

The following impoundment locations were inspected and approved for use in association with the water management strategy for the Lazurite POD.

	Impoundment Name	Qtr/Qtr	Section	Township	Range	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	Feldspar*	SESE	16	49	79	71	8.21	NA
2	Clueless	NWSE	16	49	79	10	1.9	NA
3	Yogi**	SENW	16	49	79	39	6	NA
4	Smokey	SESW	9	49	79	20	6.7	WYW147391
5	Roar Playa	NWSW	9	49	79	33	9.7	WYW147391
6	Rigger	SWNW	9	49	79	13	2.8	WYW137303
7	Lawrence (s)**	NESE	10	49	79	12	2.6	WYW147391
8	Circus*	NWSW	23	49	79	14	4.31	WYW144810
9	Freak Show	NWSW	23	49	79	9.6	2.2	WYW144810
10	High Wire	NESW	23	49	79	4.3	1.2	WYW144810
11	Mole Man*	SWSW	23	49	79	30	5.9	WYW144810

(s)Secondary impoundment
* Existing CBNG impoundment
** Existing Stock

SUMMARY OF SELECTED ALTERNATIVE

All alternatives are described in the Lauzrite EA and Appendix A. The selected alternative includes all elements of Alternative C, modified with additional components from Alternative D, which will alleviate site specific impacts to sage-grouse and their habitat. The following are the components from Alternative D included in the selected alternative:

The following impoundments are not being approved due to resource conflicts.

	Impoundment Name	Qtr/Qtr	Section	Township	Range	Capacity (Acre Feet)	Surface Disturbance (Acres)
1	Steve	NWSW	8	49	79	8.5	3.2
2	Range	NWNE	8	49	79	20	4
3	Middaugh	NWSE	10	49	79	35	5.6
4	Lion Tamer	SWSE	23	49	79	7.5	1.6

The following infrastructure is not being approved due to resource conflicts.

	Infrastructure/facility	Qtr/Qtr	Section	TWP	RNG
1	Utility corridor (gas, water, electric) from the 10BERY well location to the 9BERY well location	NE1/4	9	49N	79W

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 the selected alternative, as summarized above, 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 Landowners.
3. The selected alternative 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. Furthermore, approval of this development will help meet the nation's future needs for energy reserves, and will help to stimulate local economies by maintaining stability for the workforce.
5. The selected alternative incorporates appropriate local sage-grouse research and the best available science from across the species' range in development of the attached conditions of approval. Mitigation measures from the range of alternatives were selected to best meet the purpose and need, and will be applied by the BLM to alleviate environmental impacts.
6. The selected alternative was developed with the recognition that the project area is bisected by Interstate 90 and that the project area is interspersed with a road network consisting of improved and un-improved roads.

7. The selected alternative was developed with the recognition that a portion of the project area is Fee surface owned by the mineral lease holder, and that portions of the analyzed alternatives did not correspond to the desires of the surface owner in the project area. Mitigating measures were selected from the range of alternatives in this context to best meet the Purpose and Need.
8. Approval of this alternative is in conformance with the PRB FEIS, and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office, April 2001 (refer to Appendix E of that document relative to adaptive management).
9. The selected alternative incorporates components of the Wyoming Governor's Sage Grouse Implementation Team's "core population area" strategy and executive order and local research to provide appropriate protections for sage-grouse, while meeting the purpose and need for the Lazurite 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 the selected alternative, and, therefore, an environmental impact statement is not required.

In conformance with Appendix E, *Record of Decision, Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment* BLM Buffalo Field Office has initiated actions within the PRB FEIS analysis area in response to additional information regarding impacts to sage-grouse. These measures include:

1. Early initiation of a Resource Management Plan (RMP) revision, based on the evaluation of monitoring data generated under the mitigation monitoring and reporting plan (MMRP) in the PRB FEIS Record of Decision

2. Establishment of sage-grouse "focus" areas, encompassing approximately 1 million acres of sage-grouse habitat. These areas are managed under strict guidelines designed to preserve sage-grouse habitat for development of alternatives during the RMP process (Appendix 1).

3. Initiation of a population viability analysis in the Powder River Basin. This is a 24-month project involving the USGS, BLM Miles City Field Office, BLM Buffalo Field Office, and the University of Montana.

4. Development of alternatives that modify the proposed action to reflect the best available science in sage-grouse management.

5. Development of conditions of approval, specific to sage-grouse management, that incorporate some recommendations from recent research, the NE Local Sage-grouse Working Group, and the Petroleum Association of Wyoming.

The implementation of the selected alternative best meets the stated purpose and need for the proposed action. With the application of mitigating measures selected from alternatives C and D, sage-grouse population viability in the Powder River Basin will not be compromised due to the larger scope of planning actions and research initiated by the BLM, Buffalo Field Office.

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: 9/10/09

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Yates Petroleum Corporation
Lazurite POD
PLAN OF DEVELOPMENT
WY-070-EA09-095

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose and need of this EA is to determine how and under what conditions to allow Yates to exercise lease rights granted by the United States to develop the oil and gas resources on federal leaseholds as described in their proposed action.

Development of the Lazurite POD wells would return royalties to the federal Treasury as well as stimulate local economies.

Agency Responsibilities
The BLM recognizes the extraction of natural gas is essential to meeting the nation's future needs for energy. As a result, private exploration and development of federal gas reserves are integral to the agencies' oil and gas leasing programs under the authority of the Mineral Leasing Act of 1920, as amended, and the Federal Land Policy Management Act (FLPMA) of 1976. The oil and gas leasing program managed by BLM encourages the development of domestic oil and gas reserves and reduction of the U.S. dependence on foreign sources of energy.

This action helps move the project area toward desired conditions for mineral development with appropriate mitigation consistent with the goals, objectives and decisions outlined in the 1985 Buffalo RMP and the PRB FEIS.

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

The proposed action conforms to the terms and the conditions of the 1985 Buffalo RMP and the PRB FEIS, as required by 43 CFR 1610.5. The BFO RMP is currently under revision.

For the RMP revision, BFO established sage-grouse focus areas with rigorous interim protections in order to preserve "decision space" during the revision process. Outside the focus areas, BFO continues to apply appropriate, but far less rigorous, site-specific mitigating measures for high-quality sage-grouse habitat with well densities up to 80-acre spacing, and may include site-specific mitigating measures suggested by the best available science. Actions within BFO focus areas will be limited to impacts consistent with 640 acre spacing, and must have a plan of development that demonstrates that the proposal can be managed in a manner that effectively conserves sage-grouse habitats affected by the proposal.

The Lazurite POD does not occur within a core or focus area. However, high quality sage-grouse habitat, as indicated by the University of Montana model, occurs throughout the project area.

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Four alternatives, A, B, C and D, were evaluated in determining how to best meet the stated purpose and need of the proposed action. A brief description of each alternative follows. For the complete detailed description of each alternative, including the alternatives considered but not analyzed in detail, see Appendix A.

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

Alternative B, the "proposed action" alternative, summarizes the Lazurite Project as originally submitted to the BLM by Yates Petroleum Corporation, prior to any BLM review or modifications. See Appendix A for full description.

2.3. Alternative C – Modified Proposed Action

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 Lazurite POD are described in detail in the Appendix A

Alternative C also incorporates the results of sage-grouse habitat mapping efforts in the project area and on-site verification of habitat suitability. This alternative represents BFO efforts to reduce project-specific impacts to sage-grouse habitat, while maintaining proposed spacing and infrastructure requirements consistent with the purpose and need of the proposed action.

2.4. Alternative D - Sage-Grouse Emphasis

Alternative D represents a modification of Alternative C based on the application of additional mitigating measures designed to reduce impacts to sage-grouse and sage-grouse habitat. Alternative D is the same as Alternative C with the addition of project modifications identified by BLM, guided by seven years of sage-grouse research in the project area and additional studies from across the species' range. Alternative D also represents BFO efforts to reduce project-specific impacts to sage-grouse habitat, while maintaining proposed spacing and infrastructure requirements consistent with the purpose and need of the proposed action.

In conjunction with project-level modifications, site-specific measures applied for specific wells and infrastructure would maintain open corridors for sage-grouse and provide contiguous habitat patches. This alternative incorporates mitigation designed around site-specific habitat characteristics to minimize habitat fragmentation and accelerate return to habitat effectiveness at reclamation.

The specific changes identified for the Lazurite POD are described in detail in Appendix A.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on October 5, 2007. Field inspections of the proposed LazuritePOD CBNG project were conducted on December 3-5,9-10 and Janurary 6, by:

NAME	TITLE	AGENCY
Bob Irwin	Federal Regulatory Agent	Yates Petroleum
Ray McConnell	Drilling Supervisor	Yates Petroleum
Tim Barber	Federal Regulatory Supervisor	Yates Petroleum
LD Gilbert	Landman/Landowner Representative	Yates Petroleum
Dennis Camino	Landman	Yates Petroleum
Trent Knez	Drilling Supervisor	Yates Petroleum
Tony Wylie	Wildlife/Hydrologist	Yates Petroleum
Bruce Barton	Landowner	
Dave Belus	Landowner, lessee	
Don Brewer	Wildlife Biologist	BLM
Courtney Frost	Wildlife Biologist	BLM
Clint Crago	Archaeologist	BLM
Eric Holborn	Natural Resource Specialist	BLM
Kathy Brus	Hydrologist	BLM

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		Don Brewer
Floodplains		X		Eric Holborn
Wilderness Values			X	Eric Holborn
ACECs			X	Eric Holborn
Water Resources	X			Kathy Brus
Air Quality	X			Eric Holborn
Cultural or Historical Values	X			Clint Crago
Prime or Unique Farmlands			X	Eric Holborn
Wild & Scenic Rivers			X	Eric Holborn
Wetland/Riparian		X		Eric Holborn
Native American Religious Concerns			X	Clint Crago
Hazardous Wastes or Solids		X		Eric Holborn
Invasive, Nonnative Species	X			Eric Holborn

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Environmental Justice		X		Eric Holborn

3.1. Topographic Characteristics of Project Area

The Lazurite project is located in Johnson County approximately 20 miles E of Buffalo, WY.
The Lazurite Plan of Development area is located in central Johnson County, Wyoming, immediately north and south of Interstate-90's Schoonover Road exit. The area is semi-badland country with many erosional features (buttes, badlands, isolated mountains, break valleys, and canyons) and sparse vegetation. The elevation changes and presence of woody species provide a windbreak effect while also capturing additional moisture; therefore, all gradations of cover, from semi-desert to woodland, are supported.

This is an area of extensive existing CBNG development, as well as some existing conventional oil and gas production. Most of the roads which will be used for access to the proposed wells were constructed or improved to accommodate the current Fee or State of Wyoming lands production and/or existing cattle operations. One main access point to several Lazurite wells is part of a working agreement that consolidates infrastructure and access between multiple operators.

Approximately one half of the land surface within the POD is privately or state held; the rest is federal surface. Each of these tracts is leased for grazing by an adjacent landowner.

3.2. Vegetation & Soils

Soils have developed in alluvium and residuum derived from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams. Soils have surface and subsurface textures of silt loam and fine sandy loam. Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Soils are generally productive, though vary with texture, slope and other characteristics. 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.

Soils within the project area were identified from the North Johnson County Survey Area, Wyoming (WY719). The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. The main soil limitations include: depth to bedrock, low organic matter content, droughtiness, and high erosion potential especially in areas of steep slopes. Most of the area within the boundary of the proposed action contains soil mapping units comprised of soils having slight or moderate water erosion hazard. Even with loamy soils and good reclamation potential, proper planning and minimizing soil disturbance will help ensure disturbance will be short term and help set the course for final reclamation objectives with the development of this project.

The map unit symbols within this project area were filtered and map units representing 4.0% or greater in extent within the pod boundary are displayed. Dominant soil map units are listed in the table below with their individual acreage and percentage of the area within the POD boundary.

Table 3.2 Dominant soils affected by the proposed action include:

Map Unit Symbol	Map Unit Name	Acres	Percent
709	Theedle-Shingle loams, 3 to 30 percent slopes	2464.2	34%
708	Theedle-Kishona-Shingle loams, 3 to 30 percent slopes	1068.6	15%
623	Parmleed-Bidman fine sandy loams, 3 to 15 percent slopes	1040.1	15%

Map Unit Symbol	Map Unit Name	Acres	Percent
687	Savageton-Samday clay loams, 3 to 15 percent slopes	967.5	14%
715	Ulm-Renohill clay loams, 6 to 15 percent slopes	362.5	5%
667	Renohill-Savageton clay loams, 3 to 15 percent slopes	297.0	4%

For more detailed soil information, see the NRCS Soil Survey 719 – North Johnson County.
Additional site specific soil information is included in the Ecological Site interpretations.

3.2.1. Vegetation

Ecological Site Descriptions are used to provide site and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information.
The map unit symbols for the soils identified above and the associated ecological sites for the identified soil map unit symbols found within the POD boundary are listed in the table below.

Table 3.3 Map Units and Ecological Sites

Map Unit Symbol	Ecological Sites
709	Loamy (10-14" ppt. zone) Northern Plains
708	Loamy (10-14" ppt. zone) Northern Plains
623	Loamy (10-14" ppt. zone) Northern Plains
687	Clayey (10-14" ppt. zone) Northern Plains
715	Clayey (10-14" ppt. zone) Northern Plains
667	Clayey (10-14" ppt. zone) Northern Plains

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure are Loamy and Clayey, Northern Plains 10-14” precipitation zone:

Loamy Sites occur on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10-14 inch precipitation zone. These soils are moderately deep to very deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability. The present plant community is Western Wheatgrass/Cheatgrass. Rhizomatous wheatgrasses and annuals dominate the site. Cool-season mid-grasses are decreasing and being replaced by cheatgrass. Dominant vegetation includes Blue grama, Plains Pricklypear, cheatgrass and Bare Ground.

Clayey Sites occur on nearly level to steep slopes on landforms which include hill sides, alluvial fans and stream terraces in the 10-14”precipitation zone. The soils of this site are moderately deep to very deep (greater than 20” to bedrock), well-drained soils that formed in alluvium or alluvium over residuum derived calcareous shale. These soils have slow permeability. The bedrock is clay shale which is virtually impenetrable to plant roots. The present plant community is a Mixed Sagebrush/Grass. Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include rhizomatous wheatgrasses, green needlegrass, blue grama, and prairie junegrass. Forbs include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, and scarlet globemallow. Fringed sagewort and plains pricklypear and also occur. Cheatgrass has invaded the state.

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

Table 3.4 Summary of Ecological Sites

Ecological site	Acres	Percent
Loamy (Ly) 10-14 inch Northern Plains	5153.8	72%
Clayey (Cy) 10-14 inch Northern Plains	1727.1	24%
Shallow Clayey (SwCy) 10-14inch Northern Plains	169.6	2%
Shallow Loamy (SwLy) 10-14inch Northern Plains	92.3	1%

3.2.2. Wetlands/Riparian

This project boundary encompasses the headwaters of several major tributaries to Crazy Woman Creek and the Upper Powder River. Timber Draw skirts the southwest boundary and several deeply incised unnamed drainages contribute to Grub Draw in the north. Both of these draws are tributary to Crazy Woman Creek. Indian Creek, tributary to the Upper Powder River, quickly becomes deeply incised in the southeast portion of the POD. These drainages are ephemeral in these reaches and dry most of the year. However, small areas of riparian vegetation exist sporadically at scoured potholes scattered along the channels. Where existing stock water impoundments have persistently leaked, minimal riparian type vegetation (such as isolated cottonwood trees) has established.

3.2.3. Invasive Species

The following state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of inventory databases on the Wyoming Energy Resource Information Clearinghouse (WERIC) web site. The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. (www.weric.info):

- Spotted knapweed

Additionally the operator consulted with Johnson County Weed and Pest Office (JCWPO) concerning noxious and problem weeds specific to the Lazurite POD area. The following species were identified from state and/or county designated noxious weed lists:

- Leafy spurge
- Saltcedar
- Canada thistle
- Buffalobur
- Cocklebur
- Scotch thistle
- Musk thistle
- Wild licorice
- Common mullein

The onsites were conducted during the early winter, due to this, the operator and BLM did not confirm any WRIC identified infestations or document additional weed species.

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).

3.2.4. Visual Resource Management

The presence of a major interstate highway through the project area makes VRM a concern for this project. The entire POD area has been inventoried and established as: VRM Class III (PRB FEIS p.3-253). The objective is to provide for management activities that may contrast with the basic landscape

elements, but remain subordinate to the existing landscape character. Activities may be visually evident, but should not be dominant. The surrounding landscape has extensive non-federal oil & gas development as well as communications infrastructure on private and state surface.

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 Tony Wyllie of Yates Petroleum Corporation and Thunderbird Wildlife Consulting, Inc. (2007 2008 2009). Mr. Wyllie performed surveys for mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol in 2007 and 2008. No formal surveys were conducted for bald eagles or Ute's ladies' tresses orchid, as no suitable habitat exists for either species. There are no stands of cottonwoods or conifers in the project area for bald eagles to roost. There are no perennial drainages within the area to support Ute ladies' tresses. PRB IWG accepted protocol is available on the CBM Clearinghouse website (www.cbmclearinghouse.info).

BLM biologists conducted field visits on December 3, 4, 5 and 12, 2008 and on January 6, 2009. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.
Wildlife species common to the habitat types present are identified in the PRB FEIS (pg. 3-114). Species 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 Lazurite project area include pronghorn antelope and mule deer. Pronghorn antelope were seen during the onsite inspections in sections 9, 10, 17 and 22. Mule deer were seen in sections 8, 9, 15, 17 and 24. The WGFD has determined that the project area contains Yearlong range for pronghorn antelope and mule deer.

Yearlong use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions. Populations of pronghorn antelope and mule 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 Crazy Women and Indian Creeks. No springs have been identified within the project area. Crazy Women and Indian Creeks are tributaries to the Powder River. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

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

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

3.3.4. Raptors

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

Sixteen raptor nest sites were identified by Tony Wyllie (2008) and BLM within 0.5 mile of the project area. Of these, four nests were active in 2008.

Table 3.5 Documented raptor nests within the Lazurite POD project area.

BLM_ID	UTME	UTMN	Legal	Substrate	Year	Condition	Status	Species
435	389012	4895460	S20 T49N R79W	Cottonwood (live)	2008	Poor	INACTIVE	n/a
					2007	Good	ACTIVE	Great-Horned Owl
462	393026	4896831	S15 T49N R79W	Cottonwood (live)	2007	Gone	INACTIVE	n/a
					2008	Gone	INACTIVE	n/a
3013	394118	4894350	S26 T49N R79W	Cottonwood (live)	2004	Poor	INACTIVE	n/a
					2005	Unknown	INACTIVE	n/a
					2006	Good	INACTIVE	n/a
					2007	Fair	INACTIVE	n/a
					2008	Poor	INACTIVE	n/a
3014	394144	4894485	S26 T49N R79W	Cottonwood (live)	2004	Good	ACTIVE	Red-Tailed Hawk
					2005	Fair	INACTIVE	n/a
					2006	Good	ACTIVE	Red-Tailed Hawk
					2007	Unknown	ACTIVE	Red-Tailed Hawk
					2008	Good	ACTIVE	Red-Tailed Hawk
3015	394034	4894813	S23 T49N R79W	Cottonwood (live)	2004	Poor	INACTIVE	n/a
					2005	Unknown	INACTIVE	n/a
					2006	Good	INACTIVE	n/a
					2007	Good	ACTIVE	Great-Horned Owl
					2008	Fair	INACTIVE	n/a
3016	395078	4894573	S25 T49N R79W	Cottonwood (live)	2008	Poor	INACTIVE	n/a
3022	395082	4895437	S24 T49N R79W	Cottonwood (live)	2008	Good	ACTIVE	Great-Horned Owl
4150	389125	4898981	S8 T49N R79W	Cottonwood (live)	2006	Excellent	ACTIVE	Red-Tailed Hawk
					2006	Good	ACTIVE	Red-Tailed Hawk
					2007	Good	ACTIVE	Red-Tailed Hawk
					2008	Good	ACTIVE	Red-Tailed Hawk
5109	392068	4899671	S3 T49N R79W	Juniper	2007	Fair	INACTIVE	n/a
					2008	Unknown	INACTIVE	n/a
5110	391875	4899599	S3 T49N R79W	Juniper	2007	Poor	INACTIVE	n/a
					2008	Unknown	INACTIVE	n/a
5111	389739	4900220	S5 T49N R79W	Cottonwood (live)	2007	Good	ACTIVE	Red-Tailed Hawk

BLM_ID	UTME	UTMN	Legal	Substrate	Year	Condition	Status	Species
					2008	Gone	INACTIVE	n/a
5112	389328	4898478	S8 T49N R79W	Cottonwood (live)	2007	Good	ACTIVE	Great-Horned Owl
					2008	Fair	INACTIVE	n/a
5113	387954	4897059	S18 T49N R79W	Cottonwood (live)	2007	Good	ACTIVE	Great-Horned Owl
					2008	Good	INACTIVE	n/a
5114	388018	4896978	S18 T49N R79W	Cottonwood (live)	2007	Good	ACTIVE	American Kestrel
					2008	Good	ACTIVE	American Kestrel
5115	388166	4896832	S18 T49N R79W	Cottonwood (live)	2007	Fair	INACTIVE	n/a
					2008	Fair	INACTIVE	n/a
6056	391648	4895985	S22 T49N R79W		2007	Unknown	Active	Burrowing Owl

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 2004, the WGFD identified six prairie dog complexes (Arvada, Sheridan, Pleasantdale, Four Corners, Linch, Kaycee, and, Thunder Basin National Grasslands) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Grenier et al. 2004).

This nocturnal predator is closely associated with prairie dogs, depending almost entirely upon them for its food. The ferret also uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1,000 acres of black-tailed prairie dog colonies, separated by no more than 1.5 km, 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); therefore, no ferret surveys were required or conducted.

Three active black-tailed prairie dog colonies were identified during site visits by Tony Wyllie within the project area (see table below for the location and size of the colonies). All of the colonies are over one mile from each other. The project area is located approximately 14.3 miles from the Four Corners complex, the nearest potential reintroduction area. Black-footed ferret habitat is not present within the Lazurite project area.

Table 3.6 Prairie dog towns in the Lazurite POD (All in Township 49 North, Range 79 West).

LOCATION	SIZE
SE SW Section 17	2 acres
SE Section 7 and SW Section 8	19.7 acres
NE Section 22	98.4 acres

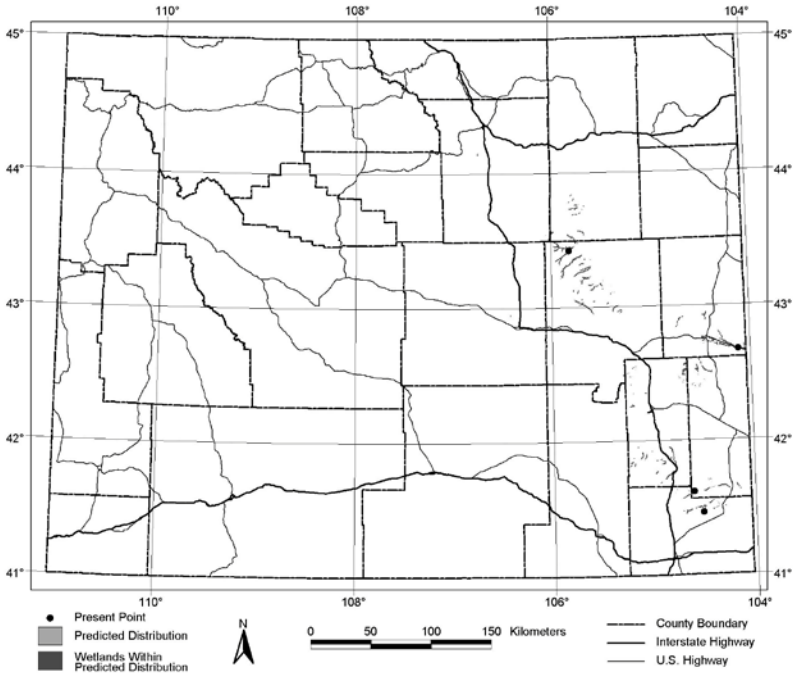
3.3.5.1.2. Blowout Penstemon

Blowout penstemon is a regional endemic species of the Sand Hills of west-central Nebraska and the northeastern Great Divide Basin in Carbon County, Wyoming. Suitable blowout penstemon habitat consists of sparsely vegetated, early successional, shifting sand dunes and blowout depressions created by wind (BLM 2005). In Wyoming, the habitat is typically found on sandy aprons or the lower half of steep sandy slopes deposited at the base of granitic or sedimentary mountains or ridges. The Lazurite project area does not contain areas with these characteristics, and blowout penstemon is not expected to occur.

3.3.5.1.3. Ute Ladies'-Tresses Orchid

Ute ladies'-tresses orchid (ULT) is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Wyoming Natural Diversity Database model predicts undocumented populations may be present particularly within southern Campbell and northern Converse Counties. In Wyoming, ULT blooms from early August to early September, with fruits produced in mid August to September (Fertig 2000).

Figure 1. Predicted Distribution of Ute ladies'-tresses in Wyoming



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 Wind Creek and 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.

All drainages in the project are ephemeral and no springs have been documented. Suitable orchid habitat is not present within the Lazurite project area.

3.3.5.2. Sensitive Species

BLM Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. Two habitat types – prairie dog colonies and sagebrush ecosystems – are the most common within the Powder River Basin and contain habitat components required in the life cycle of several sensitive species. The species associated with these ecosystems are described below in general terms. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are also described in more detail in this section. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.3.5.2.1. Prairie dog colony obligates

Prairie dog colonies create habitat for many species of wildlife (King 1955, Reading et al. 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 et al. 1989) suggest that species richness increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of 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, McCracken et al. 1985, Agnew 1986, Deisch et al. 1989). Of those species regularly associated with prairie dog colonies, six are on the Wyoming BLM sensitive species list: swift fox (*Vulpes velox*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), and long-billed curlew (*Numenius americanus*

3.3.5.2.2. Sagebrush obligates

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

3.3.5.2.3. Bald Eagle

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

Bald eagle nesting habitat is generally found in areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin,

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

There are no stands of cottonwood trees in the project area. The area may be used by bald eagles for foraging but there is no suitable winter roosting or nest habitat. The western border of the Lazurite POD is approximately 1.2 miles from Crazy Women Creek, the nearest suitable area for winter roosting or nesting. There are no records of bald eagle sightings in the project area.

3.3.5.2.4. Black-tailed prairie dog

The black-tailed prairie dog was added to the list of Candidate species for federal listing on February 4, 2000 (USFWS 2000). On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog's Candidate status. BLM Wyoming considers prairie dogs as a sensitive species and continues to afford this species the protections described in the PRB FEIS. The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains.

Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented, and isolated (Miller 1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations, and other problems, such as landowner poisoning and disease that affect long term population viability (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994).

The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of Sylvatic plague and the extent of control efforts by landowners. Comparisons with 1994 Digital Ortho Quads indicated that black-tailed prairie dog acreage remained stable from 1994 through 2001. However, aerial surveys conducted in 2003 to determine the status of known colonies indicated that a significant portion (approximately 47%) of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier 2004).

Three black-tailed prairie dog colonies, totaling approximately 120.1 acres were identified during site visits by Tony Wyllie within the project area. The location and size of the colonies are found in Table 3.6.

3.3.5.2.5. Burrowing owl

The burrowing owl is a small, long-legged owl found throughout open landscapes of North and South America. Burrowing owls can be found in grasslands, rangelands, agricultural areas, deserts, or any dry open area with low vegetation where abandoned burrows dug by mammals such as ground squirrels (*Spermophilus spp*.), prairie dogs (*Cynomys spp.),* and badgers (*Taxidea taxus*) are available. Black-tailed prairie dog colonies provide the primary habitat for burrowing owls (Klute et al. 2003).

The western burrowing owl has declined significantly throughout its North American range. Current population estimates for the United States are not well known but trend data suggest significant declines (McDonald et al. 2004). The last official population estimate placed them at less than 10,000 breeding pairs. The majority of the states within the owl's range have recognized that western burrowing owl populations are declining. It is listed as a sensitive species by the BLM throughout the west and by the USDAFS. Primary threats across the North American range of the burrowing owl are habitat loss and fragmentation primarily due to intensive agricultural and urban development, and habitat degradation due to declines in populations of colonial burrowing mammals (Klute et al. 2003).

Burrowing owl nesting habitat consists of open areas with mammal burrows. Individual burrowing owls have moderate to high site fidelity to breeding areas and even to particular nest burrows (Klute et al. 2003). Burrow and nest sites are reused at a higher rate if the bird has reproduced successfully during the previous year. Favored nest burrows are those in relatively sandy sites (possibly for ease of modification and drainage), areas with low vegetation around the burrows (to facilitate the owl's view and hunting success), holes at the bottom of vertical cuts with a slight downward slope from the entrance, and slightly elevated locations. In Wyoming, egg-laying begins in mid-April. Incubation is assumed to begin at the mid-point of the laying period and lasts for 26 days (Olenick 1990). Young permanently leave the primary nest burrow around 44 days from hatch (Landry 1979). Juveniles will continue to hunt with and associate with parents until migration (early September through early November) (Haug 1985).

The BLM BFO database indicates a burrowing owl nest in the NW NW Section 22 T49N, R79W approximately 0.15 miles south of the project area (see raptor Table).

3.3.5.2.6. Greater sage-grouse

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003). The greater sage-grouse is listed as a sensitive species by BLM (Wyoming). In recent years, several petitions have been submitted to the USFWS to list greater sage-grouse as Threatened or Endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was “not warranted” following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse. In 2007, the U.S. District Court remanded that decision, stating that the USFWS’ decision-making process was flawed and ordered the USFWS to conduct a new Status Review as a result of a lawsuit and questions surrounding the 2005 review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

The BFO has taken several steps to consider the evolving information on impacts to sage-grouse which could result from development activities on federal lands. These steps include:

- February 2008: BFO consolidates research and data to identify high-quality sage-grouse habitat in the basin. BFO, in conjunction with the University of Montana, developed models indicating "high-quality" habitat using topographic and vegetative criteria and habitat selection by radio-collared birds to identify areas with high potential for use by nesting/wintering birds. The models are divided into habitat categories of 1 through 5, with 5 being "excellent" habitat. Categories 1 & 2 are not considered suitable habitat. Category 3 may have the vegetative components necessary for suitable habitat. Categories 4 & 5 have the vegetative components for suitable habitat, and meet criteria for topography, slope and other landscape level characteristics that were indicated through analysis of radio-collared sage-grouse. The 4 and 5 categories of habitats are considered "high-quality".

- March, 2008: BFO, Wyoming State Office (WYSO) and WO establish the need for a Resource Management Plan (RMP) approach to evaluate impacts to sage-grouse and habitat; RMP amendment or revision discussed. Decision to begin a RMP revision is approved two years ahead of original schedule.

- May 28, 2008: BFO conducts public meeting to present habitat information developed through research in the Powder River Basin. BFO solicits additional information from the public and interested energy development companies to refine sage-grouse habitat maps. Objective is to establish areas of interim management for sage-grouse to preserve “decision space” during the RMP process.

- August 13, 2008: BFO releases "Guidance for general management actions during BFO Resource Management Plan Revision" and a map identifying the "focus areas". The guidance contains criteria for any proposed development in focus areas (Appendix 1). For fluid minerals, this guidance includes the following requirement; "The proponent will be asked to demonstrate that the proposal can be managed in a manner that effectively conserves sage-grouse habitats (in focus areas) affected by the proposal." The guidance also states that "Efforts will be made to assure that the impacts of surface disturbing projects will be consistent with a well pad density of 640 acres." Efforts to minimize impacts to high-quality sage-grouse habitats outside the focus areas will be far less restrictive, with well densities up to 80-acre spacing, but may include site-specific mitigating measures suggested by the best available science.

- Concurrent with BFO efforts, on August 1, 2008, the Governor of the State of Wyoming issued an Executive Order (EO 2008-2) mandating special management for all lands within sage-grouse "core population areas." Lands for special management were identified by the Wyoming Governor's Sage-Grouse Implementation Team, and generally follow the boundaries of the majority of the focus areas identified by the BFO. This team also recommended stipulations to be placed on development activities on state lands to ensure existing habitat function is maintained within those areas. EO 2008-2 also identifies objectives outside of core areas, "…development scenarios should be designed and managed to maintain populations, habitats and essential migration routes outside core population areas."

- August 13, 2008 – Present: BFO crafts updated impacts assessment to be included in all project analysis affecting sage-grouse habitat. This analysis includes research conducted in the Powder River Basin and other sage-grouse research published since the 2003 PRB EIS ROD. Analysis explicitly tied impacts to the impacts accepted under the 2003 ROD.

- October 1, 2008: BFO officially begins the RMP revision. This process was accelerated by two years to more rapidly assess impacts to sage-grouse.

- April 14, 2009: BFO/WYSO enters into agreement with University of Montana and the Miles City FO to conduct a population viability analysis in the PRB. Emphasis will be on the adequacy of BFO focus areas for maintenance of a persistent sage-grouse population. Information gathered will be used in developing alternatives for the RMP revision.

- May, 2009: The Wyoming Game and Fish Department releases, " Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats", which further describes management objectives for sage-grouse outside core areas; "Non-core areas should not be construed as "sacrifice areas" since this conservation strategy requires habitat connectivity and movement between populations in core areas. The goal in non-core areas is to maintain habitat conditions that will sustain at least a 50% probability of lek persistence over the long term."

In conformance with Appendix E, *Record of Decision, Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment* BLM Buffalo Field Office has initiated actions within the PRB FEIS analysis area in response to additional information regarding impacts to sage-grouse. These measures include:

- Early initiation of a Resource Management Plan (RMP) revision, based on the evaluation of monitoring data generated under the mitigation monitoring and reporting plan (MMRP) in the PRB FEIS Record of Decision.

- Establishment of sage-grouse "focus" areas, encompassing approximately 1 million acres of sage-grouse habitat. These areas are managed under strict guidelines designed to preserve sage-grouse habitat for development of alternatives during the RMP process (Appendix 1).

- Initiation of a population viability analysis in the Powder River Basin. This is a 24-month project involving the USGS, BLM Miles City Field Office, BLM Buffalo Field Office, and the University of Montana.

- Development of alternatives that modify the proposed action to reflect the best available science in sage-grouse management.

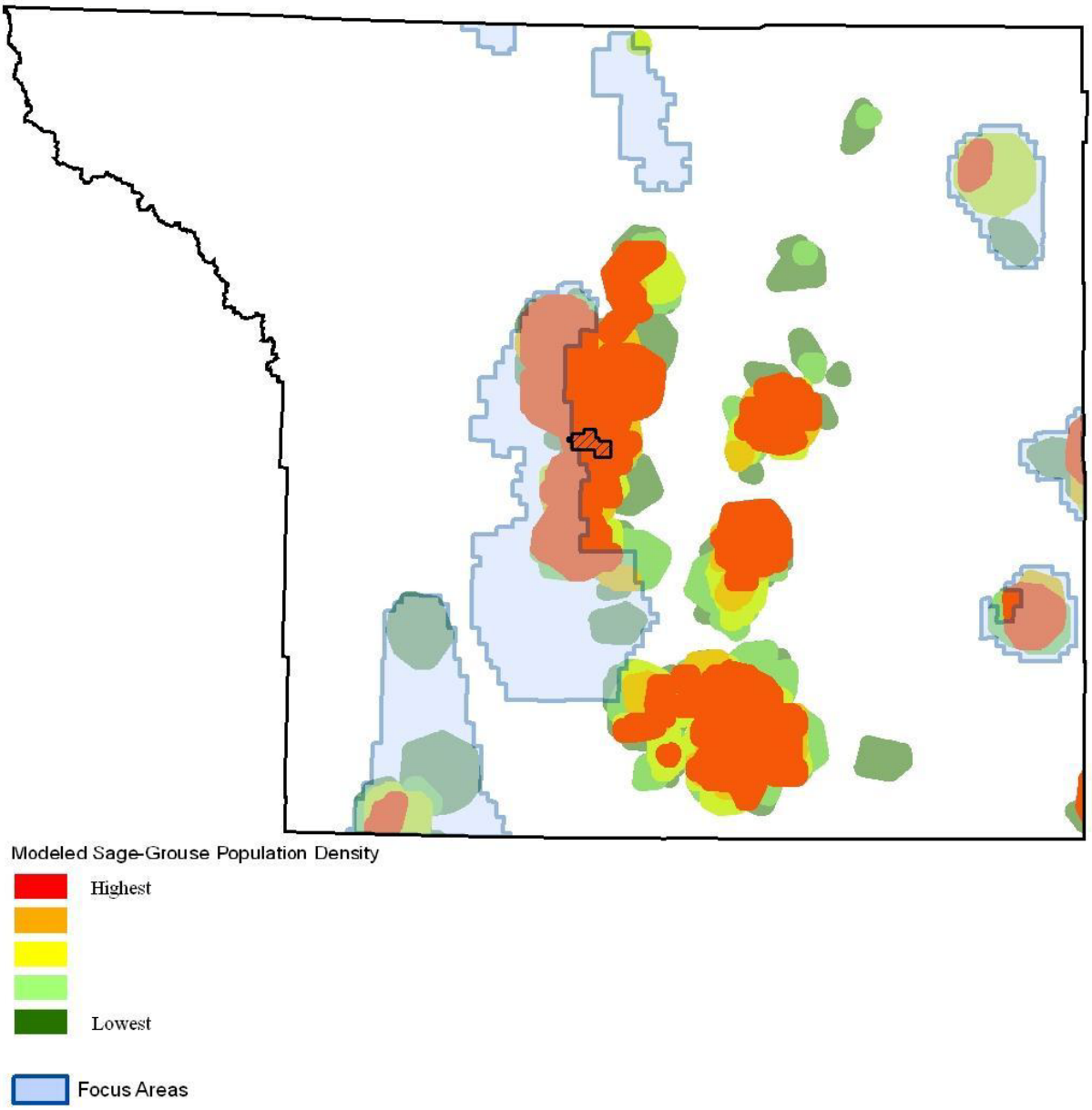
- Development of conditions of approval, specific to sage-grouse management, that incorporate some recommendations from recent research, the NE Local Sage-grouse Working Group, and the Petroleum Association of Wyoming.

The 2003 PRB EIS significance threshold and population viability assumptions are based on the analysis that sufficient functioning habitat for sage grouse will remain to support population viability within the project area. The six areas identified as BFO sage-grouse Focus Areas assume that sufficient amounts of good quality sage-grouse habitat remains unfragmented by energy or other man-made infrastructure; it is also assumed that the fragmented portions in the "energy areas" of sage-grouse habitat provide for the necessary breeding, feeding and sheltering components to sustain sage-grouse habitat connectivity.

These basic concepts for management are based on the assumptions that sufficient "islands" of undisturbed (by human infrastructure) sage-grouse habitat would remain to sustain a large enough sage-grouse population for the long-term, and be surrounded by the planned major management activities (MMAs) in the PRB (for sage-grouse in the PRB, the MMAs are livestock grazing and energy development)[1]. Research on sage-grouse in the PRB was initiated to determine what direct, indirect and cumulative impacts energy development would have on both sage-grouse habitat and its constituent resident population.

Although the Lazurite project area met the criteria based on habitat qualities and population density to be included in an interim management area for the Powder River Basin, the habitat area has been fragmented (Naugle, 2006). Fragmentation is, and has been, caused by the area being bisected by Interstate 90 and by an extensive road network consisting of improved and un-improved roads supporting Fee and Federal mineral development. The western edge of the project area borders a focus area and is within a high sage-grouse population density area (Doherty 2008) (Figure 2). High density sagebrush is present in patches throughout the project area. Much of the project area contains large stands of sagebrush and moderate topography. All of the project area meets seasonal habitat requirements and is large enough to meet the landscape scale requirements of the bird (BLM 2008). Sage-grouse habitat models indicate that all of the project area contains high quality sage-grouse nesting habitat and high quality sage-grouse wintering habitat (Walker et al. 2007).

Figure 2. Lazurite POD in relationship to Powder River Basin Sage-Grouse Population density and Focus Areas.



At the onsite, BLM biologists found sage-grouse sign near the 8 Olivine well in SE SW Section 24 T49N, R79W. Much of the area was covered with snow during the on-sites. Tony Wylie, the Yates biologist, observed sage grouse in the vicinity of 15 and 16 Beryl wells in June 2007 and found sign throughout the project area. BLM records identified 13 sage-grouse leks within 4 miles of the project area. The 4-mile distance was recommended by the State wildlife agencies' ad hoc committee for consideration of oil and gas development effects to nesting habitat (WGFD 2008). These 13 lek sites are identified below (Table 3.7).

Table 3.7 Sage-grouse leks surrounding the Lazurite project area.

Lek Name	Legal Location	Occupancy and Activity Status (Year/Peak Males)	Distance From Project Area (miles)
Flying E Creek	NE SE Sec. 11 T49N, R79W	‘01/0, ‘02/0, ‘03/0, ‘04/37, ‘05/32, ‘06/56, ‘07/56, ‘08/43	0.46
BLM	SE Sec. 36 T50N, R79W	‘85/38, ‘86/37, ‘95/0, ‘00/0, ‘02/0, ‘03/0, ‘04/0, ‘05/9, ‘06/20, ‘07/15, ‘08/4	1.67
Ploessers Dry Lake	SE SW Sec. 35 T49N, R79W	‘00/10, ‘02/0, ‘03/0, ‘04/14, ‘05/8, 06/1, ‘07/0, ‘08/0	1.85
South Grub Draw	SW SE Sec. 29 T50N, R79W	‘02/8, ‘04/6, ‘05/8, ‘06/3, ‘07/9, ‘08/0	1.87
Morris Draw	NW NW Sec. 31 T49N, R79W	‘00/40, ‘01/11, ‘02/5, ‘03/12, ‘04/10, ‘05/13, ‘06/21, ‘07/35, ‘08/26	2.03
North Grub Draw	SW SE Sec. 29 T50N, R79W	‘05/9, ‘06/11, ‘07/10, ‘08/11	2.15
Upper Dry Creek Road I	NW NE Sec. 27 T50N, R79W	‘01/0, ‘04/2, ‘05/2, ‘06/0, ‘07/7, ‘08/7	2.34
Indian Creek II	SE SE Sec. 32 T49N, R78W	‘04/4, ‘05/16, ‘06/15, ‘07/15, ‘08/9	2.75
Indian Creek IV	SE SE Sec. 1 T48N, R79W	‘04/7, ‘05/2, ‘06/1, ‘07/0, '08/0	3.00
Tear Drop	SE NE Sec. 33 T50N, R78W	‘06/13, ‘07/8, ‘08/4	3.40
Cat Creek 1	NE NW Sec. 9 T48N, R79W	‘00/35, ‘01/15, ‘02/19, ‘03/14, ‘04/10, ‘05/10, ‘06/24, ‘07/12, ‘08/5	3.43
Tear Drop II	NW SE Sec. 32 T50N, R78W	‘06/14, ‘07/15, ‘08/13	3.64
Upper Dry Creek Road II	SW NW Sec. 14 T50N, R79W	‘04/24, ‘05/69, ‘06/55, ‘07/51, ‘08/34	3.85

3.3.5.2.7. Sharp-tailed grouse

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

The Lazurite project area has the potential to support sharp-tailed grouse during most of the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October. Juniper trees could provide buds and berries, respectively, to sustain grouse through the winter. No sharp-tailed grouse leks have been identified in the project area, nor were any birds sighted during field visits.

3.3.5.2.8. Mountain plover

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

Most of the project area is either covered in dense sage brush stands or is too steep to be suitable for mountain plovers. Locations within the project area that may be suitable for mountain plovers incude: black-tailed prairie dog colonies in the NW Section 22, SW Section 8, and SESW Section 17 (see Table 3.6) ; and two small, relatively flat areas free of tall vegetation in SE Section 16 and NW SE Section 17. The latter two areas had a large amount of grass growth in 2008.

3.4. West Nile Virus

There are 15 reservoirs proposed in the Lazurite POD.

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 3.8 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007*	155	22	Unk	1
2008*	10	0	0	0

*Wyoming Department of Health Records.

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

This project area boundary encompasses the headwaters of several major tributaries to Crazy Woman Creek and the Upper Powder River. Timber Draw skirts the southwest boundary and several deeply incised unnamed drainages contribute to Grub Draw in the north. Both of these draws are tributary to Crazy Woman Creek. Indian Creek, tributary to the Upper Powder River, quickly becomes deeply incised in the southeast portion of the POD. These drainages are ephemeral in these reaches and dry most of the year.

3.5.1. Groundwater

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 13 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 147 to 1220 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).

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 CBNG impoundments, and;
- Shallow groundwater wells would be installed and monitored where necessary.

3.5.2. Surface Water

The project area is divided between the Crazy Woman Creek (primary) and the Upper Powder River (secondary) watersheds. The tributaries to both of these waters are ephemeral in this area (flowing only in response to a precipitation event or snow melt). The upper reaches of the drainages quickly become incised with steep sides, but the channels area primarily vegetated grassy swales, without defined bed and bank. The exception is the Indian Creek drainage where there are isolated areas with definite channel and floodplain. There are occasional small erosion features (23 head cuts less than 3 feet deep) that have been documented in the drainages within the POD boundary.

There are seven existing impoundments within the POD area. Five of these impoundments were constructed for water management for fee CBNG production. Two others were old unpermitted stock impoundments, one of which is proposed to be improved for CBNG water management. Several natural playas that are smaller than 10 acres in size exist with the POD boundary.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBNG produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). These values for the primary and secondary watersheds are listed below.

Monitoring Location	**TDS, mg/l**	**SAR**	**EC,** µmhos/cm
Clear Creek Watershed (Primary) near Arvada, WY USGS #06324000 Gauging Station			
Historic Data Average at Maximum Flow		1.29	1,066
Historic Data Average at Minimum Flow		2.26	1,937
Upper Powder River Watershed (Secondary) at Arvada, WY USGS #06317000 Gauging Station			
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	3,400

The operator found no natural springs within this POD boundary.

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

3.6. Economics and Recovery of CBNG Resources

Development of this project would have effects on the local, state, and national economies. Based on the estimates in the PRBEIS, the drilling of the 46 proposed wells in the Lazurite POD will generate approximately 0.35 billion cubic feet of gas (BCFG) per well, over the life of the well. Actual revenue from this amount of gas is difficult to calculate, as there are several variables contributing to the price of gas at any given time. Royalties from the gas produced in the Lazurite POD could have wide-ranging benefits. The federal government collects 12.5% of the royalties from all federal wells, which helps offset the costs of maintaining the federal agencies that oversee permitting. In addition to generating federal income, approximately 49% of the royalties from the Lazurite wells would return to the State of Wyoming. This revenue from mineral development has contributed to Wyoming's strong economy for the past several years, allowing for improvements in state funded programs such as infrastructure and education. The development of the Lazurite project would also provide revenue locally by employing an array of workers, both directly and indirectly. People would be employed to build roads and project infrastructure, drill wells, and maintain/ monitor the project area. The large pool of individuals employed to work on the Lazurite project would also have the secondary effect of increased demand for goods and services from nearby communities, primarily those of Gillette and Wright. Additionally, there are 22 wells proposed on Fee surface, and the development of these wells and infrastructure would provide revenue to the private landowners through Surface Use Agreements (SUAs) and disturbance reimbursement payments.

3.7. Cultural

Class III cultural resource inventories were performed for the Lazurite POD prior to on-the-ground project work (BFO project #'s 70080038, 70090105). Quality Services, Inc., conducted block and linear class III cultural resource inventories following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) and the *Wyoming State Historic Preservation Office Format, Guidelines, and Standards for Class II and III Reports*. Clint Crago, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following resources are located in or near the project area.

Table 3.9 Cultural Resources Inventory Results

Site Number	Site Type	Eligibility
48JO2943	Johnson County Rd 231	Not Eligible
48JO3931	Historic Artifact Scatter	Not Eligible
48JO3932	Prehistoric Lithic Scatter	Not Eligible
48JO3933	Prehistoric Lithic Scatter	Not Eligible
48JO3934	Prehistoric Lithic Scatter	Not Eligible
48JO3935	Historic Trash Scatter	Not Eligible
48JO3936	Historic Trash Scatter	Not Eligible
48JO3937	Prehistoric Lithic Scatter	Not Eligible
48JO3938	Prehistoric Lithic Scatter, Stone Circle, Hearths	Unevaluated

Site Number	Site Type	Eligibility
48JO3939	Cairn	Not Eligible

3.8. Air Quality

Existing air quality throughout most of the Powder River Basin is in attainment with all ambient air quality standards. Although specific air quality monitoring is not conducted throughout most of the Powder River Basin, air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

Existing air pollutant emission sources within the region include following:

- Exhaust emissions (primarily CO and nitrogen oxides [NOx]) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;
- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;
- Transport of air pollutants from emission sources located outside the region;
- Dust (particulate matter) from coal mines;
- NOx, particulate matter, and other emissions from diesel trains and,
- SO2 and NOx from power plants.

For a complete description of the existing air quality conditions in the Powder River Basin, please refer to the PRB Final EIS Volume 1, Chapter 3, pages 3-291 through 3-299.

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Alternative C

4.1.1. Vegetation & Soils Direct and Indirect Effects

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

- Mixing of horizons – occurs where construction on roads, pipelines or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Loss of soil vegetation cover, biologic crusts, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography and cover.

- Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Modification of hill slope hydrology.

These impacts, singly or in combination, would increase the potential for valuable soil loss due to increased water and wind erosion, invasive/noxious/poisonous plant spread, invasion and establishment, and increased sedimentation and salt loads to the watershed system.

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). The Wyoming Reclamation Policy applies to all surface disturbing activities. Authorizations for surface disturbing actions are based upon the assumptions that an area can and ultimately will be successfully reclaimed. BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to an approved "Reference Site" or NRCS Ecological Site Transition State. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.

Cumulative Effects: Most soil disturbances would be short term impacts with expedient, successful interim reclamation and site stabilization, as committed to by the operator in their POD Surface Use Plan and as required by BLM in COAs.

Impacts to vegetation and soils from surface disturbance will be reduced by following the operator's plans and BLM applied mitigation. Of the 46 proposed well locations, 32 can be drilled without a well pad being constructed, 7 will require an engineered pad and 7 will require a constructed slot. Surface disturbance associated with the drilling of the 32 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.

For a detailed record of surface disturbance associated with the Lazurite POD, see Appendix A.

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 accepted engineering practices and BLM standards.

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

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".

4.1.2. Wetland/Riparian

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 immediately downstream of these structures. Affects to riparian areas along the tributaries to Crazy Woman Creek and the Upper Powder River are not anticipated from this project because the WDEQ will enforce the conditions of the WYPDES permit which calls for full containment in all the impoundments and prohibits discharge to the nearest class 2 water (WYPDES Permits page 1).

4.1.3. Invasive Species

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:

- Control Methods include physical, biological, and chemical methods:
  Physical methods include mowing during the first season of establishment, prior to seed formation, and hand pulling of weeds (for small or new infestations). Biological methods include the use of domestic animals, or approved biological agents. Chemical methods include the use of herbicides, done in accordance with the existing Surface Use Agreement with the private surface owner.
- Preventive practices:
  Certified weed-free seed mixtures will be used for re-seeding, and vehicles and equipment will be washed before leaving areas of known noxious weed infestations.
- Education:
  The company will provide periodic weed education and awareness programs for its employees and contractors through the county weed districts and federal agencies. Field employees and contractors will be notified of known noxious weeds or weeds of concern in the project area.

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 and the operator's commitment to the control of noxious weeds and species of concern will reduce potential impacts from noxious weeds and invasive plants.

4.1.4. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the drainage, which is between 1.3 and 20.3% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to eliminate potential impacts to the waters of the state.
- The WMP for the LazuritePOD proposes that produced water will be fully contained and therefore not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.1.5. Visual Resource Management

A Visual Contrast Analysis was completed. The following wells were identified for potential mitigation to meet VRM objectives.

- LAZURITE BERYL CS 13: moved to meet VRM objectives
- LAZURITE TOURMALINE CS 4: recommended to be moved, not done to due to impacts to Sage Grouse habitat
- LAZURITE TOURMALINE CS 1: recommended to be moved, not done to due to impacts to Sage Grouse habitat
- LAZURITE BERYL CS 5: recommended to be moved, not done, move would require excessive dirt work

No additional mitigation measures are required.

4.1.6. Wildlife

4.1.6.1. Big Game Direct and Indirect Effects

Under Alternative C, Yearlong pronghorn antelope and mule deer range would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. The Summary of Alternatives table in Appendix A lists and quantifies the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

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

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

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. Survival below the maintenance level requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic

disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978) further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

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

4.1.6.1.1. Big Game Cumulative effects

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

4.1.6.2. Aquatics Direct and Indirect Effects

Under Alternative C, produced water is to be contained in14 reservoirs. Yates will manage this project so that infiltration and evaporation losses from the reservoirs will consume the produced water. If a reservoir were to discharge due to overtopping from a storm event, it is likely that the produced water will reach a fish-bearing stream through ephemeral tributaries to Crazy Women and Indian Creeks, and that downstream species would be affected by changing water quality, quantity and salinity.

4.1.6.2.1. Aquatics 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.

4.1.6.3. Migratory Birds Direct and Indirect Effects

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

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

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

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.

Migratory bird species within the Powder River Basin nest in the spring and early summer and are vulnerable to the same affects as sage-grouse and raptor species. Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor nesting timing limitations are applied, nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.1.6.3.1. Migratory Birds Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235. No additional mitigation measures are required.

4.1.6.4. Raptors Direct and Indirect Effects

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

The presence of overhead power lines may impact foraging raptors. Raptors forage opportunistically throughout the Powder River Basin. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

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 in such a way as to provide an adequate biologic buffer for nesting raptors. During the onsite, staked well locations were moved and agreed upon (Yates and BLM).

The 4 Olivine well in SWSE Section 23 is approximately 329 feet from BLM nest # 3015 which was occupied by a great-horned owl in 2007. The location is surrounded by high quality sage-grouse habitat. The present proposed well location is the best alternative for sage-grouse habitat protection. The presence of the proposed well and access roads will result in disturbance to any raptors using the nest when workers enter the area to conduct maintenance. A condition of approval limiting maintenance activity in the area during nesting season will be applied to minimize disturbance in the nest area during breeding season.

The proposed 4 Beryl well was moved from its original location, 0.12 miles in direct line of sight from BLM nest # 4150, to a location out of line of sight approximately 0.21 miles from the nest. The 2 Beryl well and the Range Reservoir are also within ¼ mile from BLM nest # 4150. The 2 Beryl well is out of line of sight. Once the Range Reservoir is constructed, there shouldn't be human disturbance unless there is an emergency. The BLM data base shows that the nest has been used by red-tailed hawks for at least the past three nesting seasons. The site is located in close proximity to Interstate 90, and to Dry Creek Road. The pair using the nest appears to be accustomed the current level of traffic on these two routes. The proposed actions associated with the Lazurite POD and other CBM development actions in the area will greatly increase the amount of traffic and disturbance in the area, possibly to a level that the pair will not be able to tolerate.

Well 16 Beryl is within 0.25 miles of BLM nest #s 5109 and 5110. Both nest have been reported as occupied by black-billed magpies.

The utility line between 3 and 5 Beryl in Section 8 is within 0.25 miles of BLM nest # 5112, last occupied by great-horned owls in 2007. Birds using the nest will not be affected as construction will be restricted to non-nesting season. Once the lines are constructed, there should be no human occupancy in the area.

Table 4.1 Infrastructure within close proximity (0.5 mile) to documented raptor nests within the Lazurite project area.

BLM ID#	AMOUNT AND TYPE OF INFRASTRUCTURE	
	Within 0.25 mile	*Within 0.25 to 0.5 mile*
3013		4 Olivine, access and utilities to 3 Olivine, Lion Tamer Reservoir
3014		3 and 4 Olivine, access and utilities, Lion Tamer Reservoir storage area
3015	4 Olivine and Lion Tamer Reservoir	3 Olivine with access, utilities and storage area
3016		6, 7 and 8 Olivine with access, utilities and storage area
4150	2,4 Beryl and access and utilities Range reservoir	1, 3, 6 Beryl with access and utilities
5109	16 Beryl, access and utilities	
5110	16 Beryl, access and utilities	9, 17 Beryl, access and utilities
5112	Utility lines in Section 8	4, 5, 6, 8, 13 Beryl, access and utilities Range, Rigger, Roar Reservoirs
5113		3 Lazurite
5114		3 Lazurite
5115		3 Lazurite
*6056	Utility corridor in SWSW Sec. 15 T49N, R79W	

*Burrowing owl, timing restrictions April 15 – August 31.

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

4.1.6.4.1. Raptors Cumulative effects

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

4.1.6.5. Threatened and Endangered and Sensitive Species

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2 Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

Table 4.2 Summary of Threatened and Endangered Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (Mustela nigripes)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat of insufficient size.
Blowout penstemon (*Penstemon haydenii*)	Sparsely vegetated, shifting sand dunes.	NS	NE	No suitable habitat present.
Threatened				
Ute ladies'-tresses orchid (Spiranthes diluvialis)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence
K Known, documented observation within project area.
S Habitat suitable and species suspected, to occur within the project area.
NS Habitat suitable but species is not suspected to occur within the project area.
NP Habitat not present and species unlikely to occur within the project area.
Project Effects
LAA Likely to adversely affect
NE No Effect.
NLAA May Affect, not likely to adversely affect individuals or habitat.

4.1.6.5.1. Black-Footed Ferret Direct and Indirect Effects

Because the black-tailed prairie dog colonies within and adjacent to the Lazurite project area is of insufficient size for supporting ferrets and is isolated from any prairie dog complexes, implementation of the proposed development will have "***no effect***" on the black-footed ferret.

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

The Ute ladies'-tresses orchid is threatened by energy developments, noxious weeds, and water developments. Prolonged idle conditions in the absence of disturbance (flooding, grazing, mowing) may be a threat just as repeated mowing and grazing during flowering may lead to decline (Hazlett 1996, 1997, Heidel 2007). Heavy equipment used in energy development construction could dig up plants. Invasive weeds transplanted by vehicle and foot traffic in habitat could outcompete this fragile species. Restricting work from areas of Ute ladies'-tresses orchid habitat reduces these impacts.

Many of the reservoirs are located within ephemeral drainages of Crazy Women and Indian Creeks. Remaining proposed reservoirs are located in upland habitats. No springs have been identified within the project area. Suitable habitat not present within the Lazurite project area. Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within the project area. Implementation of the proposed coal bed natural gas project will have "***no effect***" on the Ute ladies'- tresses orchid.

4.1.6.6. Sensitive Species Direct and Indirect Effects

BLM will take necessary actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22Astates: "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary."

4.1.6.6.1. Prairie dog colony obligates

Wells, roads, pipelines and other infrastructure associated with energy development constructed within prairie dog colonies will directly remove habitat for prairie dog colony obligate species. Activities that disturb these species could lead to temporary or even long-term or permanent abandonment. Direct loss of species may also occur from vehicle traffic. Continued loss of prairie dog habitat and active prairie dog towns will result in the decline of numerous sensitive species in the short grass prairie ecosystem.

4.1.6.6.2. Sagebrush obligates

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

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

Table 4.3 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

Presence
K Known, documented observation within project area.
S Habitat suitable and species suspected, to occur within the project area.
NS Habitat suitable but species is not suspected to occur within the project area.
NP Habitat not present and species unlikely to occur within the project area.
Project Effects
NI No Impact.
MIIH May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.
WIPV Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
BI Beneficial Impact

4.1.6.6.3. Bald eagle Direct and Indirect Effects

Bald eagle nesting or winter roost habitat does not exist in the Lazurite project area but the proximity to Crazy Women Creek (approximately 1.2 miles) makes the area accessible to eagles for foraging. There are no existing overhead power lines in the project area. Approximately two miles of overhead power is proposed within the project area by a third party. There are currently 1.25 miles of improved roads within the project area, with 11.44 miles proposed.

The presence of overhead power lines may impact 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 December 28, 2006, US Fish and Wildlife Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

Produced water will be stored in 15 proposed reservoirs which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.1.6.6.4. Black-tailed prairie dog Direct and Indirect Effects

The only black-tailed prairie dog colony affected by Lazurite project activities is located in SE Section 7 and SW Section 8 (see Table 3.6). The road and utilities corridor to the 7 Beryl well will cut through the northern portion of the colony. Individuals that survive the excavation process but whose burrows were destroyed will be displaced. As the prairie dog town grows in size, prairie dogs move from an area of high population density to an area of low population density. Male prairie dogs resort to either long-distance dispersal to new colonies (mostly as yearlings, rarely as adults) or short distance within the home colony. Female prairie dogs disperse over long distances to other colonies (as either yearlings or adults). Short-distance dispersal of females within the home colony almost never occurs (Hoogland 1995). Dispersal of prairie dogs occurs as single individuals. Both male and female prairie dogs prefer to move into an existing colony or one that has been abandoned rather than start a completely new colony. Coterie (small family group within the colony) members resist attempted invasions by conspecifics including immigrants.

Dispersing prairie dogs have increased stress levels, higher exposure to predators, and are unlikely to be accepted by other colonies if they even encounter one. Both males and females actively protect their coterie territories from invading males and females (Hoogland 1995).

4.1.6.6.5. Burrowing owl Direct and Indirect Effects

One burrowing owl nest exists approximately 0.2 miles south of the project area. It will not be directly impacted by Lazurite project activities.

The dramatic reduction of prairie habitat in the United States has been linked to reduction of burrowing owl populations (Klute et al. 2003). Use of roads and pipeline corridors may increase owl vulnerability to vehicle collision. Overhead power lines provide perch sites for larger raptors that could potentially result in increased burrowing owl predation. CBNG infrastructure such as roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

The USDAFS Thunder Basin National Grasslands in Campbell County, WY, whom cooperated with the BLM in the creation of the 2003 PRB EIS, recommends a 0.25 mile timing restriction buffer zone for burrowing nest locations during their nesting season (April 15 to August 31). Instruction Memorandum No. 2006-197, directs the field offices to "use the least restrictive stipulations that effectively accomplish the resource objectives or uses." Alteration of the general raptor nest timing limitation (Feb 1 to July 31) to a more specific burrowing owl nesting season timing limitation will effectively reduce the vulnerability of owls to collision while shortening the timing restriction period to four and one half months (See Chapter 3 for breeding, nesting, and migration chronology) from six and one half months and from 0.5 mile to 0.25 mile.

4.1.6.6.6. Greater sage-grouse Direct and Indirect Effects

There are thirteen sage-grouse leks within 4 mile of the Lazurite project area (Table 3.7). The proposed action will adversely impact breeding, nesting, brood rearing, late summer, winter habitat. Proposed project elements that are anticipated to negatively impact grouse are: 46 CBNG wells on 46 locations and approximately 10 miles of new roads, 5 miles of new pipelines, 2 miles of new overhead power, 15 new reservoirs, increased vehicle traffic on established roads and increased noise from compressor stations.

All of the Lazurite POD falls within high quality seasonal sage-grouse habitat. The proposed construction listed above will likely cause sage-grouse avoidance of the areas as human presence and noise level
In the area increases. A number of changes to proposed well sites and infrastructure location were made at the December, 2008 onsite field visits to reduce impacts to sage-grouse habitat. These are listed as follows:

- The pipeline to 5 Olivine well will be moved out of high quality sage habitat and limited to 25' corridor.
- Access to 7 Olivine well will be moved out of high quality sage habitat.
- The 8 Olivine well will be moved out of high quality sage habitat.
- The access and utilities to 3 and 6 Olivine will be rerouted to reduce disturbance and decrease fragmentation of sage habitat.
- The 7 Olivine well was moved out of high quality sage habitat.
- The 10 Beryl well was moved to a new location which will eliminate infrastructure in high quality sagebrush habitat.
- The 11, 15 and 18 Beryl wells were moved out of high quality sage habitat to road.
- The 20 Beryl, 1, 2, 3 and 5 Lazurite wells were moved out of high quality sagebrush habitat.
- The access to the 1, 2 and 3 Olivine wells was developed and coordinated with adjoining lease holders to consolidate road development thus decreasing fragmentation of sagebrush habitat.

- To reduce disturbance to sage-grouse moving between the Flying E lek in T49N,R79W Section 11 and leks to the south, it was agreed to exchange the timing limitations from the 2-6 Tourmaline and 1 Jade wells to the 3 to 8 Olivine wells and extend the time until July 15.

Actions recommended by BLM biologists at the onsite inspections that were not implemented were:

- To drop the Middaugh Reservoir, which would have saved approximately 6 acres of high quality sage habitat.
- To drop the 15 Beryl well.
- Moved the road between wells 2 and 3 Olivine.
- Move well 2 Beryl out of high quality sage habitat. The move would have taken the well out of the drilling window.
- Move the access to 8 Beryl. The Landowner didn't want the change.
- Change access to 16 Beryl. Alternative would have to be on highly erodible slope.

Prior to the onsite inspections with BLM, Yates incorporated the following measures into the Lazurite project planning to reduce impacts to sage-grouse:

- To install bird ramps on all newly constructed tire tanks.
- Will treat all CBNG reservoirs within the Lazurite POD lease hold with Atosid XR (or equivalent product), if larva are present and surface owner approves.
- Extra effort will be made to reduce sagebrush disturbance within the entire Lazurite POD.
- Yates is willing to add forbs to the seed mix, type of forbs and rate must to be mutually agreed upon.
- Yates voluntarily proposed to install the majority of electrical power for the Lazurite pod underground.
- Yates will consider using equipment, such as a spider plow or equivalent in the Lazurite project area for pipeline installation. This is a voluntary measure by Yates and is dependent on availability and cost.
- Yates will continue to be involved in the sage-grouse planning areas and consider new mitigation efforts.
- Yates will use telemetry on wells to reduce traffic to well locations.

4.1.6.6.6.1. Greater sage-grouse Cumulative Effects

In addition to the direct impacts to sage-grouse habitat that will be created by the federal wells and associated infrastructure, the project area does contain existing fee, state, and federal fluid mineral development. The sage-grouse cumulative impact assessment area for this project encompasses a four mile radius from the sage-grouse leks listed in Table 3.7. As of June 3, 2009, there are approximately 970 existing wells and associated infrastructure within four miles of the 13 leks - an area of 226 square miles. The existing well density is approximately 4 wells/section.

There are 419 proposed wells (46 are the wells from this project) within four miles of the 13 leks. With the addition of the 373 proposed wells that are not associated with this proposed action, the well density within four miles of the 13 leks increases to 6 wells/section. With approval of alternative C (46 proposed well locations) the well density increases to 6.2 wells/section.

CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (WGFD 2004). The PRB FEIS estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003).

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

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

Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (WGFD 2004). Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, powerlines, reservoirs and other infrastructure in the Powder River Basin (WGFD 2005, WGFD 2004). Sage-grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. In southwestern Wyoming, yearling female greater sage-grouse avoid nesting in areas within 0.6 miles of producing well pads (Holloran et al. 2007), and in southern Alberta, brood-rearing females avoid areas within 0.6 miles of producing wells (Aldridge and Boyce 2007).

Doherty et al. (2008) demonstrated that sage-grouse in the Powder River Basin avoided otherwise suitable wintering habitats once they have been developed for energy production, even after timing and lek buffer stipulations had been applied. The WGFD feels a well density of eight wells per section creates a high level of impact for sage-grouse and that sage-grouse avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). As interpreted by coordinated effort with state fish and wildlife agencies from Montana, Colorado, Utah, South Dakota, North Dakota and Wyoming, (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008), research indicates that oil or gas development exceeding approximately one well pad per square mile (with the associated infrastructure) results in measurable impacts to breeding populations, as measured by the annual number of male sage-grouse attending leks (Holloran 2005, Walker et al. 2007)

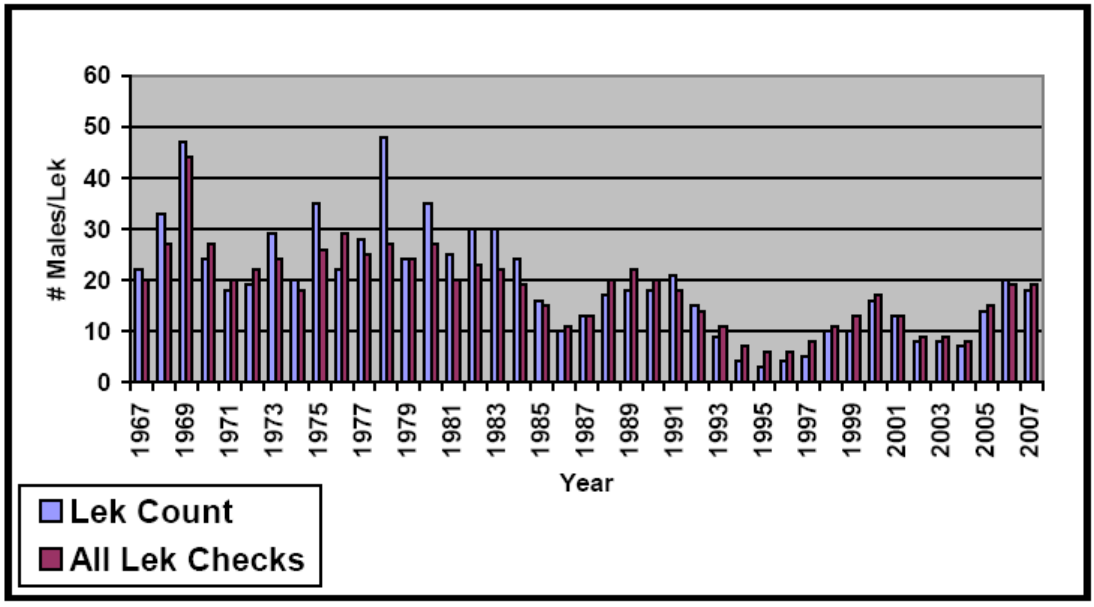
Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). In a study of greater sage-grouse population response to natural gas field development in western Wyoming, Holloran (2005) concluded that increased noise intensity, associated with active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

Vegetation communities within the Powder River Basin are naturally fragmented, as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. A sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within the Powder River Basin to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size has decreased by more than 63% in the past forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). The existing development within the cumulative impacts assessment area has further fragmented the sage-grouse habitat. Disturbance created by this project will contribute to additional fragmentation.

Another concern with CBNG development is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (WGFD 2004). West Nile virus represents a significant new stressor, which in 2003 reduced late summer survival of sage-grouse an average of 25% within four populations including the Powder River Basin (Naugle et al. 2004). In northeastern Wyoming and southeastern Montana, West Nile virus-related mortality during the summer resulted in an average decline in annual female survival of 5% from 2003 to 2006 (Walker et al. 2007). Powder River Basin sage-grouse losses during 2004 and 2005 were not as severe. Summer 2003 was warm and dry, more conducive to West Nile virus replication and transmission than the cooler summers of 2004 and 2005 (Cornish pers. comm.).

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

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



The BFO Resource Management Plan (BLM 2001) and the Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA) (BLM 2004). BLM Wyoming adopted the two-mile recommendation in 1990 (BLM 1990). The two-mile recommendation was based on early research which indicated between 59 and 87 percent of sage-grouse nests were located within two miles of a lek (BLM 2004). These studies were conducted within prime, contiguous sage-grouse habitat such as Idaho's Snake River plain.

Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the breeding lek (BLM 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage-grouse hens nested within 3 km (1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found only 36% of their grouse nesting within 3 km of the capture lek. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. 2007). Habitat conditions and sage-grouse biology within the Buffalo Field Office are more similar to Moynahan's north-central Montana study area than the Upper Green River area.

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

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

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

In January 2008 BFO staff identified that sage-grouse protections in the 2003 PRB EIS may not be adequate to preserve sage-grouse population viability in the Powder River Basin. BFO consolidated research and data to identify high-quality sage-grouse habitat in the basin and developed map of sage-grouse "focus areas". These areas encompass approximately 1 million acres of habitat, and are managed under criteria established in "Guidance for general management actions during BFO Resource Management Plan Revision" (Appendix 1). This general guidance includes the following requirement; "The proponent will be asked to demonstrate that the proposal can be managed in a manner that effectively conserves sage-grouse habitats affected by the proposal."

Based on the best available science presented above, the proposed action will most likely contribute to the abandonment of the thirteen leks within four miles of the project area. However, given the ongoing planning actions specific to sage-grouse, changes to the proposed action identified, and timing limitations applied, the proposed action should not affect population viability in the Powder River Basin or across the species' range.

4.1.6.6.7. Sharp-tailed grouse Direct and Indirect Effects

Effects to sharp-tailed grouse would be similar to sage-grouse.

4.1.6.6.8. Mountain plover Direct and Indirect Effects

Mineral development has mixed effects on mountain plovers. Disturbed ground, such as buried pipeline corridors and roads, may be attractive to plovers, while human activities within one-quarter mile may be disruptive. To reduce impacts to nesting mountain plovers, the BLM BFO requires a 0.25 mile timing limitation for potential nesting habitat prior to nest survey completion and a 0.25 mile timing limitation for all occupied nesting habitat for the entire nesting season.

Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. Limiting travel speed to 25mph provides drivers an opportunity to notice and avoid mountain plovers and allows mountain plovers sufficient time to escape from approaching vehicles. Even if a nesting plover flushes in time, the nest likely would still be destroyed. Overhead power lines provide perch sites for raptors that could result in increased mountain plover predation. CBNG infrastructure such as well houses, roads, pipeline corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

Mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat when loss or alteration of their natural breeding habitat (predominately prairie dog colonies) occurs, such as heavily grazed land, burned fields, fallow agriculture lands, roads, oil and gas well pads and pipelines. These areas could become reproductive sinks. Adult mountain plovers may breed there, lay eggs and hatch chicks; however, the young may not reach fledging age due to the poor quality of the habitat. Recent analysis of the USWFS Breeding Bird Survey (BBS) data suggests that mountain plover populations have declined at an annual rate of 3.7 % over the last 30 years which represents a cumulative decline of 63% during the last 25 years (Knopf and Rupert 1995). An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

There is a small amount of suitable mountain plover habitat the Lazurite project area (see Table 3.6). Most of the project area is covered with vegetation too dense or topography too rough to be suitable for mountain plover. Surveys done in 2007, 2008 and 2009 did not find any mountain plovers. The project should not impact mountain plovers.

4.1.6.6.9. Sensitive Species Cumulative effects

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

4.2. West Nile Virus Direct and Indirect Effects

This project is likely to create 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. This may be due to the state agencies not having instituted a state-wide treatment for mosquitoes connected to WNv.

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 added mitigation.

4.3. 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 accepted water management practices, monitoring of downstream impacts within the Crazy Woman Creek and Upper Powder River watersheds and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and private 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.

Yates Petroleum Corporation proposes to fully contain all water produced in association with these well in on-channel impoundments and off-channel pits all located within this POD area. One discharge point is associated with each structure and all are proposed to be near the high water level of each impoundment.

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 11 gpm per well or 506 gpm (1.13 cfs or 816 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 by watershed (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). This POD area encompasses two watersheds. The volumes predicted in the FEIS and the actual production figures are compared to the predicted volumes produced per volume in the table below. This volume of produced water is within the predicted parameters of the PRB FEIS.

	Predicted Volume CBNG Produced Water FEIS, Acre-feet/year		**Predicted Volume Lazurite POD, Acre-feet/year**	
Watershed	**Maximum Production, 2006**	**2009**	**2009**	**% of total Predicted CBNG Production, 2009**
Crazy Woman Creek	21,135	15,962	674	4.2
Upper Powder River	171,423	88,046	142	0.2

4.3.1. Groundwater

The PRB FEIS predicts an infiltration rate of 43% to groundwater aquifers and coal zones in the Crazy

Woman Creek drainage area and 40% in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 180 gpm will infiltrate at or near the discharge points and impoundments in the Crazy Woman drainage (290 acre feet per year) and 35.2 cfs will infiltrate in the Upper Powder River drainage (57 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 200 to 546 feet compared to an average top depth of 1,325 feet to the Big George coal zone. 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.

As stated previously, the PRB FEIS predicted impacts to groundwater as a result of methane production. Beginning as early as 1988, the BLM began a monitoring program to measure the gas pressure and water table levels in the coal zones in the Powder River Basin. As CBNG development grew, the BLM, in coordination with the natural gas producers, developed a strategy for the installation of a network of groundwater monitoring sites across the PRB. In 2003, representatives of the Petroleum Association of Wyoming met with the BLM to drill and equip at least an additional 35 monitoring sites (there were 41 sites at that time). Under the Wyodak EIS, as development moved from the coal outcrop near the mines to the west, monitoring sites were required to be installed prior to production as conditions of approval in associated plans of development.

Well locations were selected based on several criteria:

1) Generally replaced monitor wells listed in the WYODAK EIS. Substituted one set (2-8 wells), somewhat centrally located in a 4 township area, for 8 sets (2 wells each), generally 2 sets per township.
2) Must be located on Federal minerals
3) Preferably located on BLM surface
4) Preferably with public access or for which the operator will provide access
5) Responsibility was divided so that a single operator did not have a disproportionate share of the total number of wells

Yates Petroleum Corporation, as part of that agreement, committed to install two sites. One site was identified three mile west of this POD at a location identified as the Crazy Woman site located at SENW Sec 2 T49N R80W. These wells were to be installed prior to the end of 2005 for baseline purposes. This well would be the only monitor well in 5 townships and is necessary to quantify the impacts of nearby production. The well must be installed and operating prior to any production from this POD.

Yates will be required to install a well set at the identified site or at an alternate location within the POD boundary. The well set must be in place and operating prior to any production from the Lazurite POD wells.

Recovery of the coal bed aquifer was predicted in the PRB FEIS to "…resaturate and repressurize the areas that were partially depressurized during operations. The amount of groundwater storage within the coals and sands units above and below the coals is enormous. Almost 750 million acre-feet of recoverable groundwater are stored within the Wasatch Formation- Tongue River Member 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.

The BLM has installed shallow groundwater monitoring wells at five impoundment locations in the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. Water quality data has been sampled from these wells on a regular basis. Preliminary data from three sites show increasing TDS level as water infiltrates while two sites are not. On-going shallow groundwater monitoring at four other impoundment locations are less intensive and consist of batteries of between 4 and 6 wells. Preliminary data from two sites are showing increasing TDS levels as water infiltrates, while two monitoring wells do not.

In order to address the potential impacts from infiltration on shallow ground water, the WDEQ 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 has been revised as the "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" issued September, 2006. As of April of 2009, approximately 1,999 impoundment sites had been investigated through over 2,272 borings. Of these impoundments, 277 met the criteria to require "compliance monitoring" if constructed and used for CBNG water containment. Only 155 impoundments requiring monitoring are presently being used. As of the first quarter of 2009, only 18 of those monitored impoundments caused a change in the "Class of Use" of the underlying aquifer water.

4.3.1.1. 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) could 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 Member sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5)." (PRB FEIS page 4-65).

4.3.2. 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 4.4 Comparison of Regulated Water Quality Parameters to Predicted Water

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Most Restrictive Proposed Limit –		2.0	1,000
Least Restrictive Proposed Limit		10.0	3,200
Crazy Woman Creek Watershed (Primary) near Arvada, WY USGS #06316400 Gauging Station			
Historic Data Average at Maximum Flow		1.29	1,066
Historic Data Average at Minimum Flow		2.26	1,937
Upper Powder River Watershed (Secondary) at Arvada, WY USGS #06317000 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 Requirements			
WYPDES Permit #WY0056324 – Crazy Woman		NA	7,500
WYPDES Permit #WY0055051 – Indian Creek/Upper Powder River		NA	7,500
Predicted Produced Water Quality			
Big George Coal Zone	2,060	28.8	3,210

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 not within the WDEQ criteria for agricultural use (2000 mg/l TDS). The quality for the water produced from the Big George 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 11 gallons per minute (gpm) is projected is to be produced from these 46 wells, for a total of 506 gpm for the POD. See Table 4.4.

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

Under Alternative C, there are 14 discharge points included in this project with three existing at the time of the onsite. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 14 total impoundments (318.4 acre-feet) would potentially be utilized within the project area. Stock ponds exist at two locations, but these sites will be fully disturbed when dams are rebuilt and storage pools are enlarged. Three impoundments have already been constructed for fee CBNG development. All of these impoundments will disturb approximately 62.7 acres including the dam structures. Eleven (11) of these water impoundments would be considered to be on-channel

reservoirs. Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

As stated in the PRB FEIS, one of the issues raised was the potential for sedimentation to concentrate compounds in impoundments and downstream channels that may require special handling at the time of reclamation (see PRB FEIS page 4- 120). In order to establish soil chemistry goals for reclamation, baseline soil samples will be collected from the 11 proposed impoundments and analyzed for the standard WYPDES permit suite of parameters plus soil specific characteristics.

At the onsite, it was determined that the location for the Range Impoundment (NWNE Sec 8) was proposed to intersect an active erosion feature. It was recommended by the BLM specialists that this impoundment be removed from the water management strategy. The operator chose to designate the impoundment as secondary, which means that it will not be constructed at the present time and will not be bonded for reclamation, but will remain in the water management plan.

Additionally at the onsite for the Lion Tamer impoundment, the operator was requested to provide mitigation for the downstream head cut located below the proposed dam location. The operator submitted a statement from a contractor that mitigation was not necessary in their professional opinion, contrary to the concerns of the BLM Hydrologist.

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 62.7 gpm (0.14 cfs) below the lowest reservoir (after infiltration and evapotranspiration losses) in the Crazy Woman drainage and 13.2 gpm (0.03 cfs) in the Upper Powder River drainage. The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will only be permitted as a result of a storm event and could potentially allow for streambed enhancement through wetland-riparian species establishment. 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. Sampling and analysis of the soils in the proposed impoundment locations will establish a baseline goal for reclamation purposes.

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 Crazy Woman Creek of 3 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 38 wells is anticipated to be a total of 418 gpm or 0.93 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in the tributaries from this action (0.14 cfs) may add a maximum 0.11 cfs to the Crazy Woman Creek watershed flows, or 3.7% of the predicted total CBNG produced water contribution. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

The predicted maximum discharge rate from the 8 wells in the Upper Powder River watershed is anticipated to be a total of 88 gpm or 0.2 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in Indian Creek from this action (0.0.03 cfs) may add a maximum 0.0.02 cfs to the Upper Powder River watershed flows, or 0.04 % of the predicted total CBNG produced water contribution. 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 Lazurite POD, the operator provided an analysis of the potential development in the watershed above the impoundments in project area (WMP page 3). This POD (area of 7,142 acres) is located at the head of tributaries to both watersheds and will be fully developed with 1 CBNG well per 80 acres with the addition of these 48 wells. The maximum flow rate of 11 gpm per 89 wells equals 982 gpm (2.2 cfs) of produced CBNG 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 of the project area, 2.2 cfs, is much less than the volume of runoff estimated from the 2-year storm event of 170 cfs calculated for the drainages.

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 two Wyoming Pollutant Discharge Elimination System (WYPDES) permits for the discharge of water produced from this project from the WDEQ, written for the two major watersheds. The effluent limits for each permit are listed below:

Table 4.5 Lazurite POD WYPDES Permits Water Quality Effluent Limitations

Parameter	Crazy Woman Creek Primary Watershed WY0056324	Upper Powder River Secondary Watershed WY0055051
pH	6.5 to 9.0	6.5 to 9.0
Specific Conductance	7500 mg/l max	7500 mg/l max
Dissolved iron	1000 µg/l max	1000 µg/l max
Chlorides	2000 mg/l	150 mg/l
Total Recoverable Barium	NA	1800 µg/l max
Total Recoverable Arsenic	NA	8.4 µg/l max

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The primary point of compliance is the end of the outfall pipe. There are 13 designated points of compliance identified for this permit, one below each impoundment. Both permits are written such that there is no discharge permitted below the impoundments "except during periods of time in which natural precipitation causes the reservoirs to overtop and spill" (WYPDES Permit Page 2).

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

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

In-channel downstream impacts are addressed in the WMP for the Lazurite POD (pages 8-9) prepared by Bison Environmental, Inc. for Yates Petroleum Company.

4.3.2.1. Surface Water Cumulative Effects

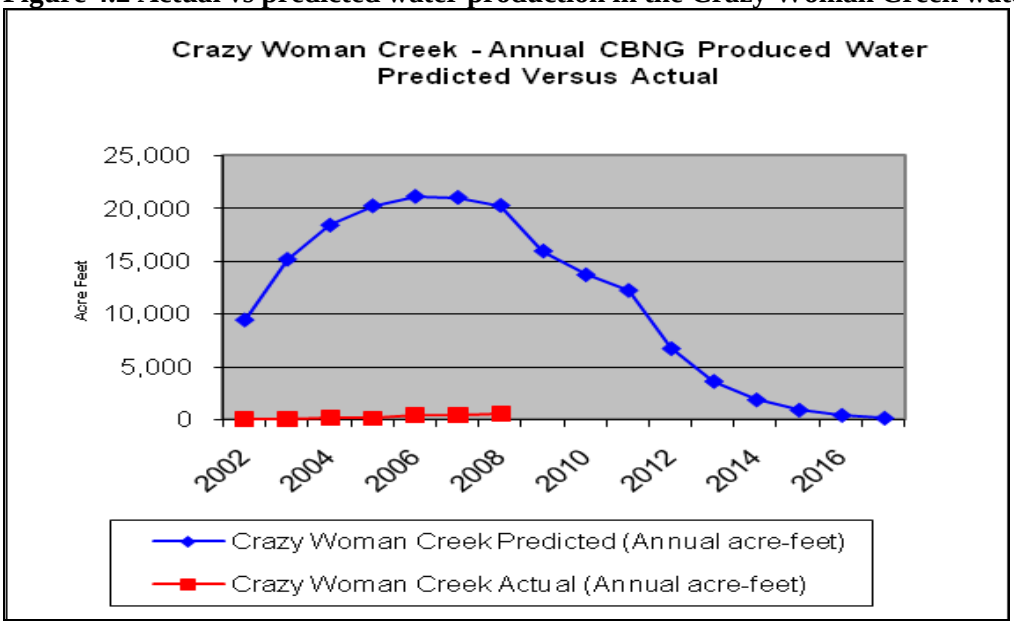
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Crazy Woman Creek and Upper Powder River watersheds. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2008, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 166,096 acre-feet of water compared to the predicted 900,040 acre-feet disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.5 and Figure 4.2 below. This volume is 20.3% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.6 Actual vs predicted water production in the Crazy Woman Creek watershed *2008 Data Update 06-08-09*

Year	Crazy Woman Creek Predicted (Annual acre-feet)	Crazy Woman Creek Predicted (Cumulative acre-feet from 2002)	Crazy Woman Creek Actual (Annual acre-feet)		Crazy Woman Creek Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	9,449	9,449	4	0.0	4	0.0
2003	15,185	24,634	1	0.0	5	0.0
2004	18,418	43,052	126	0.7	130	0.3
2005	20,240	63,292	113	0.6	243	0.4
2006	21,135	84,427	392	1.9	635	0.8
2007	21,036	105,463	349	1.7	984	0.9
2008	20,279	125,742	560	2.8	1,573	1.3
2009	15,962	141,704				
2010	13,716	155,420				
2011	12,240	167,660				
2012	6,731	174,391				
2013	3,629	178,020				
2014	1,881	179,901				
2015	910	180,811				
2016	422	181,233				
2017	150	181,383				
Total	**181,383**		**1,573**			

Figure 4.2 Actual vs predicted water production in the Crazy Woman Creek watershed

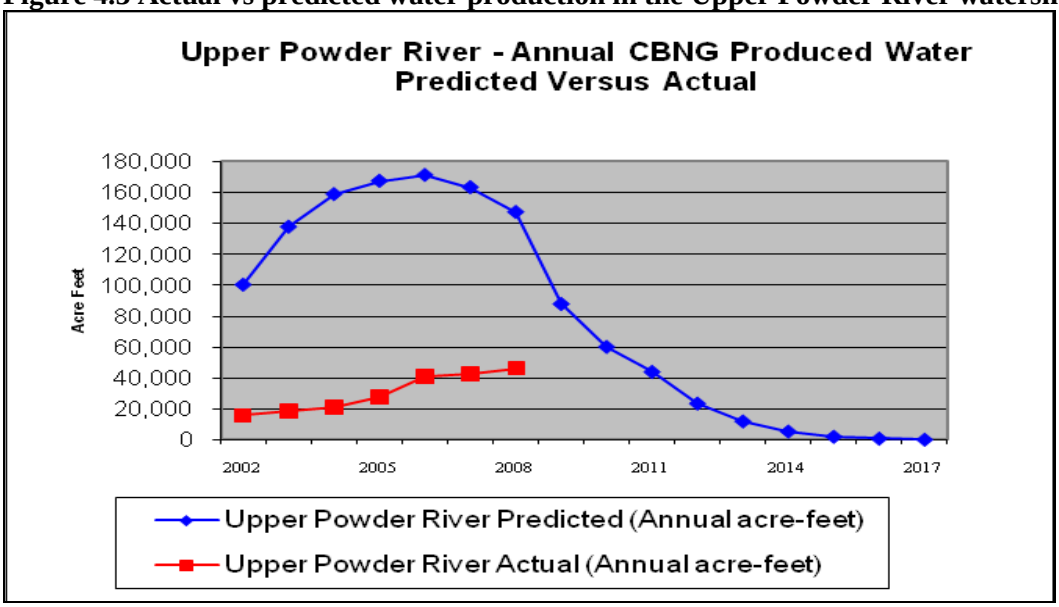


As of December 2008, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 212,522 acre-feet of water compared to the predicted 1,047,521 acre-feet disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.5 and Figure 4.2 below. This volume is 20.3% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.7 Actual vs predicted water production in the Upper Powder River watershed (Secondary)
2008 DataUpdate 06-08-09

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,112	25.8	166,096	18.5
2008	147,481	1,047,521	45,936	31.1	212,522	20.3
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**		**212,522**			

Figure 4.3 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 Crazy Woman Creek and Upper Powder River drainages, which is approximately 1.3 to 20.3% of the total predicted in the PRB FEIS.
2. The operator has committed to fully containing the water produced from this POD in impoundments which should eliminate downstream impacts.
3. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.

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.

4.4. Economics and Recovery of CBNG Resources

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.

4.5. Fluid Minerals

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. In addition, the table below indicates potential for lost resources.

Estimated Lost Gas from Undrilled Federal Locations

Assuming these wells are not drilled and there are no offsetting wells							
Twp	**Rng**	**Sec**	**Qtr/Qtr**	**Lease**	**Well Name**	Unrecovered CBM	
						High	Low
49N	79W	23	NENE	WYW147395	Olivine CS 1	917	
49N	79W	23	SWNE	WYW147395	Olivine CS 2	917	
49N	79W	23	NESE	WYW147395	Olivine CS 3	917	
49N	79W	23	SWSE	WYW147395	Olivine CS 4	917	
49N	79W	24	NESE	WYW147395	Olivine CS 5	926	
49N	79W	24	NESW	WYW147395	Olivine CS 6	926	
49N	79W	24	SWSW	WYW147395	Olivine CS 7	926	
49N	79W	24	SWSE	WYW147395	Olivine CS 8	926	
49N	79W	9	NENE	WYW147391	Beryl CS 9	843	
49N	79W	10	NENE	WYW147391	Beryl CS 15	1007	
49N	79W	10	NENW	WYW147391	Beryl CS 16	1007	
All numbers are in thousands of MCF, Low numbers were not used since there is no production surrounding these wells.							

Assuming these wells are not drilled but all surrounding 80s are							
Twp	**Rng**	**Sec**	**Qtr/Qtr**	**Lease**	**Well Name**	Unrecovered CBM	
						High	Low
49N	79W	23	NENE	WYW147395	Olivine CS 1	101	
49N	79W	23	SWNE	WYW147395	Olivine CS 2	101	
49N	79W	23	NESE	WYW147395	Olivine CS 3	101	
49N	79W	23	SWSE	WYW147395	Olivine CS 4	101	
49N	79W	24	NESE	WYW147395	Olivine CS 5	102	
49N	79W	24	NESW	WYW147395	Olivine CS 6	102	
49N	79W	24	SWSW	WYW147395	Olivine CS 7	102	
49N	79W	24	SWSE	WYW147395	Olivine CS 8	102	
49N	79W	9	NENE	WYW147391	Beryl CS 9	93	
49N	79W	10	NENE	WYW147391	Beryl CS 15	111	
49N	79W	10	NENW	WYW147391	Beryl CS 16	111	
All numbers are in thousands of MCF, Low numbers were not used since there is no production surrounding these wells.							

Note: All figures are in thousands of MCFG or thousands of dollars.

4.6. Cultural Resources

Non eligible site(s) 48JO2943, 48JO3931, 48JO3932, and 48JO3935 will be impacted by the proposed project. No historic properties will be impacted by the proposed project. Following the Wyoming State Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 8/24/2009 that no historic properties exist within the APE. If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the Standard COA (General)(A)(1).

4.7. Air Quality

In the project area, air quality impacts would occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including non-CBM well production equipment, booster and pipeline compression engine exhaust). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Air quality impacts modeled in the PRB FEIS concluded that projected oil & gas development would not violate any local, state, tribal or federal air quality standards.

5. ALTERNATIVE D

Only specific differences from Alternative C will be discussed. For a detailed description of Alternative D, see the Appendix. Alternatives D was not explored during the onsite, however following the onsite inspection, the BLM Interdisciplinary Team (IDT) reviewed the surface use and wildlife data with the changes agreed to in the field. BLM determined that the greatest impact to sage-grouse habitat from Alternative C is fragmentation on a landscape scale, caused by well locations, associated infrastructure, and overhead power. Additionally, there could be an increase in predators as new water sources, perches and cover (in the form of culverts, well houses etc.) become available from actions proposed in Alternative C. The BLM-IDT identified that further mitigation to reduce the loss of sage-grouse habitat within the project area was warranted. The following proposal will be recommended to the operator as mitigation to reduce the impacts of habitat loss, habitat fragmentation, and West Nile virus within the Lazurite POD.

5.1. Vegetation & Soils Direct and Indirect Effects

Trenching construction will remove vegetation while burying proposed and existing overhead power until reclamation restores native habitat. Consolidated linear infrastructure will maintain native soil and vegetation (see below). Removal of all 11 impoundments will retain native soil and vegetation. (see table 4.9.1 for quantification). See Appendix A, Summary of Alternatives for proposed surface disturbance associated with Alternative D.

5.1.1. Cumulative effects for Vegetation and Soils

No additional mitigation measures are required.

5.2. Wildlife

5.2.1. Big Game Direct and Indirect Effects

Short-term disturbances associated with burying existing and proposed overhead power will result in direct habitat loss until reclamation accelerates return to habitat effectiveness. This alternative will reduce habitat disturbance and eliminate habitat fragmentation (see Table 4.9.1 and Figure 4.9.1) by the removal of eight impoundments and the relocation/removal of wells.

5.2.1.1. Cumulative effects for Big Game

The cumulative effects associated with Alternative D 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. No additional mitigation measures are required.

5.2.2. Migratory Birds Direct and Indirect Effects

Alternative D contains the least habitat impact to migratory birds.

5.2.2.1. Cumulative effects for Migratory Birds

The cumulative effects associated with Alternative D are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235. No additional mitigation measures are required.

5.2.3. Raptors Direct and Indirect Effects

Alternative D contains the least habitat impact to raptors.

5.2.3.1. Cumulative effects for Raptors

The cumulative effects associated with Alternative D 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.

5.2.4. Threatened and Endangered and Sensitive Species

5.2.4.1. Threatened and Endangered Species Direct and Indirect Effects

5.2.4.1.1. Bald eagle

The overall vertical intrusion within the project would be reduced with implementation of Alternative D.

5.2.4.2. Sensitive Species Direct and Indirect Effects

5.2.4.2.1. Greater sage-grouse

Alternative D would reduce the negative impact to sage-grouse and habitat fragmentation of habitat as well as accelerate return to habitat effectiveness at reclamation.

Trenching construction would temporarily remove habitat while burying proposed and existing overhead power outside of existing corridors. This will cause a short-term disturbance and direct habitat loss; however, effective reclamation should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

Limiting production visits to once a month as well as eliminating surface disturbing or disruptive activities (to include disruptive maintenance activities such as a "work over rig") from March 1 to July 15 would reduce adverse impacts to nesting success.

According to the Wyoming Game and Fish Department's "*Recommendations for Development of Oil and Gas Resources Within Important Wildlife* Habitats", "in CBM fields, treat, remove, or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus (Walker et al. 2007b)."

The Wyoming Game & Fish Department Recommendations cite a study indicating that coal-bed natural gas (CBNG) ponds significantly increased the overall population of West Nile virus (WNv) vector mosquitoes in the Powder River Basin, and added to the duration of larval habitats that would normally be ephemeral. The author concluded CBNG ponds and associated habitats may serve to increase pathogen transmission in an otherwise arid ecosystem. (**Doherty**, M. K. 2007. Mosquito populations in the Powder River Basin, Wyoming: a comparison of natural, agricultural and effluent coal-bed natural gas aquatic habitats. M. S. Thesis. Montana State University, Bozeman, MT, USA.) Larval habitats of the West Nile virus vector mosquito *Culex tarsalis* were identified via remote sensing and GIS analyses. Result showed a 75% increase in potential larval habitats from 1999 to 2004 primarily because of the large increase in coalbed methane discharge ponds. (Zou, L.S.N Miller and E.T. Schmidtmann, 2006. Mosquito larval habitat mapping using remote sensing and GIS: implications of coal bed methane development and West Nile Virus. Journal of Medical Entomology 43:1034-1041.)

The removal of eight proposed impoundments would: 1) Reduce the potential for the spread of West Nile Virus. 2) Reduce direct loss of sage-grouse habitat (Table 4.9.1 and Figure 4.9.1) while retaining habitat connectivity between leks by decreasing multifaceted impacts. 3) Reduce the potential for increased density of predators attracted by new surface water sources.

5.2.4.2.2. Sharp-tailed grouse

Impacts to sharp-tailed grouse are similar to that of sage-grouse.

5.2.4.3. Cumulative effects for Sharp-tailed grouse

The cumulative effects associated with Alternative D 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. No additional mitigation measures are required.

5.3. Economics and Recovery of CBNG Resource (Fluid minerals, socio-economics)

The cumulative effects associated with Alternative D 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.

5.4. Comparison Summary of Effects By Cumulative effects

The cumulative effects associated with Alternative D are within the analysis parameters and impacts described I the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page4-271. No additional mitigation measures are required.

Table 5.3 Cumulative Effects

Resource/Species	Alternative A	Alternative C	Alternative D Sage Grouse emphasis
Wetlands/Riparian Areas	No existing wetlands/riparian areas would be disturbed.		
Wildlife			
Big Game	No habitat loss or fragmentation. Would likely see increased traffic passing through due to surrounding mineral development	Greatest habitat loss.	Least habitat loss.
		Greatest habitat fragmentation.	Least habitat fragmentation.
Raptors	No habitat loss.	Greatest foraging habitat fragmentation.	Least foraging habitat fragmentation.
	No wells authorized near nests.		

Resource/Species	Alternative A	Alternative C	Alternative D Sage Grouse emphasis
Migratory Birds	No habitat loss.	Greatest habitat loss.	Least habitat loss.
		Greatest habitat fragmentation.	Least habitat fragmentation.
	No habitat fragmentation.		
		Overhead electric poses predation & collision risk.	Overhead electric poses predation & collision risk.
Threatened and Endangered Species			
Bald eagle	No habitat loss	Overhead electricity increasing mortality risk from electrocution.	Removal of overhead electricity will eliminate risk from electrocution. Removal of proposed impoundments will reduce West Nile virus impacts to eagles and retain foraging in areas where impoundments will impact prairie dogs.

Resource/Species	Alternative A	Alternative C	Alternative D Sage Grouse emphasis
Sensitive Species			
Greater Sage Grouse	No habitat loss.	Greatest habitat loss.	Least habitat loss.
	No decision on overhead electricity. Overhead power could be routed through project area on private surface without BLM discretion increasing predation and collision risk. Grouse may avoid overhead power lines.	Greatest predation and collision risk associated with overhead power lines.	Least habitat fragmentation. Increase habitat connectivity. Reduce predators in nesting habitat with eliminating water impoundments. Eliminate collision and vertical intrusion from burying overhead power.
West Nile Virus	No Impact	likely to have effect on the overall spread of WNV.	Unlikely to have any effect on the overall spread of WNV.
Water Resources			
CBNG Produced Water	0 gpm water produced		
Groundwater	No Impact		
Surface Water	No Impact		
Long Term Disturbance	No Impact		

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.

6. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Bob Irwin	Permitting Agent	Yates Petroleum	yes
Tony Wyllie	Regulatory Agent	Yates Petroleum	yes
Mary Hopkins	Interim WY SHPO	Wyoming State Historic Preservation Office	No

7. 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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Appendix A
Detailed Description of Alternatives B, C, D, and Alternatives Considered but not Analyzed in Detail
Yates Petroleum Corporation
Lazurite POD
ENVIRONMENTAL ASSESSMENT –WY-070-EA09-095

1. Alternative B - Proposed Action

Proposed Action Title/Type: Yates Petroleum Corporation‘s Lazurite POD Plan of Development (POD) for 46 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 46 wells proposed within this POD; the wells are vertical bores proposed on an 80 acre spacing pattern with one well per location. Each well will produce from one coal seam. Proposed well house dimensions are approximately 4 ft wide x 4 ft length x 6 ft height. Well house color is Covert Green, selected to blend with the surrounding vegetation. Proposed wells are located as follows:

	WELL NAME	WELL #	QTR	SEC	TWP	RNG	LEASE
1	LAZURITE CS	5	NESE	17	49N	79W	WYW147393
2	LAZURITE CS	6	NWSE	17	49N	79W	WYW147393
3	LAZURITE CS	2	NENW	17	49N	79W	WYW147393
4	LAZURITE CS	3	SWNW	17	49N	79W	WYW147393
5	LAZURITE CS	4	SWNE	17	49N	79W	WYW147393
6	LAZURITE OLIVINE CS	3	NESE	23	49N	79W	WYW147395
7	LAZURITE OLIVINE CS	2	SWNE	23	49N	79W	WYW147395
8	LAZURITE OLIVINE CS	4	SWSE	23	49N	79W	WYW147395
9	LAZURITE OLIVINE CS	1	NENE	23	49N	79W	WYW147395
10	LAZURITE OLIVINE CS	5	NESE	24	49N	79W	WYW147395
11	LAZURITE OLIVINE CS	6	NESW	24	49N	79W	WYW147395
12	LAZURITE OLIVINE CS	7	SWSW	24	49N	79W	WYW147395
13	LAZURITE OLIVINE CS	8	SWSE	24	49N	79W	WYW147395
14	LAZURITE TOURMALINE CS	1	NENE	15	49N	79W	WYW147392
15	LAZURITE TOURMALINE CS	4	SWNE	15	49N	79W	WYW147392
16	LAZURITE TOURMALINE CS	5	NESE	15	49N	79W	WYW147392
17	LAZURITE TOURMALINE CS	8	SWSE	15	49N	79W	WYW147392
18	LAZURITE TOURMALINE CS	6	NESW	15	49N	79W	WYW147392
19	LAZURITE TOURMALINE CS	7	SWSW	15	49N	79W	WYW147392
20	LAZURITE TOURMALINE CS	2	NENW	15	49N	79W	WYW147392
21	LAZURITE TOURMALINE CS	3	SWNW	15	49N	79W	WYW147392
22	LAZURITE BERYL CS	1*	NENE	8	49N	79W	WYW147391
23	LAZURITE BERYL CS	2	NENW	8	49N	79W	WYW147391
24	LAZURITE BERYL CS	3	SWNW	8	49N	79W	WYW147391

	WELL NAME	WELL #	QTR	SEC	TWP	RNG	LEASE
25	LAZURITE BERYL CS	5	NESE	8	49N	79W	WYW147391
26	LAZURITE BERYL CS	6	NESW	8	49N	79W	WYW147391
27	LAZURITE BERYL CS	7	SWSW	8	49N	79W	WYW147391
28	LAZURITE BERYL CS	8	SWSE	8	49N	79W	WYW147391
29	LAZURITE BERYL CS	4	SWNE	8	49N	79W	WYW147391
30	LAZURITE BERYL CS	9	NENE	9	49N	79W	WYW147391
31	LAZURITE BERYL CS	11	NESE	9	49N	79W	WYW147391
32	LAZURITE BERYL CS	14	SWSE	9	49N	79W	WYW147391
33	LAZURITE BERYL CS	10	SWNE	9	49N	79W	WYW147391
34	LAZURITE BERYL CS	12	NESW	9	49N	79W	WYW147391
35	LAZURITE BERYL CS	13	SWSW	9	49N	79W	WYW147391
36	LAZURITE BERYL CS	16	NENW	10	49N	79W	WYW147391
37	LAZURITE BERYL CS	17	SWNW	10	49N	79W	WYW147391
38	LAZURITE BERYL CS	19	SWNE	10	49N	79W	WYW147391
39	LAZURITE BERYL CS	22	SWSE	10	49N	79W	WYW147391
40	LAZURITE BERYL CS	15	NENE	10	49N	79W	WYW147391
41	LAZURITE BERYL CS	18	SWNE	10	49N	79W	WYW147391
42	LAZURITE BERYL CS	20	NESW	10	49N	79W	WYW147391
43	LAZURITE BERYL CS	21	SWSW	10	49N	79W	WYW147391
44	LAZURITE CS	1	NENE	17	49N	79W	WYW147393
45	LAZURITE JADEITE CS	1	NENW	9	49N	79W	WYW137303
46	LAZURITE JADEITE CS	2	SWNW	9	49N	79W	WYW137303

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

	Impoundment Name	Qtr/Qtr	Section	Township	Range	Capacity (Acre Feet)	Surface Disturbance (Acres)
1	Feldspar	SESE	16	49	79	71	8.2
2	Clueless	NWSE	16	49	79	10	1.9
3	Yogi	SENW	16	49	79	39	6
4	Smokey	SESW	9	49	79	20	6.7
5	Roar Playa	NWSW	9	49	79	33	9.7
6	Rigger	SWNW	9	49	79	13	2.8
7	Lawrence	NESE	10	49	79	12	2.6
8	Circus	NWSW	23	49	79	14	4.3
9	Freak Show	NWSW	23	49	79	9.6	2.2
10	High Wire	NESW	23	49	79	4.3	1.2
11	Mole Man	SWSW	23	49	79	30	5.9
12	Steve	NWSW	8	49	79	8.5	3.2

	Impoundment Name	Qtr/Qtr	Section	Township	Range	Capacity (Acre Feet)	Surface Disturbance (Acres)
13	Range	NWNE	8	49	79	20	4
14	Middaugh	NWSE	10	49	79	35	5.6
15	Lion Tamer	SWSE	23	49	79	7.5	1.6

County: Johnson

Applicant: Yates Petroleum Corporation

Surface Owners: Soldier Creek, Timothy Marton, Lawrence Middaugh, Manuella Nicholas, Tear Drop Cattle Company, Yates Petroleum Corporation, Lawrence Grocki, State of Wyoming

Project Description:

The proposed action involves the following:

- Drilling of 46 total federal CBM wells in the Big George and/or Lower Big George coal seams to depths of approximately 2495 feet.

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

- Well metering shall be accomplished by telemetry. Metering would entail approximately 3 visits per month to each well.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 15 discharge points and 15 stock water impoundments. Twelve (12) of these impoundments lie within the Crazy Woman Creek watershed and 3 within the Upper Powder River watershed. Three of the impoundments have been constructed for fee development. The operator has committed that these impoundments would provide full containment of discharge water from this POD. Two Wyoming Pollutant Discharge Elimination System (WYPDES) permits have been issued by the Wyoming Department of Environmental Quality (WDEQ) for this project area: WY0056324 for the water discharge points located in the Crazy Woman Creek watershed and WY0055051 for the water discharge points located in the Upper Powder River watershed.

- An unimproved and improved road network.

- An above ground power line network to be constructed by third party. The proposed route has been reviewed by the third party. If the proposed route is altered, then the new route will be proposed via right-of-way 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. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the power drops.

- A storage tank of 1000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 6-12 months. Fuel deliveries are anticipated to be approximately twice a week. Noise level is expected to be 75 decibels at 50 feet distance.

- A buried gas, water and power line network.

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

Implementation of committed mitigation measures contained in the MSUP, Drilling Program and WMP, in addition to the Standard COAs contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.
Additionally, the Operator, in their POD, has committed to:

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

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

2. Alternative C – Environmentally Preferred

2.1. Changes as a result of the on-sites

	WELL NAME	WELL #	QTR	SEC	TWP	RNG	LEASE	Changes as a result of the onsite
1	LAZURITE CS	2	NENW	17	49N	79W	WYW147393	well moved to reduce disturbance and decrease fragmentation to sagegrouse habitat, also get out of sand blow out, new location situated off access/utility corridor
2	LAZURITE CS	3	SWNW	17	49N	79W	WYW147393	well moved, access/utilities rerouted to reduce disturbance and decrease fragmentation to sagegrouse habitat and, meet landowner request
5	LAZURITE OLIVINE CS	1	NENE	23	49N	79W	WYW147395	well moved reduce disturbance and decrease fragmentation to sagegrouse habitat
9	LAZURITE OLIVINE CS	5	NESE	24	49N	79W	WYW147395	utilities rerouted to reduce disturbance and decrease fragmentation to sagegrouse habitat
11	LAZURITE OLIVINE CS	7	SWSW	24	49N	79W	WYW147395	access/utilities rerouted to reduce disturbance and decrease fragmentation to sagegrouse habitat, new access will use proposed utility corridor coming in from the W
12	LAZURITE OLIVINE CS	8	SWSE	24	49N	79W	WYW147395	well moved to reduce disturbance and decrease fragmentation to sagegrouse habitat
14	LAZURITE TOURMALINE CS	2	NENW	15	49N	79W	WYW147392	well moved, access/utilities rerouted to reduce disturbance and decrease fragmentation to sagegrouse habitat,
15	LAZURITE TOURMALINE CS	3	SWNW	15	49N	79W	WYW147392	well moved, operator request, slot required w/ proposed location, new location no pad or slot required
24	LAZURITE BERYL CS	4	SWNE	8	49N	79W	WYW147391	well moved, proximity to raptor nest w/in line of site, < 150 ft, new location out of line of site and > 300 ft away

	WELL NAME	WELL #	QTR	SEC	TWP	RNG	LEASE	Changes as a result of the onsite
30	LAZURITE BERYL CS	10	SWNE	9	49N	79W	WYW147391	well moved, access/utilities rerouted, proposed location was at end of narrow ridge, safety concerns w/ rig and truck traffic, no turn around room, new location has access that is shorter, coming off main access road and safer(better topography) room for drill rig and support traffic
32	LAZURITE BERYL CS	12	NESW	9	49N	79W	WYW147391	well moved; proposed has steep side slopes, cut/fill for engineered pad excessive and fill would be in drainage, new location, will require engineered pad, but cut/fill will be ~half of proposed location, steep side slopes will be avoided
33	LAZURITE BERYL CS	13	SWSW	9	49N	79W	WYW147391	well move to alleviate VRM concerns w/ I-90, new location no pad required, eyebrow location along access/utility corridor
35	LAZURITE BERYL CS	15	NENE	10	49N	79W	WYW147391	well moved, access/utilities reduce disturbance and decrease fragmentation to sagegrouse habitat, new access/utilities ~1/4 mile shorter then proposed, will be incorporated into existing lease road / utilities upgrades being done by adjacent operators
38	LAZURITE BERYL CS	18	SWNE	10	49N	79W	WYW147391	well moved to reduce disturbance and decrease fragmentation to sagegrouse habitat, access/utilities rerouted to corridor w/ main access to 4 wells, proposed route, access/utilities would have run cross country to serve one well
40	LAZURITE BERYL CS	20	NESW	10	49N	79W	WYW147391	well moved to reduce disturbance and decrease fragmentation to sagegrouse habitat access/utilities rerouted to achieve better reclamation potential, proposed access/utilities on rocky knob poor reclamation
41	LAZURITE BERYL CS	21	SWSW	10	49N	79W	WYW147391	well move to reduce disturbance and decrease fragmentation to sagegrouse habitat
42	LAZURITE BERYL CS	22	SWSE	10	49N	79W	WYW147391	access/utilities rerouted to get off rocky ridge, new route better reclamation potential
45	LAZURITE JADEITE CS	2	SWNW	9	49N	79W	WYW137303	well moved, operator request, to get set back from permitted CBM infrastructure

	WELL NAME	WELL #	QTR	SEC	TWP	RNG	LEASE	Changes as a result of the onsite
46	LAZURITE CS	6	NWSE	17	49N	79W	WYW147393	well moved, original well proposed in non-leased area, new location will use an existing livestock water well location
47	Steve Impoundment		NWSE	8	49	79	WYW147391	Operator withdrew this location from consideration for an on-channel impoundment.

2.2. Description of Mitigation Measures (applied as Conditions of Approval):

The operator is responsible for the Conditions of Approval (COAs) attached to this EA and will be issued an Incident of Non-Compliance if found to be in violation of any COA.

3. Programmatic and Site specific mitigation measures, Alternative C

3.1. 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.

3.1.1. Water Management

3.1.1.1. Groundwater

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

3.1.1.2. Surface Water

1. Channel Crossings:
   a) 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.

   b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.

2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.

3. The operator will supply two copies of the complete approved SW-4, SW-3, or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.

3.1.2. 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.

3.1.3. Wildlife

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

2. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

3.1.4. 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.

3.2. Site Specific Conditions of Approval, Alternative C

3.2.1. Surface Use

1. The approval of this project does not grant authority to use off lease Federal lands. No access or surface activity is allowed on or off the affected leases on Federal lands until right-of-way grants become authorized.

2. 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

3. 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 Lazurite POD is Covert Green (18-0617 TPX).

4. All infrastructure, unless designated otherwise will have a 45 foot working area, with blading within the 45 feet not to exceed 35 foot (unless steep slopes dictate more).

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

Species	% in Mix	Lbs PLS*
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	10	1.2
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	10	1.2
Western Wheatgrass (Pascopyrum smithii)	40	4.8
Prairie coneflower (Ratibida columnifera)	5	0.6
White or Purple Prairie Clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata) /or American vetch (Vicia americana)	5	0.6
Green needlegrass (Nassella viridula***)***	25	3.0
Total	**100%**	**12 lbs/acre**

*PLS = pure live seed

*Northern Plains adapted species

*Double this rate if broadcast seeding

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

Civil Engineering

1. All surfacing material will meet grading requirements for Grading W.

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

3. Provide 4” of aggregate where grades exceed 8%.

4. Maintain a minimum of 20’ vegetated buffer between the edge of disturbance on roadways and all head cuts.

5. Road construction shall not block nor change the natural course of any drainage. Roads shall cross perpendicular to drainages.

6. All roads identified to be engineered will be constructed to completion before the well is drilled

3.2.2. Water Management

1. The operator will provide two copies of the shallow groundwater investigations for the proposed impoundments in this POD as they become available.

2. Prior to the modification of any impoundment in this POD from the approved design, such as the addition of toe drains or misters, the operator will submit a Sundry Notice to the BLM for review and approval.

3. All constructed reservoirs and associated disturbance on BLM surface will be fenced to prevent livestock access. The fencing must be wildlife friendly and meet the following parameters:
    - No more than three strands
    - Bottom wire 16” off the ground
    - Top wire not higher than 40”
    - At least one gate, which is large enough to accommodate construction equipment and equipped with a mechanical closure, will be included.
    - The fence shall be situated at least 20 feet back from the high water line of the impoundment to prevent accidental entrapment of wildlife.
    - The fences must be inspected and maintained by the operator on a routine basis.

4. Impoundments constructed over Federal minerals or on Federal surface to manage CBNG-produced water must be reclaimed when the production phase concludes. In order to establish soil chemistry goals for reclamation, baseline soil samples will be collected from the impoundments listed below. This baseline analysis will characterize existing soil chemistry and set reclamation target ranges. If the operator does not establish baseline parameters prior to impoundment construction, they would be required to do so at the time of reclamation by sampling locations upstream of the facility.

	Impoundment Name	Qtr/Qtr	Section	Township	Range	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	Smokey	SESW	9	49	79	20	6.7	WYW147391
2	Roar Playa	NWSW	9	49	79	33	9.7	WYW147391
3	Rigger	SWNW	9	49	79	13	2.8	WYW137303

	Impoundment Name	Qtr/Qtr	Section	Township	Range	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
4	Lawrence	NESE	10	49	79	12	2.6	WYW147391
5	Freak Show	NWSW	23	49	79	9.6	2.2	WYW144810
6	High Wire	NESW	23	49	79	4.3	1.2	WYW144810

Samples will be taken from the approximate proposed deepest point in the pool area prior to any construction. The recommended location is 10 feet upstream of the proposed low level outlet within the reservoir pool. Discrete samples will be taken from 0-6 inches, 6 to 24 inches and 24 to 48 inches for analysis for the following parameters:

- Texture
- pH
- EC
- Soluble Ca
- Soluble Mg
- Soluble Na
- Soluble K
- SAR
- Total Organic Carbon (TOC)
- Total metals including:
  - Al
  - Ba
  - B
  - Cd
  - Cu
  - Fe
  - Mn
  - Mo
  - Ra-226
  - Se
  - Zn

Standard soil sampling protocol will be used. Two copies of the analysis results will be sent to the BLM BFO Authorized Officer.

After the construction of the impoundment, an additional surface sample will be taken from 0 to 6 inches at the lowest point in the pool area and analyzed for the same parameters, with two copies of the analysis results sent to the BLM BFO Authorized Officer.

5. The WYPDES Permits for this POD specified that the impoundments were to fully contain the produced water except in a storm event. The impoundments in the Lazurite POD will be non-compliant if leaking. Disposal of federally produced water will cease into the non-compliant impoundment until successful mitigation is achieved. If produced water resurfaces below the mitigation site, or in adjacent drainages, the mitigation will be deemed unsuccessful and the impoundment will be lined or reclaimed. Additional mitigation measures may be required to aid in the restoration of the channel below the leaking impoundment to baseline range characteristics and conditions.

6. As part of the approval of this POD, the operator will be responsible for drilling, completing, and equipping a set of monitoring wells, as described below. The specific location will be determined in consultation with the BLM in the NESW Section 2 T49N R50W or another suitable location, where the oil and gas mineral estate is owned by the Federal Government. USBLM CBNG groundwater monitoring sites in the Powder River Basin generally consist of two types of wells and a common data collection platform. The two types of wells are: 1) coal or production zone completion(s) and 2) under- or over-burden sand zone completions. Descriptions of these three components are as follows:

A. Coal Zone Monitor Wells

There could be one or more of these wells at each monitor site, depending on the number of CBNG producing zones. Because of the presence of methane, and potential for significant well head pressure, these wells must be shut in (not open to the atmosphere). These wells are completed the same as actual production wells and are subject to the same Conditions of Approval (COA) associated with CBNG production wells. The finished well will include the following:

The well(s) will be drilled to the top of the production zone(s) and 5 1/2" OD (minimum) API steel casing will be set and cemented from the top of coal to the surface. The coal will then be drilled out, leaving an open-hole completion. The well will then be circulated with fresh water to remove any remaining drilling fluids and solids, and air lifted to get a yield estimate. If the coal doesn't appear to be making water during the cleanup of the well bore, water enhancement (and possibly under reaming) may be required. The well must be completed on top with a standard well head, i.e. KVF 'Gillette Special' well head (2x2 or 2x4 with a 2", centered tubing port and threaded auxiliary access port in the mandrel).

Standard equipment includes:

a. KVF wellhead as described above
b. downhole transducer to measure total head (gas + water) - we are currently using Druck PTX1835, 250 psig pressure transmitters
c. wellhead pressure transducer to measure well head pressure (this allows separation of gas and water pressures) - we are currently using Druck PTX621 transmitters (10, 100, up to 900 psig, depending on anticipated well head pressure)
d. an airline consisting of 1/8" ID by 3/8" OD poly tubing, running from the surface to near the bottom of the hole, suspending a weight to keep the line taught. This arrangement allows verification measurements without opening the wellbore.
e. access ports to allow for pressure testing, sampling (gas and water), and detection of methane.

B. Sand Zone Monitor Wells

There could be one or more of these wells at each monitor site, depending on parameters of interest, local concerns, etc. Typically there is a well completed in an overburden sand to monitor leakage of the shallower, generally more accessible sands. Wells are completed in under-burden sands when the under-burden sands are of more local interest or are of more significant thickness and quality, and some sites are established with wells in each of the sands from the surface down to the production zone to study recharge/discharge relationships, inter-aquifer communication, and changes in water quality. In addition, some sites will require shallow alluvial wells along ephemeral drainages receiving CBM discharge water - again to look at recharge. These wells are completed as follows:

The depth of the sand well(s) will be determined in the field utilizing the geophysical logs from the adjacent coal well(s). On wells where coal is penetrated (as determined from the logs from the adjacent coal well(s)) and on wells greater than 500 feet in depth, drilling and casing will be done as described above for the coal zone well(s). One of two completion methods may be used. The decision on which method to use will be determined by the authorized officer depending on the objectives and use of the well.

Method 1: Steel casing will be set through the sand zone, cemented to surface, and perforated, 4 shots per foot, through the sand zone.

Method 2: On wells where water quality sampling is a primary concern, steel casing will be set above the sand zone and cemented to the surface. The sand zone will then be drilled out and a screened or slotted casing string set through the sand zone. This screened casing string can either be placed using packers (i.e. K-packer) or hung on a string of casing from the surface.
On wells not penetrating coals and less than 500 feet (and optionally on wells from 500 to approximately 700 feet), the hole must be drilled with a minimum of a 9" bit to accommodate SDR17, 5 inch ID (minimum) PVC casing and 1" (minimum) flush joint tremie pipe allowing for proper placement of gravel pack and bentonite grout. If larger casing is used, a larger hole will have to be drilled. Upon completion of drilling, geophysical logs will be run to determine the exact placement of the well screen. The well casing will include 10 to 20 feet of blank pipe on the bottom (capped), .020 slot well screen open to the selected sand zone, and blank pipe to the surface. The well will then be gravel packed with 10-20 silica sand to cover the well screen (and associated sand zone).

On very shallow wells (less than 200 feet) the annulus above the gravel pack will be backfilled with bentonite gravel (or pellets) to the surface. On wells from 200 to approximately 700 feet total depth, the annulus above the gravel pack must be grouted from the bottom to the surface using a tremie. The top of the well casing must have threads (slip to thread adapter) and a vented cap.

The well(s) will then be cleaned up by air lifting until all drilling fluids and solids are removed, clear water is produced, and a yield is estimated.
Standard equipment includes:

Either a submersible transducer as in the coal wells (we generally use these if depth to water is greater than 400 feet or so) or a shaft encoder (Handar, Sutron, Stevens) and float-tape-weight arrangement.

C. Data collection platform and miscellaneous support equipment.

All wells are linked to a central data logger (Campbell CR10 or CR510) located in a central shelter and powered via 12 volt batteries and solar modules.
All wells are enclosed in secure, weather proof shelters and fenced in to protect from livestock and wildlife damage.

Other Requirements:

1. Equipment Funding: The methane operator will be required to provide the BLM with $5000 for each monitoring well bore (i.e. $10,000 for a typical two well setup, $15,000 for a three well setup, etc.).

2. Schedule: Wells must be completed and funding provided 30 days prior to initiating pumping of production wells in the Lazurite POD.
3. Access: If no public access exists to the monitor well site, the CBM operator must provide access in the form of a right of way or access agreement with the private landowners involved.
4. The operator shall submit APDs to BLM for the monitor wells. The APDs should include the completed APD cover sheet (Form 3160-3), APD processing fee, survey plats, a drilling plan and a surface use plan (including a map). The monitor wells will require a cultural clearance report. In addition, they are subject to the same spud notification requirements and completion report requirements as regular federal wells (see General Conditions of Approval). If you have any questions concerning this stipulation and for information on locating and equipping of the wells, please contact Mike Brogan, BLM Hydrologist, at (307) 261-7600.
5. Monitor wells are subject to the same standard COA applied to CBNG production wells.
6. Prior to installation of monitoring equipment by the BLM, the operator will submit to the BLM copies of the following:
    - State Engineers Well Permit (U.W. 5) and Well Completion (U.W. 6) forms
    - Signed landowner access agreement (if applicable)
    - Final copies of all well logs

3.2.3. Wildlife

Burrowing Owls

The following conditions will alleviate impacts to burrowing owls:

7. No surface disturbing activity shall occur within 0.25 miles of all identified prairie dog colonies from April 15 to August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season. A 0.25 mile buffer will be applied if a burrowing owl nest is identified. This condition will be implemented on an annual basis for the duration of surface disturbing activities within the prairie dog town(s). This timing limitation will be in effect unless surveys determine the nest(s) to be inactive. This timing limitation will affect the road and utility corridor in T49N, R79W section 15.

Raptors

The following conditions will alleviate impacts to raptors:

1. No surface disturbing activity shall occur within 0.5 mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
49N 79W	3	Access and utilities
49N 79W	5	1 and 2 Beryl wells, access and utilities, power drop
49N 79W	5	Range Reservoir
49N 79W	8	3,4,5,6, and 8 Beryl wells, access and utilities
49N 79W	9	9 and 13 Beryl wells, access and utilities
49N 79W	9	Rigger and Roar Reservoirs
49N 79W	10	16 Beryl well, access and utilities
49N 79W	17	3 Lazurite well, access and utilities
49N 79W	23	3 Olivine well, access and utilities

Township/Range	Section	Wells and Infrastructure
49N 79W	23	4 Olivine well, access and utilities
49N 79W	23	Lion Tamer Reservoir
49N 79W	23	Storage area
49N 79W	24	6, 7 and 8 Olivine wells, access and utilities, power drop

a. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.

b. Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. This applies to the nests listed in Table 3.5.

2. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.

3. Well metering, maintenance and other site visits within 0.5 miles of raptor nests should be minimized as much as possible during the breeding season (February 1 – July 31).

4. Access to 4 Olivine and Lion Tamer Reservoir will be restricted from February 1 to July 31 annually. If the occupancy check required above indicates the BLM nest # 3015 is inactive in a given year, access will not be restricted for the remainder of that year.

5. Maintenance (e.g. work-over, enhancements) on the 4 Olivine well will require an exception from February 1st to July 31st in order to minimize impacts BLM nest # 3015.

Sage Grouse

1. The following wells and infrastructure will have timing limitation stipulations of no surface disturbing activities (to include maintenance, unless an emergency) from March 1-June 15 for the life of the project:

Township/Range	Section	Wells and Infrastructure
49N., 79W.	10	15, 16, 17, 18, 19, 20, 21, 22 Beryl wells and
		associated infrastructure, Middaugh and Lawrence
		reservoirs.
	23	All POD activity.
	24	All POD activity.

2. A sage-grouse lek survey will be conducted for all known leks within 2 miles of the POD by a biologist following the most current WGFD protocol. All survey results shall be submitted annually, in writing, to a Buffalo BLM biologist by 31 July. Currently, this applies to the Red Draw lek but will include any new leks discovered.

4. Alternative D-Sage-Grouse Emphasis

The project-level modifications identified for the Lazurite POD, Alternative D, are listed below:

1. Consolidate all linear infrastructure with access roads.
2. Limit production visits to once per month.
3. Implement reclamation activities, including seeding, in the fall.
4. If project construction continues for more than 1 year, phase project to leave undisturbed habitat available to nesting sage-grouse during the season following the first year of construction.

The site-specific level modifications identified for the Lazurite POD, Alternative D, are listed below:

1. Drop eight reservoirs: Middaugh, Smokey, Roar, Rigger, Range, Lawrence, High Wire and Lion Tamer.
2. Add wells 5, 6 and 8 Olivine and their infrastructure to the Edisto POD.
3. Defer all wells and infrastructure in sections 22, 23 and 24. This will leave an undisturbed movement corridor for sage grouse moving between the Flying E lek to high quality habitat to the south.
4. Drop 9 Bery and thus eliminate pipeline to the west and pipeline/traffic along C & D road.
5. Drop 15 Beryl.
6. Drop 16 Bery to eliminate all disturbances in this section that is within two miles of the Flying E lek.

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 or minimize environmental effects of the operator's proposal.

4.1. Programmatic and Site specific mitigation measures

All programmatic and site specific measures from Alternative C apply, with the exception of the following:

4.1.1. Water Management

In Alternative D, no impoundments would be approved and no water could be discharged to the surface. This leaves the operator without a mechanism for the management of the water produced in association with the natural gas. In order to produce the approved wells, the operator would be required to submit a viable alternative water management plan for approval. That plan would need to be developed to conform to all the sage grouse management criteria, i.e. no new surface water impoundment structures and no surface discharge of the CBNG produced water.

4.1.1.1. Alternatives considered but not analyzed in detail

The following water management strategies were considered for use in the Lazurite POD and the following text follows a similar discussion presented in the WMP.

4.1.1.2. Land Application Disposal

Land application disposal would involve applying the water to cropland at agronomic rates through an irrigation system. Land application of water produced from the Lazurite POD was considered, but due to the lack of appropriate sites, the high construction and operating costs, and seasonal limitations, land application was ruled out.

4.1.1.3. Re-Injection into Disposal Wells and/or Aquifer Storage and Retrieval

In this area, suitable geologic formations are not available that could economically receive the quantities of water necessary, therefore this alternative was not pursued as a water management alternative.

4.1.1.4. Treatment of Produced Water

Treatment of produced water from the Lazurite POD was evaluated to examine a range of possibilities. Ion exchange was considered, but costs were considered to be cost prohibitive for this project. In particular, the waste stream produced would require disposal through commercial injection or evaporation on site, thus adding substantial costs and detracted from the viability of this project.

4.1.1.5. Artificial Wetlands

Artificial wetlands do not effectively reduce the level of dissolved solids in the discharge water or meet the volume requirements of this project, and the landowners and lessees did not desire the creation of large wetland areas.

5. Summary of Alternatives

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

Summary of the Alternatives Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.1) Revised Number or Miles	Alternative D (Environmental Alt.2) Revised Number or Miles
Total CBNG Wells	7	46	46	
Well Locations				38
Nonconstructed		36	32	
Constructed		3	7	38
Slotted		7	7	
Conventional Wells	0	0	0	0
Gather/Metering Facilities	0	0	0	0
Compressors	0	1	1	0
Ancillary (Staging/Storage Areas)	0	1	1	0
Template/Spot Upgrade Roads				
No Corridor	3.5 miles	.0 miles	.5	0
With Corridor	4.2 miles	7.3 miles	8.3	7.0
Engineered Roads				0
No Corridor	0	.3 miles	.3	0
With Corridor		1.2 miles	1.2	0.9

Summary of the Alternatives Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.1) Revised Number or Miles	Alternative D (Environmental Alt.2) Revised Number or Miles
Primitive Roads No Corridor With Corridor	 1.4 miles	 0.2 miles 4.6 miles	 0.2 1.2	 0.2 3.4
Buried Utilities No Corridor	 0	 4.0 miles	 5.3	 3.6
Buried Utilities No Corridor				
Overhead Powerlines	3.5 miles			0
Communication Sites	0	0	0	0
Monitor Wells	0	0	1	1
Land Application Disposal	0	0	0	0
Subsurface Drip Irrigation	0	0	0	0
Treatment Facilities	0	0	0	0
Impoundments On-channel Off- Channel	 5 (3 CBNG 2 stock) 0	 10 (2 existing upgraded) 2	 9 (2 existing upgraded) 2	 2 (1 existing upgraded) 0
Water Discharge Points	3	12	11	2
Channel Disturbance Headcut Mitigation Channel Modification	 0 0	 0 0	 0 0	 0 0
TOTAL ACRES DISTURBANCE	**Approx. 87 ac.**	**Approx. 108 ac.**	**Approx. 103 ac.**	**Approx. 61 ac**