FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Yates Petroleum Corporation
Lottery POD
ENVIRONMENTAL ASSESSMENT –WY-070-07-110

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Yates Petroleum Corporation's Lottery POD Coal Bed Natural Gas (CBNG) POD comprised of the following 13 Applications for Permit to Drill (APDs) and 15 impoundments, as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	LOTTERY CS	1*	NENE	3	50N	75W	WYW138136
2	LOTTERY CS	2	NENW	3	50N	75W	WYW138136
3	LOTTERY CS	3	SWNW	3	50N	75W	WYW138136
4	LOTTERY CS	4	SWNE	3	50N	75W	WYW138136
5	LOTTERY CS	5	NENE	4	50N	75W	WYW138136
6	LOTTERY CS	6	NENW	4	50N	75W	WYW138136
7	LOTTERY CS	7	SWNE	4	50N	75W	WYW138136
8	LOTTERY CS	10	NENE	8	50N	75W	WYW138136
9	LOTTERY CS	12	SWNW	9	50N	75W	WYW138136
10	LOTTERY CS COM	8	NENE	5	50N	75W	WYW138136
11	LOTTERY CS FEDERAL	9	NESE	5	50N	75W	WYW138136
12	LOTTERY CS FEDERAL	11	NENW	9	50N	75W	WYW138136
13	LOTTERY CS FEDERAL COM	13	SWNE	9	50N	75W	WYW138136

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease #
1	Last Shot	SWNE	9	50N	75W	WYW138136
2	Spring Fever	NWNE	5	50N	75W	WYW138136
3	Tucked In	NENE	5	50N	75W	WYW138136
4	JDS	NWNW	4	50N	75W	WYW138136
5	Jet Stream (Chassel)	SWNW	4	50N	75W	FEE
6	Steeler	NENE	4	50N	75W	WYW138136
7	Sidearm (existing)	NESW	3	50N	75W	WYW138136
8	Fast Ball	SENW	3	50N	75W	WYW138136
9	Finished (existing) (Lone Cedar)	SWSE	3	50N	75W	WYW162026
10	Curve	NESE	3	50N	75W	WYW162026
11	Slider	NWSE	3	50N	75W	WYW138136
12	Underhand (existing)	SWNE	3	50N	75W	WYW138136
13	Knuckle	NWNE	3	50N	75W	WYW138136
14	Split Finger (existing)	NENE	3	50N	75W	WYW138136
15	Tough Stuff	SWSE	33	51N	75W	WYW138136

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

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

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

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

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

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

Field Manager:_____ Date: _____

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Yates Petroleum Corporation
Lottery POD
PLAN OF DEVELOPMENT
WY-070-07-110

INTRODUCTION

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

1. PURPOSE AND NEED

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

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Description of the Proposed Action

Proposed Action Title/Type: Yates Petroleum Corporation's Lottery POD Plan of Development (POD) for 13 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well and Impoundment Information: There are 13 wells and 17 impoundments proposed within this POD, as follows:

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	LOTTERY CS	1*	NENE	3	50N	75W	WYW138136
2	LOTTERY CS	2	NENW	3	50N	75W	WYW138136
3	LOTTERY CS	3	SWNW	3	50N	75W	WYW138136
4	LOTTERY CS	4	SWNE	3	50N	75W	WYW138136
5	LOTTERY CS	5	NENE	4	50N	75W	WYW138136
6	LOTTERY CS	6	NENW	4	50N	75W	WYW138136
7	LOTTERY CS	7	SWNE	4	50N	75W	WYW138136
8	LOTTERY CS	10	NENE	8	50N	75W	WYW138136
9	LOTTERY CS	12	SWNW	9	50N	75W	WYW138136
10	LOTTERY CS COM	8	NENE	5	50N	75W	WYW138136
11	LOTTERY CS FEDERAL	9	NESE	5	50N	75W	WYW138136
12	LOTTERY CS FEDERAL	11	NENW	9	50N	75W	WYW138136
13	LOTTERY CS FEDERAL COM	13	SWNE	9	50N	75W	WYW138136

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
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4	JDS	NWNW	4	50N	75W	WYW138136
5	Jet Stream (Chassel)	SWNW	4	50N	75W	FEE
6	Steeler	NENE	4	50N	75W	WYW138136
7	Sidearem (existing)	NESW	3	50N	75W	WYW138136
8	Fast Ball	SENW	3	50N	75W	WYW138136
9	Finished (existing) (Lone Cedar)	SWSE	3	50N	75W	WYW138136
10	Curve	NESE	3	50N	75W	WYW138136
11	Slider	NWSE	3	50N	75W	WYW138136
12	Underhand (existing)	SWNE	3	50N	75W	WYW138136
13	Knuckle	NWNE	3	50N	75W	WYW138136
14	Split Finder (existing)	NENE	3	50N	75W	WYW138136
15	Tough Stuff	SWSE	33	51N	75W	WYW138136
16	Triple Play	NWNW	9	50N	75W	WYW138136
17	Double Play	SWSW	9	50N	75W	WYW138136

County: Campbell

Applicant: Yates Petroleum Corporation

Surface Owners: Bud Hayden Ranch, Love Land & Cattle Company, Throne Ranch Company, BLM

The proposed action involves the following:

- Drilling of 13 total federal CBM wells proposed to be single well bores for each location in which subsurface commingling is proposed in the; Felix, Big George, Anderson, Upper Canyon, Lower

Canyon, Wall, and Pawnee coal zones to depths of approximately; 510-660, 1120-1340, 1150-1370, 1185-1474, 1480-1750, 1435-2050, and 2210-2345 feet respectively. Coal zones will be developed on a well by well decision per thickness determined during drilling. Each coal zone will have a minimum thickness requirement for production due to economic return. Standard timeframes and drilling techniques will be used to drill these wells.

- An unimproved and improved road network.

- A Water Management Plan (WMP) that involves 17 stock water reservoirs within the Upper Powder River primary watershed.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be reduced. 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 Lottery POD POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

1. 1LOTT – Short segment of 2 track access past fence has + 8% slope. Access will be constructed per design template with proper drainage. Will need spot upgrade added to map and table.

2. 3LOTT – Adjusted access to keep the running surface grade @ 8%. The access route that parallels Kerry Hayden's fence line to ridge and then down slope to the well location will be constructed per design template with proper drainage. The spot upgrade table should be modified to include the above changes and width dimensions. Project map needs to illustrate improved access to well location. The location will require a slot.

3. 5LOTT - Adjusted access to keep the running surface grade @ 8%. Access will be constructed per design template with proper drainage. The spot upgrade table should be modified to include the above changes and width dimensions. Project map needs to illustrate improved access to well location.

4. 7LOTT – To minimize disturbance, an alternative access from an existing improved road east of location will used.

5. 9LOTT – To minimize disturbance, the access was relocated to east side of knob. Will need new spot upgrade narrative and project maps. The upgrade will include using the inslope template with cross drainage.

6. 10LOTT – Moved first section of access 90' uphill to avoid drainage. Still need culverts and low water crossing in spot upgrade areas. Well will be drilled with a closed system. Need layout diagram for system.

7. 11LOTT – Need template design road from 13LOTT down steep hill to corridor junction prior 11LOTT location. The spot upgrade table should be modified to include the above changes and width dimensions. Project map needs to illustrate improved access to well location.

8. 13LOTT – Moved pipeline corridor off bench down through little drainage. The change should be easier to reclaim. Need new project maps illustrating change.

9. The Double Play & the Triple Play reservoirs were dropped to lesson disturbance to sage-grouse nesting habitat.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

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

2.3.2.2. Surface Water

1. Channel Crossings:
   a) 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 a copy of the complete approved SW-4, SW-3, or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.

2.3.2.3. Soils

1. The Companies, on a case by case basis depending upon water and soil characteristics, will test sediments deposited in impoundments before reclaiming the impoundments. Tests will include the standard suite of cations, ions, and nutrients that will be monitored in surface water testing and any trace metals found in the CBM discharges at concentrations exceeding detectable limits.

2.3.2.4. Wetland/Riparian

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance can't occur, the minimum number of poles necessary to cross the area will be used.

2. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.

3. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.

4. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.5. Wildlife

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

2. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.

3. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.

4. The Companies will limit the construction of aboveground power lines near streams, water bodies, and wetlands to minimize the potential for waterfowl colliding with power lines.

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

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

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

2.3.2.6.2. Black-footed Ferret

1. Prairie dog colonies will be avoided wherever possible.

2. If any black-footed ferrets are located, the USFWS will be consulted. Absolutely no disturbance will be allowed within prairie dog colonies inhabited by black-footed ferrets.

2.3.2.6.3. Mountain Plover

1. Outside of occupied black-tailed prairie dog colonies, a mountain plover nesting survey following U.S. Fish and Wildlife Service protocol is encouraged prior to construction initiation, as project modifications can be made if necessary to protect nesting plovers and natural gas production. If requested in writing, then authorization may be granted for construction activities to occur between August 1 and March 15, outside the mountain plover breeding season. A mountain plover nesting survey following U.S. Fish and Wildlife Service protocol shall be conducted during the first available survey period (May 1 – June 15). Additional measures such as monitoring and activity restrictions may be applied if mountain plovers are documented.

2. A disturbance-free buffer zone of 0.25 mile will be established around all mountain plover nesting locations between March 15 and July 31.

3. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ¼ mile of known mountain plover nest sites.

4. Construction of ancillary facilities (for example, compressor stations, processing plants) will not be located within ½ mile of known nesting areas. The threats of vehicle collision to adult plovers and their broods will be minimized, especially within breeding aggregation areas.

5. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.

6. Creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.

2.3.2.7. Visual Resources

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

2.3.2.8. Noise

1. Noise mufflers will be installed on the exhaust of compressor engines to reduce the exhaust noise.

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

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

1. Archeological Monitoring: All earth moving activity in the following areas will be monitored by an archeologist who meets or exceed the qualification standards recommended by the Secretary of the Interior. The Bureau has identified these areas as containing the potential for buried cultural deposits (areas containing deep alluvial deposits). The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of work.

    a. All earth moving activities associated with the construction of the Tucked In and Spring Fever reservoirs, NE ¼ Section 5, T50N R75W
    b. All earth moving activities within alluvial deposits of Fortification Creek in T50N R75W Sections 5 and 9. The determination of the exact monitoring areas is based on the discretion of the archeological monitor, although, all alluvial deposits within the creek bottom must be monitored.

2. All changes made at the onsite will be followed. They have all been incorporated into the operator's plan of development.

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 Lottery POD is Carlsbad Canyon, 2.5Y 6/2.

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

    Reclamation Standards:

    1. The reclaimed area shall be stable and exhibit none of the following characteristics:
        a. Large rills or gullies.
        b. Perceptible soil movement or head cutting in drainages.
        c. Slope instability on, or adjacent to, the reclaimed area in question.
    2. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
    3. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation

shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:

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

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

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***
Western Wheatgrass(Pascopyrum smithii) or ***Thickspike Wheatgrass*** (Elymus lanceolatus ssp. lanceolatus)	30	4.8
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	10	1.2
Green needlegrass (Nassella viridula)	25	3.0
Slender Wheatgrass (Elymus trachycaulus ssp. trachycaulus)	20	1.2
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
Totals	**100%**	**12 lbs/acre**

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

6. Due to steep slopes and shallow soils, the pipeline corridor drainage crossing west of 7Lott will need additional soil amendments.

7. The Spring Fever impoundment proposed on the Love Land & Cattle Company surface can not be constructed until certification of a signed surface use agreement which authorizes construction of water management structure is provided to the Authorized Officer.

8. The location(s) of approximately 40' tall telemetry station antenna has not been approved. Prior construction of the antenna, a sundry of the proposal must be submitted and approved by the BLM.

9. Please contact Casey Freise Natural Resource Specialist, @ (307) 684-1189 Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

Wildlife site specific mitigation measures

1. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, "The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time" (M32). The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, Yates will coordinate with the BLM to determine if additional resurvey will be required.
2. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.
3. No surface disturbing activities are permitted in suitable mountain plover habitat (i.e. prairie dog colonies in Section 4) from March 15-July 31 annually, unless a mountain plover survey has been conducted during the current breeding season. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following proposed wells and their associated infrastructure:

Township/Range	*Section*	*Affected Wells and Infrastructure*
T50N, R75W	4	JDS reservoir, access road from the JDS reservoir to 7LOTT well and the 6LOTT and 7LOTT wells.

The surveys will be conducted in suitable habitat (i.e. prairie dog colonies, roads, pipelines, reservoirs under construction and any short grass prairie area) throughout the entire project area.

   a. Mountain plover nesting surveys shall be conducted by a biologist following the most current U.S. Fish and Wildlife Service Mountain Plover Survey Guidelines (the survey period is May 1-June 15). All survey results must be submitted in writing to the BFO and approved prior to initiation of surface disturbing activities.
   b. If a mountain plover is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).

4. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following proposed wells and their associated infrastructure:

Township/Range	*Section*	*Affected Wells and Infrastructure*
T50N, R75W	5	Pipeline corridor to the 9LOTT well.
T50N, R75W	8	10 LOTT well and its associated infrastructure.
T50N, R75W	9	Double Play, Triple Play, Last Shot Reservoirs, 11 LOTT and 13 LOTT and their associated infrastructure.

   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 ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.

   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. Nests to be checked are within a ½ mile or less of the proposed development. The nests are listed below:

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE
New	RTHA	429339E, 4909043N	SESW Sec 4 T50N, R75W	Cottonwood tree live
New	UNK	428222E, 4908324N	SWNE Sec 8 T50N, R75W	Juniper tree live
New	UNK	428860E, 4907958N	NWSW Sec 9 T50N, R75W	Cottonwood tree live
3142	RTHA	429621E, 4907907N	NWSW Sec 9	Juniper tree live
New	UNK	427669E, 4907857N	NWSE Sec 9 T50N, R75W	Juniper tree live
New	UNK	428875E, 4907838N	NWSW Sec 9	Juniper tree live
New	UNK	429007E, 4907619N	SWSW Sec 9 T50N, R75W	Cottonwood tree live
3143	UNK	429279E, 4907614N	SESW Sec 9 T50N, R75W	Artificial nesting platform
New	UNK	428766E, 4907494N	SWSW Sec 9 T50N, R75W	Juniper live
3355	GHOW	427828E, 4907481	SESW Sec 8	Willow, live

c. 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.
d. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.

5. No surface disturbing activities are permitted within 2 miles of the following sage-grouse leks: Fortification, Montgomery, Hayden I, Hayden II, Hayden Sat A, and Hayden Sat B, between March 1 and June 15, prior to completion of a greater sage-grouse lek survey. This timing limitation will affect the following wells and infrastructure:

Township/Range	*Section*	*Affected Wells and Infrastructure*
T50N, R75W	3	1LOTT well and associated infrastructure.
T50N, R75W	4	Access road/pipeline to 6LOTT, JDS Reservoir
T50N, R75W	5	8LOTT and associated infrastructure, access road/pipeline to 6LOTT, Tucked In, Spring Fever reservoirs and 9LOTT and associated infrastructure.
T50N, R75W	8	10LOTT well and associated infrastructure.
T50N, R75W	9	12LOTT wells and associated infrastructure, Double Play and Triple Play Reservoirs and main road/pipeline to the 11 and 13 LOTT wells.

a. If an active sage grouse lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage-grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
b. Creation of raptor hunting perches will be avoided within 0.5 mile of documented sage-grouse and sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage-grouse.
c. The maximum width for the access road/ pipeline corridor from the 11LOTT to the 9LOTT well will not exceed 25 feet. The access road and pipeline corridor from 10 LOTT to the road leading to the main access road will not exceed 25 feet maximum disturbance width. Access road/pipeline from 13 LOTT to main access will not exceed 25 feet maximum disturbance width. Access road to the Tuff Stuff Reservoir will not exceed 25 feet maximum disturbance width. Access road to 1 LOTT and Spilt Finger reservoir will not exceed 25 feet maximum disturbance width. This will help to limit the loss of good sage grouse nesting habitat.

6. If a new sharp-tailed grouse lek is identified during the survey, the 0.67 mile timing restriction (March 1 to June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the buffer until the following breeding season. The required survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.

7. All other conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion shall be complied with.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 5/31/06. Field inspections of the proposed Lottery POD CBM project were conducted on 11/8/06 by Bob Irwin, Tony Wyllie, Justin Roswadovski – Yates Petroleum Corporation, Jerry Means – KG Construction, Dave Belus – Love Land and Cattle lessee, Kerry Hayden – surface owner, Buck Damone, Guymen Easdale, Mike Worden, and Casey Freise – 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			Guymen Easdale
Floodplains		X		Casey Freise
Wilderness Values			X	Casey Freise

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
ACECs			X	Casey Freise
Water Resources		X		Casey Freise
Air Quality		X		Casey Freise
Cultural or Historical Values			X	Clint Crago
Prime or Unique Farmlands			X	Casey Freise
Wild & Scenic Rivers			X	Casey Freise
Wetland/Riparian		X		Casey Freise
Native American Religious Concerns			X	Clint Crago
Hazardous Wastes or Solids		X		Casey Freise
Invasive, Nonnative Species	X			Casey Freise
Environmental Justice		X		Casey Freise

3.1. Topographic Characteristics of Project Area

The POD is located 20 miles NW of Gillette, WY. The project area consists of gentle to steep rolling uplands dissected by ephemeral drainages. The ephemeral drainages ultimately flow into the upper reach of Fortification Creek which has a broad flood plain and defined channel. Fortification Creeks flows SW to NW and is located in the center of the POD.

3.2. Soils & Vegetation

Soils within the project area were identified from the *North Campbell County Survey Area, Wyoming (WY705) and South Campbell Soil Survey Area, Wyoming (WY605).* The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

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

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

Table – Ecological Sites

Ecological Site	Acres	Percentage
LOAMY (10-14NP)	1060	52%
BADLANDS	714	35%
CLAYEY (10-14NP)	151	7%
SHALLOW CLAYEY (10-14 NP)	100	5%
LOAMY (15-17 NP)	12	1%
SANDY (10-14 NP)	9	<1%

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure, by dominant soil series are:

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

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

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

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, Cheatgrass has invaded with Western Wheatgrass and Thickspike Wheatgrass maintaining at a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. Blue Grama is the same or slightly less than found in the HCPC. Plant diversity is low.

Dominant grasses identified during the onsite include: prairie junegrass, cheatgrass, bluebunch wheatgrass, and western wheatgrass. Shrubs identified include: Wyoming Big Sagebrush.

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

"Miscellaneous Areas",* Badlands*:
This site occurs on steep slopes and ridge tops, but may occur on all slopes which include landforms such as hillsides, ridges and escarpments.

The sites are identified as miscellaneous areas and classified as Badland. Badlands have essentially no soil and support little or no vegetation. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

The proposed action was designed to avoid these highly erosive soils which have a low potential for successful reclamation.

Clayey Sites:
This site occurs on nearly level to 30% 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 Historic Climax Plant Community for this site would be a Rhizomatous Wheatgrasses, Green Needlegrass Community. Potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants.

The present plant community is a Blue Grama Sod/Plains Pricklypear Plant Community. It is dominated by a dense sod of Blue Grama and Pricklypear cactus that covers up to 90% of the soil surface.

When the HCPC is replaced by warm season grass dominated communities grass production is reduced. The sod formed by these grasses is resistant to water infiltration. While the soil is protected by this sod, off-site areas are affected by excessive runoff which may cause gully erosion. This sod is resistant to change and may require practices such as range renovation to return to a cool season grass community.

Dominant grasses identified at the onsite include: Western Wheatgrass, Sandburg's Bluegrass, Cheatgrass, and Green Needlegrass. Forbs identified include: Field Pennycress. Other vegetative species identified at onsite: Wyoming Big Sagebrush and Prickly Pear Cactus. Differences in dominant species within the project area vary with soil type, aspect and topography.

3.2.1. Wetlands/Riparian

Fortification Creek flows through the middle of the POD. The creek is ephemeral and has a well defined channel. No cottonwoods or willows were observed during the onsite.

3.2.2. Invasive Species

The operator consulted with the Campbell County Weed and Pest Office about noxious weeds in the area. Canada thistle, Leafy spurge, Spotted knapweed and Saltcedar are state listed noxious weeds known to the area. No state-listed noxious weeds and invasive/exotic plant infestations were discovered during subsequent field investigation by the proposed project proponent.

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 Thunderbird-Jones & Stokes Consulting. Thunderbird performed aerial surveys for sage grouse and surveys for raptor nests during 2005 and 2006. No formal surveys were conducted for mountain plover or for Utes ladies'-tresses orchid.

A BLM biologist conducted field visits on November 8 and 13, 2006. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the project area include pronghorn, mule deer, and elk. The Fortification Creek area is approximately 2 miles west and north of the Lottery project area. Calving grounds, crucial winter range, winter yearlong and yearlong range occur to the southwest, west, northwest and north of the Lottery project area. Calving grounds are approximately 2.6 miles west and north of the project area; crucial winter range is located approximately 3 miles west and approximately 6.5 miles north of the project area; winter yearlong range is approximately 2.8 miles west and north of the project area and year long range is approximately 1.5 miles southwest, west, northwest and north of the project area.

During the onsite a small group of elk (7 individuals) mostly cows, were seen approximately 0.25 miles southwest of the project area. Elk sign was found throughout the project area and the landowner observes small groups of elk (4-8 individuals) at least two times per week all year long.

The WGFD has determined the northwest portion of the project area is winter range and the southern and eastern half of the project area is yearlong range for antelope. The eastern half of the project area is yearlong range and the western half is winter yearlong range for mule deer.

Yearlong use is when a substantial portion of a population makes general use of the habitat on a year-round basis. **Winter/Yearlong** use is when a population of animals makes general use of suitable habitat sites within a range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Winter** use is when a population or portion of a population of animals uses the documented suitable habitat sites within this range annually, in substantial numbers only during the winter period. 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 Fortification Creek which is a tributary of 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 for them.

Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

3.3.3. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

3.3.4. Raptors

Two nests are within the project boundary and eight more are within one half mile of proposed disturbance. In 2006 one raptor nest was active.

Table 3.2. Documented raptor nests within the Lottery project area in 2006 (UTM Zone 13, NAD83). At the time the EA was written, the 2007 raptor data was not available.

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS
New	RTHA	429339E, 4909043N	SESW Sec 4 T50N, R75W	Cottonwood tree live	Good	Active
New	UNK	428222E, 4908324N	SWNE Sec 8 T50N, R75W	Juniper tree live	Fair	Inactive
New	UNK	428860E, 4907958N	NWSW Sec 9 T50N, R75W	Cottonwood tree live	Fair	Inactive
3142	RTHA	429621E, 4907907N	NWSW Sec 9	Juniper tree live	Fair	Inactive
New	UNK	427669E,	NWSE Sec 9	Juniper tree live	Fair	Inactive

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS
		4907857N	T50N, R75W			
New	UNK	428875E, 4907838N	NWSW Sec 9 T50N, R75W	Juniper tree live	Fair	Inactive
New	UNK	429007E, 4907619N	SWSW Sec 9 T50N, R75W	Cottonwood tree live	Fair	Inactive
3143	UNK	429279E, 4907614N	SESW Sec 9 T50N, R75W	Artificial nesting platform	Poor	Inactive
New	UNK	428766E, 4907494N	SWSW Sec 9 T50N, R75W	Juniper live	Fair	Inactive
3355	GHOW	427828E, 4907481	SESW Sec 8 T50N, R75W	Willow, live	Poor	Inactive

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 1988, the WGFD identified four prairie dog complexes (Arvada, Recluse, Thunder Basin National Grasslands, and Midwest) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Oakleaf 1988).

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

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

Approximately 77.7 acres of black-tailed prairie dog colonies were identified during site visits by Thunderbird-Jones & Stokes within the Lottery project area. Black-footed ferret habitat is not present.

3.3.5.1.2. Bald eagle

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

Bald eagle nesting habitat is generally found along lakes, rivers, and other areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up

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

Trees within the Lottery project area are primarily limited to junipers (*Juniperus spp.*) that occur throughout many of the drainages. Individuals ranged from 6-20 feet tall and are most abundant in the north. Less than 15 small (< 20 feet tall) cottonwood trees (*Populus spp.*) are scattered throughout drainages and occur in small groups (2-5 trees) or as lone individuals in the southern portion of the project area (southern ½ of Section 4, eastern ½ of Section 8 and Section 9) (Gregory 2006).

No potential nests, suitable nesting habitat, or suitable winter roosting habitat were identified during the consultants or BLM biologist's site visits, within the immediate project area or extending one mile from proposed activities T50N, R75W. On January 14, 2006 a bald eagle was observed approximately 4.4 miles from the Lottery project area.

3.3.5.1.3. Ute's Ladies Tresses Orchid

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

In general, habitats within the Lottery project area lacked the potential to support the Ute ladies'-tresses orchid. With the exception of Fortification Creek in the southwest quarter of Section 4 and the northeast quarter of Section 5, the project area included only dry ephemeral drainages and lacked a perennial or late season historic water source (Gregory 2006).

All drainages were dry during the January 2006 survey, most contained soils that were sandy loams and sandy clays. Fortification Creek does have the potential to hold water during a portion of the spring, but it is most likely dry by autumn. Fortification Creek was dry when the onsite was conducted in November 8, and 13, 2006. Most drainages, including Fortification Creek, transition to upland vegetation and have steep, rugged banks (Gregory 2006).

Three existing reservoirs occur within the project area. A reservoir in SENE Section 9 contained emergent cattails, but no other mesic edge vegetation was present. The only other area of surface water that could be affected by proposed development was a small impoundment located in the SWNE Section 4 that contained no emergent vegetation and was surrounded by dense sagebrush.

Fortification Creek flows intermittently and its tributaries are ephemeral. There are no springs (WWC Engineering 2006/2007). Suitable orchid habitat is not present within the Lottery project area.

3.3.5.2. Sensitive Species

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

3.3.5.2.1. Black-tailed prairie dog

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

The black-tailed prairie dog is a burrowing rodent that feeds primarily on grasses. It is the only species of prairie dog that is found on the short and mid-grass plains east of the Rockies. Black-tailed prairie dogs avoid areas with tall grass, heavy sagebrush and other thick vegetative cover which interfere with detection of predators (Krueger 1986, Clark and Stromberg 19987).

Two prairie dog colonies were identified during site visits by Thunderbird-Jones & Stokes within the project area. The two colonies are active and densely populated and total 77.7 acres.

3.3.5.2.2. Greater sage-grouse

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

Suitable sage-grouse habitat is present through out the project area. Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), the primary shrub, occurs in dense (15-25% cover) to moderately dense (10-15% cover) stands throughout the project area. Sagebrush height ranges from 15-36 inches tall and averages between 20 and 30 inches tall. The taller and denser stands of sagebrush are located in Sections 2, 3, 5, 8, 9 along many of the slopes and banks of drainages. The sagebrush growth form is mostly spreading, providing a good broad canopy. Shorter (10-20 inches) and moderately dense stands of sagebrush are found on many hilltops (Gregory 2006). Within the sagebrush there is good residual grass cover, the grass height ranges from 6-12 inches tall.

Six documented sage-grouse leks are present within 3 miles of the project area (Table 5). According to the Wyoming Game and Fish Department data base, all six are classified as occupied and five were active in 2006. Sage grouse scat was found throughout the project area.

Table 5. Documented sage-grouse leks within three miles of the project area in 2006.

Lek ID	UTM NAD83	Legal Location	Status (Peak Males)	Distance From Project Area (Miles)	Occupied/ Unoccupied
41-Fortification	4912600N 424200E	NWSW Sec 25 T51N, R76W	Inactive No birds	2.6 miles	Occupied
41-Montgomery	4913650N 432118E	NWNW Sec 26 T51N, R75W	Active 28 males	1.7 miles	Occupied
41-Hayden I	4905718N	SWSE Sec 17	Active	1.2	Occupied

Lek ID	UTM NAD83	Legal Location	Status (Peak Males)	Distance From Project Area (Miles)	Occupied/ Unoccupied
	427849E	T50N, R75W	27 males		
41-Hayden II	4911185N 425944E	SESW Sec 31 T51N, R75W	Active 2 males	1.2 mile	Occupied
41-Hayden Sat A	4905334N 431583E	SWNE Sec 22 T50N, R75W	Active 4 males	2.3 miles	Occupied
41-Hayden Sat B	4903652N 431042E	SWNE Sec 27 T50N, R75W	Active 33 males	3.0 miles	Occupied

Sharp-tailed grouse

Thunderbird-Jones & Stokes Consultants found no sharp-tailed grouse leks located in or near the Lottery POD.

3.3.5.2.3. Mountain plover

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

The majority of the project area hosts sagebrush, but patches of grassland occur along the flatter ridgetops, especially in the northern portion of the project area (N1/2 Section 4, E1/2 Section 5, SW quarter of Section 34, and the SW quarter of Section 35, Township 51 North, Range 75West). Grass cover varies from dense along the bottoms of a few drainages to sparse along the steeper hills and ridges. The majority of grasses throughout the project area ranged from 10 to 18 inches in height (Gregory 2006).

Wyoming big sagebrush (*Artemisia tridentate wyomingensis*), the primary shrub, occurs in dense (15-25% cover) to moderately dense (10-15% cover) stands throughout the project area. Sagebrush height ranged from 15-36 inches tall and averaging between 20 and 30 inches tall. The majority of the project area is poor mountain plover habitat. However, suitable mountain plover habitat exists within the two active prairie dog colonies.

3.4. West Nile Virus

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

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

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

Table 3.4 Historical West Nile Virus Information

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

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

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

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

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

The WDEQ and the Wyoming Department of Health sent a letter to CBNG operators on June 30, 2004.

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

3.5. Water Resources

The POD is located within the tributaries of Fortification Creek Drainage, with most of POD adjacent to the upper reaches of the main stem of Fortification Creek. Fortification Creek drains into the Upper Powder River drainage system.

3.5.1. Groundwater

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

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

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

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

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

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 4 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in

the POD with depths ranging from 33 to 796 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the Fortification Creek drainage which is tributary to the Upper Powder River primary watershed. The tributaries to Fortification Creek are ephemeral (flowing only in response to a precipitation event or snow melt). The tributary channels are well vegetated grassy swales, without defined bed and bank in upper reaches with some stretches being very erosive and having steep gradients. Fortification Creek is ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The Fortification Creek channel has a well defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in μmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Upper Powder River, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located at Powder River at Arvada, WY PRB FEIS page 3-49).

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

3.6. Cultural Resources

A Class III inventory was conducted for the Lottery project prior to on-the-ground project work (BFO project #'s 70060185 – Harken 2006). Quality Services, Inc., conducted the Class III inventory following the Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48FR190) for the proposed project. Clint Crago, BFO archaeologist, reviewed the report for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined them to be adequate. The following resources are located within the Area of Potential Effect (APE).

Table 3.6 Cultural Resource Sites Identified within the Moolah Project Area

Site Number	Site Type	Eligibility
48CA1716	Homestead	Not Eligible
48CA6175	Historic Feature and Artifact Scatter/Prehistoric Artifact Scatter	Not Eligible
48CA6197	Prehistoric Lithic Scatter	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance should be reduced by following the operator's plans and BLM applied mitigation. Twelve wells can be drilled without a well pad being constructed and 1 well will require a small slot. Surface disturbance would occur with the drilling of the wells. This disturbance, for the 12 wells with no pad, would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of (68X15 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance for these wells would involve approximately 0.1 acre/well for 1.2 total acres. The slotted pad will have a disturbance area of 120 X 50 feet which will be 0.3 acres. Estimated physical surface disturbance for all the wells would total 1.5 acres.

Approximately 0.3 miles of improved roads would be constructed to provide access to various well locations. Approximately 1.6 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. No pipeline will be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	12	0.1/acre	1.2	Long Term
Constructed Pad	1	Site Specific	.3	
Gather/Metering Facilities	0	Site Specific	0	Long Term
Screw Compressors	0	Site Specific	0	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments				Long Term
On-channel (proposed)	11	Site Specific	17.9	
On-channel (existing)	4	Site Specific	6.8	
Water Discharge Points	15	Site Specific or 0.01 ac/WDP	.15	
Channel Disturbance				
Headcut Mitigation*		Site Specific	0.0	
Channel Modification		Site Specific	0.0	
Improved Roads				Long Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
No Corridor	0.3	45' Width	.8	
With Corridor	1		9.5	
2-Track Roads				Long Term
No Corridor	1.0	20' Width	2.6	
With Corridor	3.1	45' Width	16.9	
Pipelines				Short Term
No Corridor				
With Corridor	1.9	45' Width	5.8	
Buried Power Cable	0	12' Width or Site Specific	0	Short Term
No Corridor				
Overhead Powerlines	.65	15' Width	1.2	Long Term
Additional Disturbance		Site Specific	0	

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

4.1.1. Soils

Under this alternative 13 federal wells would be drilled (see description of alternatives). The topographical, ecological and soils in this area are diverse. There are many areas which will be reclaimed by traditional methods, reducing the overall impact of the project. However, some areas will be challenging for reclamation due to soil properties and/or site characteristics. The operator planned their project to avoid those areas where possible, however the proposed action will affect some areas of soils with a limited potential for successful reclamation. Disturbances within these areas require the programmatic/standard COA's be complimented with a site specific performance based reclamation related COA.

Direct and Indirect Effects: Direct and indirect effects resulting from well pad, access roads, pipelines, and other activities include: mixing of soil horizons, loss of soil vegetative cover, organic matter and productivity, increased susceptibility of the soil to erosion, soil compaction, and modification of hillslope hydrology. Soil productivity would be eliminated along improved roads and severely restricted along two track trails until successful final reclamation is achieved. Estimated disturbance associated with this Pod is summarized in Table 4.1.

Soil horizon mixing may result where construction of roads, pipelines or other activities occur. Mixing of horizons may result in moving organic matter and nutrients at depths out of reach of surface plants or destroyed. Horizon mixing may bring soil texture and structure to the surface that are more susceptible to wind and water erosion. If soil structure is destroyed, surface infiltration by water and air may be affected. Inorganic compounds, such as carbonates and other salts, or unweathered material may be brought to the surface which effect seed germination, plant health and viability.

Soil erosion would affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography, and cover. Expedient reclamation of disturbed land with salvaged topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with use of erosion control measures would help ensure soil productivity and stability will be regained in the shortest time frame.

Soil compaction by vehicle traffic results in the collapse of soil pores reducing the transmissivity of water and air. Compaction decreases infiltration thus increasing runoff and hazard of water erosion. The potential for compaction is greatest when soils are wet. 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 in these areas may be reduced by remedial action such as plowing or ripping.

Soil disturbances other than permanent facilities would be short term, and would be reduced with expedient, successful interim reclamation and site stabilization. Construction activities would be designed following Best Management Practices (BMPs) to control erosion and sedimentation; erosion control measures would be maintained and continued until adequate vegetation cover is re-established; vegetation would be removed only when necessary and reseeded following the BLM seeding policy.

Cumulative Effects: Most soil disturbances would be short term, given 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. Construction activities associated with the Proposed Action would impact approximately 5.8 acres during the short term (<5 yrs) and approximately 57.2 acres in the long term (>5 yrs).

4.1.2. Wetland/Riparian

All produced water within the Lottery POD is proposed full containment. The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Due to this assumption, resurfacing of produced water may be present in Fortification Creek downstream of the proposed action. This may lead to the development of wetland/riparian vegetation.

4.1.3. Invasive Species

The operator consulted with the Campbell County Weed and Pest Office about noxious weeds in the area. Canada thistle, Leafy spurge, Spotted knapweed and Saltcedar are state listed noxious weeds known to the area. Utilization of existing facilities and surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, and related facilities would present opportunities for weed invasion and spread.

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 anticipated to be within the parameters of the PRB FEIS for the following reasons:

- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The WMP for the Lottery POD commits that produced water will not contribute to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Although outside of designated elk seasonal ranges, the Lottery project area is within the Fortification Creek Herd Unit; the area where the WGFD actively manages elk. The current Fortification elk herd, 230, is essentially at the WGFD objective of 150. The Fortification elk herd was managed through liberal hunting seasons to bring the population down to the objective from a population of over 400 in the mid 1990s. Hunting quotas are now at a maintenance level.

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

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

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

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

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be discharged into 11 proposed and 4 existing on-channel impoundments. If a reservoir were to discharge, it is unlikely produced water will reach a fish-bearing stream. It is unlikely downstream species would be affected.

4.2.2.1. Cumulative effects

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

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

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

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

Existing and newly constructed reservoirs may have either a positive or negative affect on waterfowl. The reservoirs may provide winter forage and nesting habitat for migrating waterfowl and shore birds. Concentrations of salts and metals, particularly barium and selenium, may increase in the containment reservoirs receiving coalbed natural gas produced water discharges, as water evaporates overtime. Direct effects (toxicity) to waterfowl could occur, depending on the quality of the produced water

With the development of coal bed natural gas more and more reservoirs are being constructed to handle the produced water. This causes direct habitat loss within the sagebrush and grassland ecosystems and creates more breeding areas for mosquitoes and increases the potential for West Nile virus. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin

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

There are ten raptor nests within 0.5 miles of proposed development. Four nests are within 0.25 miles of potential development, six raptor nests are within 0.5 miles of proposed development.

Table 4.2. Infrastructure within close proximity to documented raptor nests within the Lottery project area (Timing limitations will apply to this infrastructure).

BLM ID#	UTM (NAD 83)	SPECIES	STATUS	WELL / PIT NUMBER	DISTANCE
New	429339E, 4909043N	RTHA	Active	Kinder Morgan Compressor; 11 LOTT (nest location was not available at the time of onsite); Triple Play reservoir (nest location was not available at the time of onsite); Access road and pipeline to the 11LOTT well; Pipeline to 13 LOTT well	0.47 miles 0.16 miles 0.15 miles 0.16 miles 0.23 miles
New	428222E, 4908324N	UNK	Inactive	10LOTT well Access road/pipeline to 10LOTT; Main access	0.26 miles 0.18 miles 0.27 miles
New	428860E, 4907958N	UNK	Inactive	Main access road; 12LOTT well; Double Play Reservoir	0.16 miles 0.25 miles 0.32 miles
3142	429621E, 4907907N	RTHA	Inactive	Last Shot Reservoir- nest is out of line of sight; 13LOTT well; Existing 2 track-access to well 13LOTT	0.16 miles 0.29 miles 0.15 miles
New	427669E, 4907857N	UNK	Inactive	All infrastructure	0.49 miles or more
New	428875E, 4907838N	UNK	Inactive	Main access road in Section 8	0.35 miles
New	429007E, 4907619N	UNK	Inactive	Main access road in Section 8	0.35 miles
3143	429279E, 4907614N	UNK	Inactive	Montgomery Road (existing improved road)	0.32 miles
New	428766E, 4907494N	UNK	Inactive	Montgomery Road (existing improved road)	0.30 miles

BLM ID#	UTM (NAD 83)	SPECIES	STATUS	WELL / PIT NUMBER	DISTANCE
3355	427828E, 4907481N	GHOW	Inactive	Montgomery Road (existing improved road)	0.33 miles

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

4.2.4.1. Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

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

4.2.5.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	One small isolated prairie dog colony present.
Threatened				
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body.	S	LAA	Project includes overhead power and roads.
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.

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

4.2.5.1.1. Black-footed ferret

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

4.2.5.1.2. Bald eagle

Based on the raptor nesting and bald eagle winter roost surveys and lack of suitable habitat, it is unlikely bald eagles nest or roost within the Lottery project area. The proposed project should not affect bald eagle nesting or winter roosting, however given the large quantity of available prey, densely populated and active prairie dog colonies and lagomorphs, the project is likely to affect foraging bald eagles.

The presence of overhead power lines and roads may adversely affect foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking, such as the Lottery project area.

There are 2.65 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Yates is proposing an additional 0.65 miles of overhead three-phase distribution lines.

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.

Produced water will be stored in 11 proposed and 4 existing 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.

4.2.5.1.3. Ute's Ladies Tresses Orchid

Produced water will be contained in 4 existing and 11 proposed on-channel reservoirs. Many of the reservoirs are located within ephemeral drainages of Fortification Creek. No springs have been identified within the Lottery project area. Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. Implementation of the proposed coal bed natural gas project should not affect the Ute ladies'-tresses orchid as suitable habitat is present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (*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 and grasslands will be affected.
Brewer's sparrow (*Spizella breweri*)	Basin-prairie shrub	S	MIIH	Sagebrush cover will be affected.
Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	S	MIIH	Prairie dog colony present. Proposed development within prairie dog colonies.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Sagebrush/grassland habitat will be lost, human presence/construction may displace birds.
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush cover will be affected. Direct nesting and brood rearing habitat loss. Habitat fragmentation will displace the birds.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected. Direct habitat loss. Habitat fragmentation will displace the birds.
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	S	MIIH	Sagebrush/grassland habitat will be lost.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	S	MIIH	Prairie dog colonies present. Direct habitat loss and displacement.
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.
Sage sparrow (*Amphispiza billneata*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be lost and construction/drilling activity will displace the birds.
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be lost and construction/drilling activity will displace the birds.
Trumpeter swan (*Cygnus buccinator*)	Lakes, ponds, rivers	S	MIIH	Reservoirs may provide migratory habitat. Reservoirs may become contaminated with salts and heavy metals.
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. Road and wells are within two colonies.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
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	S	MIIH	Sagebrush/grassland habitat will be lost.
Townsend's big-eared bat (*Corynorhinus townsendii*)	Caves and mines.	NP	NI	Habitat not present.
Plants				
Porter's sagebrush (*Artemisia porteri*)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (*Cymopterus williamsii*)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

Presence

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

Project Effects

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

4.2.5.2.1. Black-tailed prairie dog

The 6 LOTT and 7 LOTT wells are proposed within an active and densely populated prairie dog colony. The BLM was unable to move wells due to topography, moving the wells would cause considerable more surface disturbance. Access road/pipeline running from the JDS reservoir to the 6 LOTT and 7 LOTT wells skirt the edge of an active and densely populated prairie dog colony. Approximately 4 acres of active and densely populated prairie dog burrows will be destroyed.

During the onsite on November 8 and 13, 2006 BLM biologist observed that prairie dogs were just starting to colonize the area where the proposed JDS reservoir is to be constructed. Burrows were very scattered and sparse. Construction of the JDS reservoir will destroy approximately 3.24 acres of sparsely populated prairie dog colony.

The presence of JDS reservoir may limit colony expansion. The well house and nearby power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent road may result in prairie dog road mortalities.

4.2.5.2.2. Greater sage-grouse

There are six sage grouse leks within 3.0 miles of the Lottery project area Fortification, Montgomery, Hayden I, Hayden II, Hayden Sat A and Hayden Sat B. Suitable sage-grouse habitat is present throughout the Lottery project area, sage-grouse scat was found during each site visit.

Suitable sage-grouse habitat is present through out the project area. Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), the primary shrub, occurs in dense (15-25% cover) to moderately dense (10-15% cover) stands throughout the project area.

Seven proposed reservoirs were proposed in sage grouse nesting habitat, out of the seven, only four will be authorized by the BLM. The BLM will not approve the Double Play, Triple Play or Spring Fever reservoirs. Under the original proposal approximately 12.5 acres of sage grouse nesting habitat would have been lost. By not approving the construction of 3 reservoirs, the loss of direct sage grouse nesting habitat has been reduced. The net loss of sage grouse nesting habitat (moderate to dense stands of sagebrush) as a result of reservoir construction is 6.8 acres.

The proposed pipeline corridor (water, gas and power line) from the 11 LOTT to the 9 LOTT goes through sage grouse nesting habitat. The maximum disturbance width for the pipeline corridor will not exceed 25 feet. This will result in 2.12 acres of sage grouse nesting habitat (moderate to dense stands of sagebrush) loss. With the original proposal, there would have been 3.8 acres of sage grouse nesting habitat loss.

The access road and pipeline corridor from 10 LOTT to the main access road goes through sage grouse nesting habitat. The maximum width of disturbance will not exceed 25 feet. This will result in 1.3 acres of sage grouse nesting habitat (moderate to dense stands of sagebrush) loss. With the original proposal, there would have been 2.45 acres of sage grouse nesting habitat loss.

Access road/pipeline from 13 LOTT to the main access goes through sage grouse nesting habitat. The maximum width of disturbance will not exceed 25 feet. This will result in 0.9 acres of sage grouse nesting habitat (moderate to dense stands of sagebrush) loss. With the original proposal, there would have been 1.5 acres of sage grouse nesting habitat loss.

Access road to the Tuff Stuff Reservoir goes through sage grouse nesting habitat. The maximum width of disturbance will not exceed 25 feet. This will result in 0.8 acres sage grouse nesting habitat (moderate to dense stands of sagebrush) loss. With the original proposal, there would have been 1.5 acres of sage

grouse nesting habitat (moderate to dense stands of sagebrush) loss.

Access road to 1 LOTT and Spilt Finger Reservoir goes through sage grouse nesting habitat. The maximum width of disturbance will not exceed 25 feet. This will result in 0.8 acres of sage grouse nesting habitat (moderate to dense stands of sagebrush) loss. With the original proposal, there would have been 1.4 acres of sage grouse nesting habitat (moderate to dense stands of sagebrush) loss.

There will be 12.8 acres of direct sage grouse nesting habitat (moderate to dense stands of sagebrush) loss as a result of constructing wells, reservoirs and roads/piplines.

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

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

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

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

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

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

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

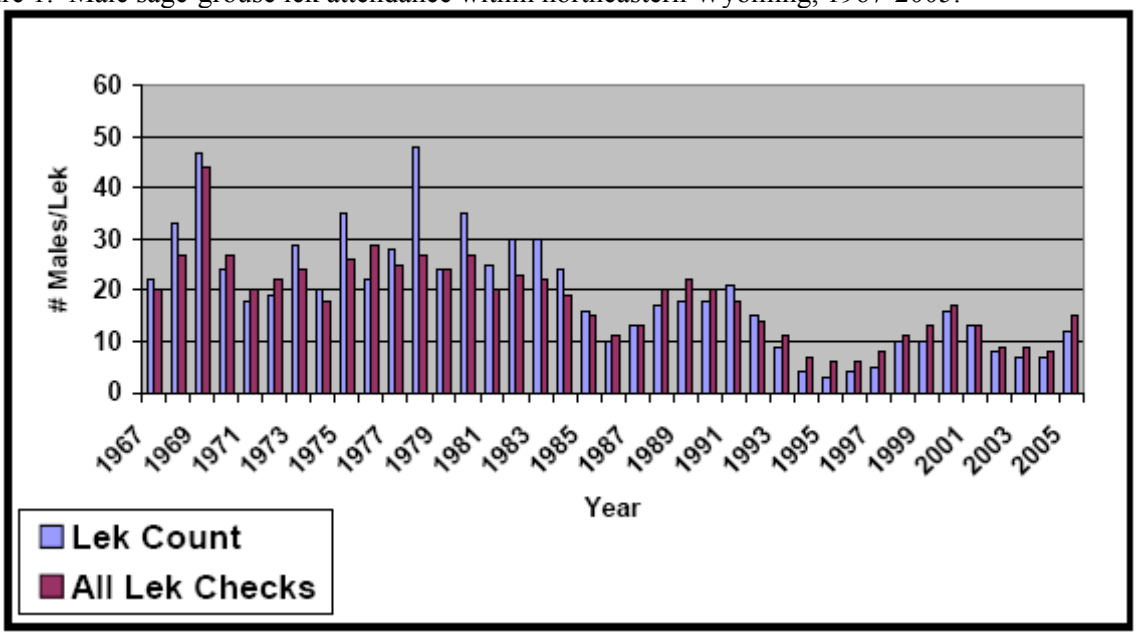
(1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found 36% of their grouse nesting within 3 km of the capture leks. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. In press).

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

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

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

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



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

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

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

4.2.5.2.3. Mountain plover

The majority of the project area is sagebrush and tall grassland, not suitable for plovers. However, suitable habitat is present within the active prairie dog colonies . The project may affect mountain plovers.

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors and roads may be attractive to plovers while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. The existing overhead power lines provide perch sites for raptors potentially resulting in increased mountain plover predation. CBNG infrastructure such as the well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

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

With the loss or alteration of their natural breeding habitat (predominately prairie dog colonies), mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat. 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 and 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 US Fish and Wildlife Service (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 1995).

Additional analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus

The PRB FEIS and ROD included a programmatic mitigation measure that states, “The BLM will consult with appropriate state agencies regarding WNv. If determined to be necessary, a COA will be applied at the time of APD approval to treat mosquitoes for any CBM discharge waters that become stagnant.” This project is likely to result in standing surface water which may potentially increase mosquito breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNv species and its effects in Wyoming.

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

With 11 proposed and 4 existing reservoirs within the project area there will be an increase the amount of standing water and increase the amount of mosquito habitat and will increase the potential for West Nile

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

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River primary watershed and the Fortificatoin Creek secondary watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should reduce project area and downstream potential impacts from proposed water management strategies.

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

The maximum water production is predicted to be 50 gpm per well or 650 gpm (1.4 cfs or 1,048 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 171,423 acre-feet in 2006. As such, the volume of water resulting from the production of these wells is .6% of the total volume projected for 2006. This volume of produced water is within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 260 gpm will infiltrate at or near the discharge points and impoundments (419 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 33 to 996 feet compared to CBNG wells commingled in the; Felix, Big George, Anderson, Upper Canyon, Lower Canyon, Wall, and Pawnee coal zones to depths of approximately; 510-660, 1120-1340, 1150-1370, 1185-1474, 11480-1750, 1435-2050, and 2210-2345 feet respectively. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells

within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

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

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

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

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

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

4.4.1.1. Groundwater Cumulative Effects:

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

Development of CBM through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water "…cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed

during reasonably foreseeable CBM development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5)." (PRB FEIS page 4-65). No additional mitigation is necessary.

4.4.2. Surface Water

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

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

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Most Restrictive Proposed Limit –		2	1,000
Least Restrictive Proposed Limit		10	3,200
Watershed at Arvada, WY Gauging station Historic Data Average at Minimum Flow		13.4	2,812
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	 500 2,000 5,000	 8	
WDEQ Water Quality Requirement for WYPDES Permit # WY0055115 At discharge point	5,000		7,500
Predicted Produced Water Quality commingled in the; Felix, Big George, Anderson, Upper Canyon, Lower Canyon, Wall, and Pawnee coal zones.	1,000	12.7	1,580

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 1,000 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

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

There are 15 discharge points proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 15 impoundments (147.7 acre ft) would potentially be utilized within the project area. These impoundments will disturb approximately 24.7 acres including the dam structures. Of these water impoundments, 11 would be proposed on-channel reservoirs and 4 would be existing on-channel ponds. 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.

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 .21 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 171,423cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 13 wells is anticipated to be a total of 50.0 gpm or 1.4 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 Upper Powder River from this action (1.4 cfs) may add a maximum .21 cfs to the Upper Powder River flows, or .00012% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Upper Powder River (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page3). Based on the area of Fortification Creek and Amos Draw watersheds above the POD (13.21 sq mi) and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 106 wells which could produce a maximum flow rate of 5,300 gpm (11.8 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 11.8 cfs, is much less than the volume of runoff estimated from the 2-year storm event for Fortification Creek and Amos Draw.

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

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

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

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 9
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Radium 226	1 pCi/l max
Dissolved iron	1,000 µg/l max
Dissolved manganese	629 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	150 mg/l

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

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 Lottery POD prepared by WWC Engineering for Yates Petroleum Corp.

4.4.2.1. Surface Water Cumulative Effects

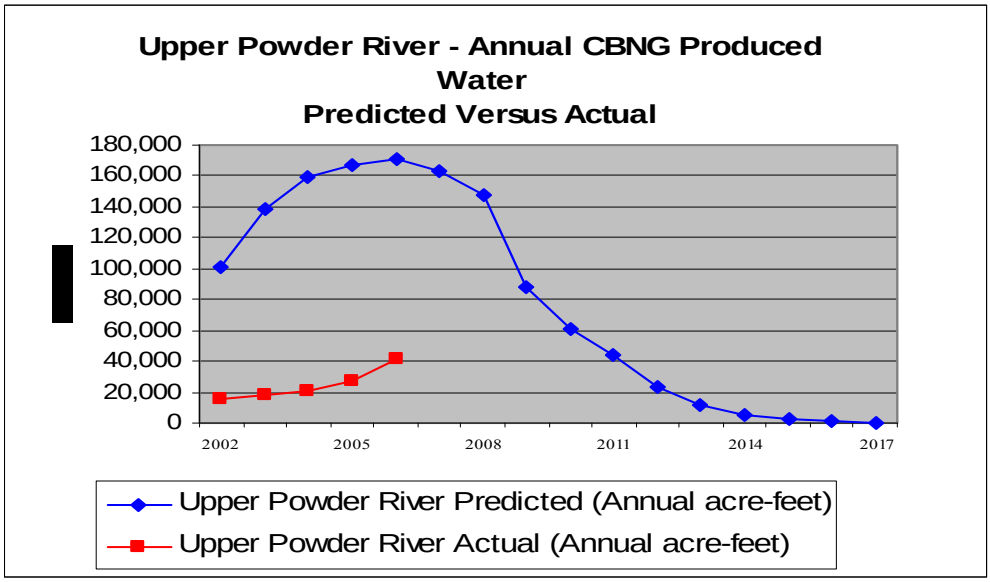
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2006 all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 123,986 acre-ft of water compared to the predicted 736,519 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 16.8 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

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

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040				
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	**1,285,233**		**123,984**			

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



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

The PRB FEIS states, "Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ's (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. As the two states develop a better understanding of the effects of CBM discharges through the enhanced monitoring required by the MOC, they can adjust the permitting approaches to allow more or less discharges to the Powder River drainage. Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met." (PRB FEIS page 4-117)

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

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

No additional mitigation measures are required.

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

4.5. Cultural Resources

The Bureau of Land Management has determined that no historic properties are within the area of potential effect. Sites 48CA1716 and 48CA6175 will be impacted by the project; however both are considered not eligible to the NRHP. The Bureau will require a monitoring stipulation for all construction activities along the Fortification Creek drainage due to a high potential for buried cultural deposits. On 3/19/07, the Bureau electronically notified the Wyoming State Historic Preservation Office (SHPO) following section V(A)(2) of the Wyoming State Protocol that no historic properties were identified in the proposed project area.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Sara Needles	Wyoming SHPO	Wyoming SHPO	No

6. OTHER PERMITS REQUIRED

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

7. REFERENCES AND AUTHORITIES

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

Audubon Watch List. Mountain Plover (*Charadrius montanus*). http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=139

Avian Power Line Interaction Committee. 2006. Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute. Washington, D.C. 125pp.

Barko, Valerie A., James H.Shaw, David M. Lesie. 1999. Birds Associated with Black-tailed Prairie Dog Colonies in Southern Shortgrass Prairie. The Southwestern Naturalist 44(4):484-489

Barko, Valerie A., Michael W. Palmer, Jeffery Stewart, and David M. Engle. 2001. Vascular Plant Communities Associated with Black-tailed Prairie Dog Colonies in Southern Shortgrass Prairie. Oklahoma Academy of Science. 81:11-19

Bennet, Bob. 2004. Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval (COAs). BLM (State Director, Wyoming). Cheyenne, WY. 7pp.

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

Braun, C.E., O.O. Oedekoven, and C.L. Aldridge. 2002. Oil and Gas Development in Western north America: Effects on Sagebrush Steppe Avifauna with Particular Emphasis on Sage Grouse. Transactions of the North American Wildlife and Natural Resources Conference. 67: 337-349

Bruan, C.E. 1986. Changes in sage grouse lek counts with the advent of surface coal mining. Proceedings: issues and technology in the management of impacted western wildlife. 2: 227-231.

Bruan, C.E. 1998. Sage-grouse declines in the western North America: what are the prolems? Western Association of Fish and Wildlife Agencies Proceedings 78: 139-156.

Bruns Stuckrahm , Donna M., Theresa E. Olson and Elizabeth K. Harper.1993. Plant Species in Black-tailed Prairie Dog Townsin Billings County, North Dakota. Prairie Naturalist 25(2) June 1993 173-183

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

Clark, Tim W., Dan Hinckley and Terrell Rich. 1989. The Prairie Dog Ecosystem: Managing For Biological Diversity. Montana BLM Wildlife Technical Bulletin No.2 pp 55.

Code of Federal Regulations (CFR)

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

Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage grouse populations and their habitat. Wildlife Society Bulletin 28: 967-985.

Connelly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver. 2004. Conservation assessment of greater sage-grouse and sage brush habitats. Western Association of Fish and Wildlife Agencies. Unpublished report. Cheyenne, Wyoming, USA. http://sagemap.wr.usgs.gov/Docs/Greater_Sage-grouse_Conservation_Assessment_060404.pdf

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

Desmond, Martha J., J.A.Savidge and K.M. Eskridge. 2000. Correlations Between Burrowing Owl and Black-tailed Prairie Dog Declines: A 7-Year Analysis. Journal of Wildlife Management 64(4):1067-1075

Dickson, Tom. 2004. The Swift Fox's Speedy Return. Montana Outdoors July-Aug 2004. http://fwp.mt.gov/mtoutdoors/HTML/Articles/2004/SwiftFox.htm

Easdale, Guymen. 2006. Onsite Notes for Lottery. BLM Buffalo Field Office. Buffalo, WY.

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

Gregery, Jessica. 2006. Wildlife Surveys and Habitat Assessment for the Lottery Plan of Development. Thunderbird-Jones & Stokes. Gillette, Wy.

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

Grenier, Martin, Bob Oakleaf, Kelli Taylor and Michelle Hymas. 2004. Inventory and Monitoring of the Black-tailed Prairie Dogs in Wyoming-Status of Colonies Completion Report. Wyoming Game and Fish Department

Hall, F., and E. Haney. 1997. Distribution and trend of sage-grouse (*Centrocercus ur ophasianus*) in relation to overhead transmission lines in northeast California. Draft document. California Department of Fish and Game.

Hanf, J.M., P.A. Schmidt, E.B. Groshens. 1994. Sage grouse in the high desertof central Oregon: results of a study, 1988-1993. USDI Bureau of Land Management, Prineville, Oregon, USA.

Harken, N. 2006 Class III Cultural Resource Inventory of Yates Petroleum's Lottery POD, Campbell County, Wyoming.

Hartzler, J.E. 1974. Predation and daily timing of sage-grouse leks. The Auk 91: 532-536.

Hausleitner, D. 2003. Population dynamics, habitat use and movements of greater sage-grouse in Moffat

County, Colorado. Thesis, University of Idaho, Moscow, Idaho, USA.

Holloran, M.J., and S.H. Anderson. 2004. Sage-grouse response to natural gas field development in northwestern Wyoming. Page 16 in Proceedings of the 24th Meeting of the Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee. Wenatchee, Washington. USA.

Hoogland, J.L.1981. Nepotism and cooperative breeding in the black-tailed dog (Sciuridea: Cynomys ludovicianus). In Natural selection and social behavior: Recent research and new theory, ed. R.D. Alexander and D.W. Tinkle, 238-310 New York Press.

Hunting, Kevin. Mountain Plover (*Charadrius montanus*) California Department of Fish and Game. http://www.prbo.org/calpif/htmldocs/species/grassland/moplacct.html

Ingelfinger, F., and S. Anderson. 2004. Passerine response to roads associated with natural gas extraction in a sagebrush steppe habitat. Western North American Naturalist 64:385-395

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

Kelly Brian T. 2004. Letter to interested parties: Black-footed ferret clearance surveys. U.S. Fish and Wildlife Service (February 2, 2004). Cheyenne, WY. 4pp.

Knowles, Craig, S. Stoner, and S. Gieb. 1982. Selective Use of Black-tailed Prairie Dog Towns By Mountain Plovers. Condor 84:71-74

Litzel, R. 2004. Personal communication [January 6 phone conversation with Jim Sparks]. Johnson County Weed and Pest District.

Lowham, H.W. Streamflows in Wyoming WRIR 88-4045 U.S. Geological Survey 1988

Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67th North American Wildlife and Natural Resources Conference.

Lyon, A.G. 2000. The potential effects of natural gas development on sage-grouse near Pinedale, Wyoming. Thesis, University of Wyoming, Laramie, USA.

Lyon, A.G., and S.H. Anderson.2003. Potential gas development impacts on sage grouse nest initiation and movement. Wildlife Society Bulletin 31:486-491.

Lyon, Jack L., October. 1979. Habitat Effectiveness for Elk as Influenced By Roads and Cover. Journal of Forestry. October, 1979.

Marra PP, Griffing SM, McLean RG. West Nile virus and wildlife health. Emerg Infect Dis [serial online] 2003 Jul. Available from: URL: http://www.cdc.gov/ncidod/vol9no7/03-0277.htm.

Mackie, R.J., D.E. Pac, K.L. Hamlin, and G.L. Dusek. 1998. Ecology and Management of Mule Deer and White-tailed Deer in Montana. Montana Fish, Wildlife and Parks. Helena, Montana.

Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey

2003

Mooney, A. 2004. Personal Communication [January 6 phone conversation with Jim Sparks]. Campbell County Weed and Pest District.

Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.

O'gara, Bart W. and Jim D. Yoakum. 1992. Pronghorn Management Guidelines. U.S. Department of the Interior, Fish and Wildlife Service.

Olson, Sally and Daniel Edge. 1984. Nest Site Selection by Mountain Plovers in North Central Montana. Journal of Range Management 38(3) May 1995 280-282

Patterson, Craig T. and Stanley H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (Haliaeetus leucocephalus) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.

Remington, T.E., and C.E. Braun. 1991. How surface coal mining affects Sage Grouse, North Park, Colorado. Proceedings: issues and technology in the management of impacted western wildlife 5:128-132.

Riddle, P., and C. Oakley. 1973. The Impact of Severe Winters and Fences on Antelope Mortality in South Central Wyoming. West. Association State Fish and Game Comm. Proc. 53.

Rinkes, T. 2003. Personal communication [Draft notes from Annual Sage-Grouse and Sagebrush Species of Concern Meeting]. Bureau of land Management Wildlife Biologist/Sage Grouse Coordinator.

Rogers, Brad. Personal Communication. Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Cheyenne Field Office. Cheyenne, WY.

Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah

Rost, Gregory R. and James A. Bailey. 1979. Distribution of Mule Deer and Elk in Relation to Roads. Journal of Wildlife Management. 43.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. The Scientific Basis for Lynx Conservation: Qualified Insights. Ch16. USDA Forest Service Technical Report RMRS-GTR-30.

Russell, Robin E. and James K. Detling 2003. Grasshoppers (Orthoptera: Acrididae) and Black-tailed Prairie Dogs (Sciuridae: Cynomys ludovicianus(Ord):Assocations between Two Rangeland Heribivores. Journal of the Kansas Entomological Society 76(4), 2003. pp578-587

Ryder, T.J. and L.L. Irwin. 1987. Winter Habitat Relationships of Pronghorns in South Central Wyoming. Journal of Wildlife Management, 51.

Sharps, Jon C. and Daniel W. Uresk. 1990. Ecological Review of Black-tailed Prairie Dogs and

Associated Species in Western South Dakota. Great Basin Naturalist 50(4) 339-345

Sheldon, Daly and Fred Lindzey. 2003. "Movement and Dispersion of Pronghorn in Relation to Fences". In: Program and Abstracts for the Annual Meeting at the Inn in Lander, WY:

Slovkin, J.M. 1982. Habitat Requirements and Evaluations. Elk of North America. Stackpole Books, Harrisburg, Pennsylvania.

Stromberg, Mark Robert.1975. Habitat Relationships of the Black-tailed Prairie Dog (Cyomys ludovicianus)

Turbak, Gray. 2004. Prairie Home Companions National Wildlife Federation Dec/Jan 2004, vol.42 no. 1

The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).

U.S. Department of the Interior, Bureau of Land Management, 2002. Oil and Gas Development on the Southern UTE EIS.

U.S. Department of the Interior, Bureau of Land Management, 2003. Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans, Miles City, Montana.

U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.

U.S. Department of the Interior, Bureau of Land Management, Buffalo Field Office, Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office April 2001.

U.S. Department of the Interior, Bureau of Land Management, Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. April 30, 2003.

U.S. Fish and Wildlife Service (USFWS). 1989. Black-footed ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.

U.S. Fish and Wildlife Service. 2002. Final Biological and Conference Opinion for the Powder River Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties (WY6633). U.S. Fish and Wildlife Service. December 17, 2002. Cheyenne, WY. 58pp.

Walker B, Naugle D, Rinkes T. 2003. The Response of Sage Grouse to Coal-bed Methane Development and West Nile virus in the Powder River Basin: Is There a Link ? Page 6 in: Program and Abstracts for the Annual Wildlife Society Meeting, Wyoming Chapter.

WDEQ, June 14, 2004. Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments

Whicker, April D., and James Detling. 1988. Ecological Consequences of Prairie Dog Disturbances. BioScience Dec. 1988 Vol. 38 No.11 778-785

Wildlife – Human Interactions: Disease, Recreation, and Development, Fragmentation and Urban Issues.

The Wildlife Society Wyoming Chapter. Lander, WY. Nov. 18-21, 2003.

Wuerthner, George. 1996. Viewpoint: The black-tailed prairie dog-headed for exticion? Journal of Range Management 50:459-466

WWC Engineering. 2007. Water Management Plan for the Lottery Plan of Development (Yates).

Wyoming Game and Fish Department. 2002. Draft Wyoming Greater Sage Grouse- Grouse Conservation Plan. July 10, 2002. Located on the Internet at: http://gf.state.wy.us/htlm/sagegrouse.htm. Accessed August 2, 200

Yates Petroleum Corporation. 2006. Lottery Plan of Development – Master Surface Use Plan. Yates Petroleum Corporation. Gillette, Wy.

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