

**FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD  
FOR  
Lance Oil & Gas Company, Inc.  
Camp John & Augusta  
ENVIRONMENTAL ASSESSMENT -WY-070-05-373**

**DECISION:** Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize the Lance Oil & Gas Company, Inc.'s Camp John & Augusta Coal Bed Natural Gas (CBNG) POD comprised of the following 18 Applications for Permit to Drill (APDs), as follows:

	WELL NAME	WELL #	QTR	SEC	TWP	RNG	LEASE #
1	AUGUSTA UNIT	14-22BG	SWSW	22	51N	76W	WYW162029
2	AUGUSTA UNIT	14-22WA	SWSW	22	51N	76W	WYW162029
3	CAMP JOHN UNIT	14-23BG	SWSW	23	51N	76W	WYW147337
4	CAMP JOHN UNIT	14-23WA	SWSW	23	51N	76W	WYW147337
5	CAMP JOHN UNIT	12-26BG	SWNW	26	51N	76W	WYW129043
6	CAMP JOHN UNIT	12-26WA	SWNW	26	51N	76W	WYW129043
7	CAMP JOHN UNIT	21-26BG	NENW	26	51N	76W	WYW129043
8	CAMP JOHN UNIT	21-26WA	NENW	26	51N	76W	WYW129043
9	CAMP JOHN UNIT	32-26BG	SWNE	26	51N	76W	WYW129043
10	CAMP JOHN UNIT	32-26WA	SWNE	26	51N	76W	WYW129043
11	AUGUSTA UNIT	12-27BG	SWNW	27	51N	76W	WYW162027
12	AUGUSTA UNIT	12-27WA	SWNW	27	51N	76W	WYW162027
13	AUGUSTA UNIT	21-27BG	NENW	27	51N	76W	WYW162027
14	AUGUSTA UNIT	21-27WA	NENW	27	51N	76W	WYW162027
15	AUGUSTA UNIT	41-27BG	NENE	27	51N	76W	WYW162027
16	AUGUSTA UNIT	41-27WA	NENE	27	51N	76W	WYW162027
17	AUGUSTA UNIT	32-27BG	SWNE	27	51N	76W	WYW162027
18	AUGUSTA UNIT	32-27WA	SWNE	27	51N	76W	WYW162027

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:

- The Operator, in their Plan of Development, 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.
  - Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
  - 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 Landowner(s).
- Alternative C will not result in any undue or unnecessary environmental degradation.
- 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.
- Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
- Alternative C is the environmentally-preferred Alternative.
- 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.
- Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

**FINDING OF NO SIGNIFICANT IMPACT:** Based on the analysis of the potential environmental impacts of the proposed action in the attached environmental assessment, I have determined that NO significant impacts are expected 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: \_\_\_\_\_

8/25/05

**BUREAU OF LAND MANAGEMENT  
BUFFALO FIELD OFFICE  
ENVIRONMENTAL ASSESSMENT (EA)  
FOR  
Lance Oil & Gas Company, Inc.  
Camp John & Augusta  
PLAN OF DEVELOPMENT  
WY-070-05-373**

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

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

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

### **2. ALTERNATIVES INCLUDING THE PROPOSED ACTION**

#### **2.1. Alternative A - No Action**

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

#### **2.2. Alternative B Proposed Action**

Description of the Proposed Action

Proposed Action Title/Type: Lance Oil & Gas's Camp John & Augusta Plan of Development (POD) for 18 coal bed natural gas well APD's (18 proposed wells – 9 proposed well locations, 2 wells per location) and associated infrastructure.

Proposed Well Information: There are 18 wells proposed within this POD, as follows:

	WELL NAME	WELL #	QTR	SEC	TWP	RNG	LEASE #
1	AUGUSTA UNIT	14-22BG	SWSW	22	51N	76W	WYW162029
2	AUGUSTA UNIT	14-22WA	SWSW	22	51N	76W	WYW162029
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17	AUGUSTA UNIT	32-27BG	SWNE	27	51N	76W	WYW162027
18	AUGUSTA UNIT	32-27WA	SWNE	27	51N	76W	WYW162027

County: Campbell

Applicant: Lance Oil & Gas

Surface Owners: Hayden Revocable Trust, the BLM.

The proposed action involves the development of the project, which includes the following:

- Drilling of 18 total federal CBM wells in the Big George and Wall coal zones to depths of approximately 1,250 to 2,250 feet.
- An unimproved and improved road network.
- A water management plan that involves the following infrastructure and strategy: a primary strategy of 1 treatment facility and one discharge point in Fortification Creek, and a secondary or backup strategy which includes as needed construction of 10 discharge points and 11 stock water reservoirs ( 5 proposed and 6 existing) within the Upper Powder River watershed.
- A buried gas, water and power line network, and no central gathering/metering facilities or compression facilities.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan, Drilling Plan and Water Management Plan in the Plan of Development (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 Master Surface Use Plan, Drilling Program and Water Management Plan, in addition to the Standard Conditions of

Approval contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

Additionally, the Operator, in their Plan of Development, has committed to:

- Comply with all applicable Federal, State and Local laws and regulations.
- 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.
- Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
- 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**

Modifications, or alternatives, to the original proposal received from the operator, were identified as the result of the pre-approval onsite inspection(s). The following changes and mitigation measures to the proposed action resulting from the on-site will be analyzed in Alternative C.

Implementation of committed mitigation measures contained in the Master Surface Use Plan, Drilling Program and Water Management Plan, in addition to the Standard Conditions of Approval contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

At the on-site, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be minimized. 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 or minimize 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 or minimize environmental effects of the operator's proposal. The specific changes identified for the Camp John & Augusta POD are listed below under 2.3.1:

#### **2.3.1. Changes as a result of the on-sites**

Outfall 008 was dropped because flow from a spring was discovered in the draw at the onsite. BLM personnel were not able to reach the spring itself due to time constraints during the onsite.

#### **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 *Conditions of Approval* (COAs) and will be in addition to stipulations applied at the time of lease issuance and any standard conditions of approval.

##### **2.3.2.1. Groundwater**

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring 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. 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 ground water. NPDES permits received by DEQ prior to August 1<sup>st</sup> for discharging to impoundments will be assessed through the "Impoundment Monitoring Plan". For NPDES permits received by DEQ after the August 1<sup>st</sup> effective date, the BLM will require that operators comply with the requirements outlined in the DEQ compliance monitoring guidance document (June 14, 2004) prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

#### **2.3.2.2. Surface Water**

1. Locate discharge points in areas that will minimize erosion and impacts to the receiving channel, existing improvements, and downstream users.
2. Locate discharge points in stable, low gradient drainage systems and below active head cuts, when possible. If discharge is located above a head cut, mitigation measures will be required by the BLM Authorized Officer on a site specific basis. Some mitigation measures will require engineering design.
3. All discharge points will require energy dissipation measures.
4. Discharge points may not be authorized by BLM regardless of WYPDES status or previous use. Sites may be moved or otherwise mitigated by the BLM Authorized Officer during onsite inspections where environmental issues exist.
5. Cumulative produced water discharge must not exceed the naturally occurring 2 year peak flow of the receiving channel.
6. Discharge Points will not be located in playas or enclosed basins unless it can be demonstrated that it can be done without resulting in adverse impacts. Discharges into valley bottoms with no defined low-flow channel will generally not be allowed, but will be reviewed on a site-specific basis. Channel modification may be required. Plans will be reviewed with the BLM authorizing officer prior to installation.
7. Channel Crossings:
  - Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
  - Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
  - 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.
  - Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
8. 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.

9. Concerns regarding the quality of the discharged CBM water on downstream irrigation use may require operators to increase the amount of storage of CBM water during the irrigation months and allow more surface discharge during the non-irrigation months.
10. The BLM will consult with appropriate state agencies regarding West Nile Virus. If determined to be necessary, a condition of approval will be applied at the time of APD approval to treat mosquitoes for any CBM discharge waters that become stagnant.
11. The operator will be required to provide reclamation bonds in the amount specified by a qualified Professional Engineer for the impoundments to be used for the management of CBNG water. The bond amount will be submitted within 90 days after POD approval and will be approved by the BLM prior to commencing construction.
12. 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 these impoundments.
13. The operator will provide copies of the complete approved WYPDES permit to the BLM, when it is issued by the WDEQ, prior to commencing construction of treatment/storage facilities.

#### **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. To protect the biological and hydrologic features of riparian areas, woody draws, wetlands, and floodplains, all well pads, compressors, and other non-linear facilities will be located outside of these areas.
2. To reduce adverse effects on existing wetlands and riparian areas, water discharge should not be allowed if increased discharge volumes or subsequent recharge of shallow aquifers will inundate and kill woody species, such as willows or cottonwoods. If discharge is allowed into wetland/riparian areas, the flow will be confined to as narrow an area as possible to reduce impacts to soils and vegetation.
3. For any jurisdictional wetlands identified that may be impacted, a detailed mitigation plan will be developed during the APD/POD or sundry notice approval process. Federal requirements to replace all impacted wetlands will mitigate this loss, so environmental impacts will occur only during the life of the project (including reclamation).
4. Any fences used in wetland areas should be placed well back from the wetlands to prevent waterfowl mortalities and should be constructed to standards that allow big game movement.
5. Crossings of wetland/riparian areas by linear features, such as pipelines, roads, and power lines will be avoided to the extent practicable. Where crossings cannot be avoided, impacts will be minimized through use of the following measures:

- Site-specific mitigation plans will be developed during the APD, POD, or Sundry Notice approval process for all proposed disturbance to wetland/riparian areas.
- Crossings will be constructed perpendicular to wetland/riparian areas, where practical.
- 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.
- Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.
- No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.
- The lower edge of soil or other material stockpiles will be located outside the active floodplain.
- Drilling mud pits will be located outside of riparian areas, wetlands, and floodplains, where practical.
- Disturbed channels will be re-shaped to their approximate original configuration or stable geo-morphological configuration and properly stabilized.
- Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

#### **2.3.2.5. Wildlife**

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
2. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
3. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
4. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.
5. The Companies will locate impoundments to avoid sagebrush shrublands, where practical.
6. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.
7. 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.

8. 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. Site-specific project areas will be evaluated for suitable bald eagle nesting and roosting habitat prior to permit approval. Suitable nesting habitat is any mature stand of conifer or cottonwood trees in association with rivers, streams, reservoirs, lakes or any significant body of water. Suitable roosting habitat is defined as any mature stands of conifer or cottonwood trees.
2. The BLM will monitor all take of bald eagle habitat associated with the preferred alternative. The actual measurement of disturbed habitat is the responsibility of BLM but can be delegated to BLM agent (consultant, contractor, etc.). A written summary will be provided to the USFWS' Wyoming Field Office semi-annually. The semi-annual report will include field survey reports for endangered, threatened, proposed and candidate species for all actions covered under the *Environmental Impact Statement (EIS) for the Powder River Basin Oil and Gas Project* and ROD. The semi-annual reports will include all actions completed up to 30 days prior to the reporting dates. The first report will be due 6 months after the signing of the ROD and on the anniversary date of the signing of the ROD. Reporting will continue for the life of the project.
3. The BLM will monitor all road-associated carcasses, jackrabbit sized and larger, along project (operator-maintained) roads.
4. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of the APD/POD or Sundry Notices.
5. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a BLM approved biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.
6. A minimum disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle nest sites. A seasonal minimum disturbance-free buffer zone of one mile will be established for all bald eagle nest sites (February 15 – August 15).
7. A seasonal minimum disturbance-free buffer zone of 1 mile will be established for all bald eagle winter roost sites (November 1 – April 1). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.
8. Within ½ mile of bald eagle winter roost sites additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 and 3:00 may be necessary to prevent disturbance (November 1 – April 1).
9. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

### **2.3.2.7. Visual Resources**

1. The Companies will mount lights at compressor stations 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. 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.

### **2.3.3. Site specific mitigation measures**

1. All contractors will have a copy of the pod map and conditions of approval with them at all times. If operators/contractors are found without the information mentioned above, they will be shut down immediately as ordered by the authorized officer.
2. No construction activities are approved for the access road, water pipelines and buried power lines related to Rights-of-Way Serial Number WYW-161617, Sec. 12-15, Sec. 22, Lots 4, 5, T51N R76, until the Rights-of-Way has been authorized.
3. No construction activities are approved for the polymer gas pipelines related to Rights-of-Way Serial Number WYW-163668, Sec. 15: Lots 12, 13, Sec. 22: Lots 4, 5, T51N, R76W, until the Rights-of-Way has been authorized.
4. Water Treatment Facility: No construction or surface disturbing activities related to the Water Treatment Facility can take place before the operator has an approved Chapter 3 permit from the WDEQ. Lance Oil & Gas will notify the BLM prior to commencement of construction and provide requisite reclamation bonding for the water treatment facility in the amount specified by a Wyoming registered qualified professional engineer's estimate of reclamation including costs to remove pipes, concrete and other structural components, for any structures and impoundments to be used for the management of CBNG water.
5. Proposed Reservoirs: If reservoirs are chosen for water storage/disposal as opposed to a Water Treatment Facility, Lance Oil & Gas will notify the BLM and provide requisite reclamation bonding for the reservoirs in the amount specified by a Wyoming registered qualified professional engineer's estimate of reclamation including costs to remove pipes, concrete and other structural components, for the impoundments to be used for the management of CBNG water. The bond amount will be submitted for approval by the BLM prior to commencing construction.
6. Roads into crucial elk winter range will be signed and closed to the general public, during the period December 1 to April 1. Areas for placement of signage and closure will be designated by the Wildlife Biologist. Please contact Larry Gerard, Wildlife Biologist @ 307.684.1142. Access to wells or infrastructure within the CJA POD

will only be to by authorized personnel and the landowner. This COA affects the following wells:

14-23 WA, BG; 12-26 WA,BG; 41-27 WA, BG; 32-27 WA,BG; 21-27 WA,BG; 12-27WA,BG; and 14-22 WA,BG.

7. Wells located within crucial elk winter range will be equipped with radio-telemetry to reduce traffic and maintenance service. Individual well access roads will be immediately reclaimed back to a 2 track road.
8. No surface disturbing activities are permitted within two miles of active leks between March 1 and June 15, prior to completion of a greater sage grouse lek survey. This condition will be implemented on an annual basis for the duration of surface disturbing activities. **This timing stipulation affects all the wells in the project except for the 11-22 well.**

If an active lek is identified during the survey, the two 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 will 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 BLM and WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist prior to surface disturbing activities.

9. Sagebrush shall be re-established, seedlings present, within three years for all sagebrush areas disturbed, (Northeastern Wyoming Sage Grouse Working Group. 2004).
10. All changes made at the onsite will be followed. They have all been incorporated into the operator's plan of development.
11. No drilling pads are authorized for the following well locations: Augusta Federal 14-22, Augusta Federal 12-27, Augusta Federal 21-27, Augusta Federal 32-27 and the Augusta Federal 41-27.
12. 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 Camp John & Augusta POD is Covert Green (18-0617 TPX).
13. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according to the following spacing:

<u>Grade</u>	<u>Drainage Spacing</u>
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
12-16%	100 ft

14. The operator is responsible for having the licensed professional engineer(s) certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
15. Provide 4" of aggregate where grades exceed 8%.
16. 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 - <i>Cultivar</i>	Full Seeding (lbs/ac PLS*)
Western Wheatgrass – <i>Rosana</i>	3
Bluebunch Wheatgrass – <i>Secar or P-7</i>	3
Needle-and-Thread	1
Green Needlegrass	2
Prairie Sandreed - Goshen	1
Prairie coneflower	1
Purple Prairie Clover	1
Fourwing saltbrush	.5
<b>Totals</b>	<b>12.5</b>

Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed. Complete fall seeding after September 15 and prior to prolonged ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.

#### **2.4. Alternatives considered but not analyzed in detail**

Water management alternatives considered but rejected by the operator included direct discharge, full containment, reinjection, and land application disposal. For a detailed discussion on why these alternatives were rejected, see pages 8-11 of the water management plan.

### **3. DESCRIPTION OF AFFECTED ENVIRONMENT**

Applications to drill were received on 22 December 2004. Field inspections of the proposed Camp John & Augusta CBM project were conducted on 24 May 2005 by Kerry Hayden – Surface Owner, Naomi Morton-Knight – Knight Technologies, Greg Hicks – Western Water Consultants,

Rusty Roush and Ethan Jahnke – Lance Oil & Gas, Steve Janzen, Paul Rau, Ben Adams, Larry Gerard and David G. Seward – 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.**

<b>Mandatory Item</b>	<b>Potentially Impacted</b>	<b>No Impact</b>	<b>Not Present On Site</b>	<b>BLM Evaluator</b>
Threatened and Endangered Species		X		Larry Gerard
Floodplains	X			Ben Adams
Wilderness Values			X	David G. Seward
ACECs				David G. Seward
Water Resources	X			Ben Adams
Air Quality		X		David G. Seward
Cultural or Historical Values		X		G.L. "Buck" Damone III
Prime or Unique Farmlands			X	David G. Seward
Wild & Scenic Rivers			X	David G. Seward
Wetland/Riparian	X			Ben Adams
Native American Religious Concerns			X	G.L. "Buck" Damone III
Hazardous Wastes or Solids		X		David G. Seward
Invasive, Nonnative Species	X			David G. Seward
Environmental Justice			X	David G. Seward

### **3.1. Topographic Characteristics of Project Area**

The proposed project is approximately 24 miles northwest of Gillette, Campbell County, Wyoming, just east of the Johnson/Campbell County line. McLaughlin Draw borders the western portion of the proposed POD, with Fortification Creek on the northern border – traversing southeasterly through the northeastern portion of the proposed POD. Elevations range from approximately 4,200 to 5,500 feet in the project area. The Fortification Creek Special Management Area lies north of the proposed POD. Land uses in the area include cattle grazing, conventional oil & gas and the development of CBNG. This area is characterized by steep hills, narrow gullies, broad swales and highly erosive soils. The upper ends of the drainages are typical of ephemeral draws in this type of topography, formed by irregular occurrences of high intensity short duration precipitation events. The lower portions of the drainages flatten out and tend to form fairly gentle broad-bottomed swales with excellent vegetative cover.

### **3.2. Vegetation & Soils**

Using the Natural Resource Conservation Service, (NRCS, USDA), Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains, in the 10-14" Northern Plains precipitation zone, the landforms and the soils of this site are classified predominantly as a Loamy ecological site occurring within the proposed POD.

### **Mixed Sagebrush/Grass Plant Community**

Historically, this plant community evolved under grazing by bison and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush management. Wyoming big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grasses, and miscellaneous forbs.

Dominant grasses include needleandthread, western wheatgrass, and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and Sandberg bluegrass. Forbs commonly found in this plant community include plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear can also occur.

Occurring on gentle sloping hillsides and ridge tops the Loamy ecological site is very fragile, with thin surface horizons, generally with an overall topsoil depth of 6"-8". The plant community found during the on-site includes; Western Wheatgrass, Needleandthread, Prairie Junegrass, Threadleaf Sedge, Fringed Sage, Big Sagebrush, prickly pear cactus and some volunteer species such as Cheatgrass.

The following are Natural Resource Conservation Service recommendations related to surface disturbing activities, based upon the characteristics of the soil:

- Erosion and rutting hazard potential: Rated at severe.
- Reclamation potential: Rated at fair to poor.
- Road suitability potential: Rated at poorly suited.

#### **3.2.1. Wetlands/Riparian**

There are small amounts of wetland and riparian areas within the project boundary. They are not generally well developed in the tributary draws to Fortification Creek. However, one unnamed tributary to Fortification Creek did exhibit a fairly well developed wetland area, likely present because of a spring upstream and other water contributions such as snow accumulation, piping, etc. Fortification Creek has substantial wetland/riparian habitat downstream of the POD's proposed discharge point. These riparian/wetland areas are characterized primarily by occasional cattail areas, rushes and sedges, and areas where the stream channel has standing water during periods of little or no flow.

#### **3.2.2. Invasive Species**

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

### **3.3. Wildlife**

The Camp John Augusta (CJA) POD area is located 23 miles northwest of Gillette, WY in western Campbell County, Township 51 North, Range 76 West, Sections 21-28, Sixth Principal

Meridian. The project area is predominantly private surface overlaying federal minerals. There is currently no CBNG development directly east, west or north of the project area.

Elevations within the project area range from 4300 to 4600 feet above sea level. The topography is rolling including areas with numerous ridgelines, draws and break country as it drains to Fortification Creek on the north boundary of the project area (Maechtle 2005). The project area is drained by Fortification Creek, a tributary of the Powder River.

Land cover within the POD consists of predominantly sage brush and native grasses, scattered cottonwood trees along Fortification Creek, and juniper scattered throughout. Current land uses within the project area include cattle grazing, conventional oil, gas, and CBNG development (Maechtle 2005).

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 Big Horn Environmental Consultants (BHEC). BHEC surveyed construction areas and associated buffers for sage-grouse and raptors by aerial reconnaissance throughout periods of peak sage-grouse lek attendance in 2004 and again in 2005. Bald eagle winter roost surveys were conducted by BHEC in 2004. Formal surveys were not conducted nor required for Ute ladies'-tresses orchid.

A BLM biologist conducted field visits on May 24, 2005. 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. A Biological Assessment was prepared by a BLM biologist. The Biological Assessment was submitted to the U.S. Fish and Wildlife Service (USFWS) for consultation.

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 CJA project area include elk, mule deer and pronghorn antelope. The WGFD has designated the project area as Winter/Yearlong range for both pronghorn and mule deer. Populations of mule deer and pronghorn antelope within their respective hunt areas are at or slightly above WGFD objectives. Elk that occur in the project area are part of the Fortification Creek herd. The project area includes both **crucial winter** and **yearlong** range. Several elk were radio-collared in 2005 in an effort to document distribution and habitat use within this herd. This is an historic elk population enhanced with additional transplanted bulls in the 1950's from Yellowstone Park.

**Winter-Yearlong** use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges.

**Crucial Range** use is a particular seasonal range or habitat which has been documented as the determining factor in the population's ability to maintain and reproduce itself at a certain level. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

### 3.3.2. Aquatics

The project area is drained by ephemeral tributaries of the Powder River. No springs were identified within the project area. 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

Nine raptor nest sites were identified by BHEC during aerial flights (Maechtle 2004, 2005). Follow up ground surveys were completed by BHEC. These nests include: three active red-tailed hawks, three active great horned owls, one active golden eagle and one American kestrel, and one unknown.

**Table 3.2. Documented raptor nests within the CJA project area in 2005 (UTM Zone 13, NAD83).**

UTM E	UTM N	Legal Location	Species	Substrate	Status
422233	4915609	SESE Sec. 15 T51N, R76W	Red-tailed hawk	Cottonwood, live	Active
421278	4916161	NESW Sec. 15 T51N, R76W	Red-tailed hawk	Cottonwood, live	Active
421278	4916161	NESW Sec. 15 T51N, R76W	Great horned owl	cliff	Active
420893	4916504	SWNW Sec.15 T.51N. R76W	Great horned owl	cliff	Active
422861	4915080	NENW Sec. 23 T. 51N R76W	American kestrel	Cottonwood, dead	Active
423717	4913933	SESE Sec.23 T51N R76W	Red-tailed hawk	Cottonwood, live	Active
423658	4914113	SESE Sec.23 T51N R76W	Great horned owl	Cottonwood, live	Active
421385	4916067	NENW Sec.23 T51N R76W	Unknown	Cottonwood, dead	Inactive
424679	4913178	SENE Sec.25 T51N R76W	Golden eagle	Cottonwood, live	Active

### 3.3.5. Threatened and Endangered and Sensitive Species

#### 3.3.5.1. Threatened and Endangered Species

Within the BLM Buffalo Field Office there are four 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 re-established populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 1988, the WGFDF 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 WGFDF 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). Extensive surveys on the Thunder Basin National Grassland from 1981-1991, revealed no ferrets within that complex. The U.S. Fish and Wildlife Service have also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

No black-tailed prairie dog colony was identified during site visits by BHEC partially or wholly within the project area. Black-footed ferret habitat is not present within the CJA project area.

#### **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 operational in the Powder River Basin. Wintering bald eagles congregate in communal roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

The CJA project has few mature trees associated with it. 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. The eastern boundary of the project area is 6 miles from the Powder River; the nearest water body capable of supporting bald eagles.

#### **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. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. The orchid is documented in four Wyoming locations, Converse County along a tributary of Antelope Creek, an irrigated field in Niobrara County, along Bear Creek in Goshen County, and Horse Creek in Laramie County.

Fortification creek and its tributaries are ephemeral. No springs were identified within the project area. Suitable orchid habitat is not present within the CJA project area.

#### **3.3.5.1.4. 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.

#### **3.3.5.1.5. Black-tailed prairie dog**

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

No black-tailed prairie dog colony(s) was identified during site visits by BHEC partially or within the project area.

#### **3.3.5.1.6. Greater sage-grouse**

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

Two documented sage grouse leks are present within two miles of the project area. The Fortification lek is located in the SE corner of the POD and was inactive in 2004 and 2005, Hayden II lek is located 1 mile SE of the project boundary and was active in 2004. Only the Hayden II lek has been active in recent years. During the May 2005 BLM field review, sage grouse sign was observed within the project area.

#### **3.3.5.1.7. 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.

Mountain plover breeding and nesting habitat does not exist within the project area (Maectle 2004). Mountain plovers prefer relatively flat terrain, with short vegetation, and high bare ground. The project area is highly dissected by draws and ridgelines with sagebrush as the predominant vegetation cover, both within the draws and on the few flat areas that do exist.

### 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 been firmly established in the United States and has continued to spread west. Birds are the natural vector host and serve not only to amplify the virus, but spread it rapidly throughout the country since they are the only known animal to infect mosquitoes. Though less than 1% of mosquitoes are infected with WNV, they still are very effective in transmitting the virus to humans, horses, and wildlife. The *Culex* genus appears to be the most important mosquito group that vector, WNV.

The human health issues related to WNV are well documented and may continue to escalate as the virus moves west. In Wyoming, 392 human cases, with 8 deaths, were attributed to the WNV in 2003. 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 4 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 some *Culex* species, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is not necessary to place the briquettes in the main water body because

wave action prevents this environment from being optimum mosquito breeding habitat. Follow-up treatment of adult mosquitoes with malathion may be needed every 3 to 4 days to control adults following application of larvicide (Mooney, personal conversation). These treatment methods seem to be effective when focused on specific target areas, especially near communities, however they have not been applied over large areas nor have they been used to treat a wide range of potential mosquito breeding habitat such as that associated with CBNG development.

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

### **3.5. Water Resources**

The project area is within the Upper Powder River drainage system. Specific drainages which will be impacted by this project are McLaughlin Draw, Antelope Draw, Fortification Creek and several unnamed tributaries to Fortification Creek north of the Kinney Divide. With the exception of Fortification Creek, these drainages are all ephemeral, flowing water only in response to precipitation events.

Fortification Creek tends to be intermittent, becoming quasi perennial as it approaches the Powder River. During periods of prolonged drought it can become ephemeral within the project area. Within the project area, Fortification Creek has a very broad valley bottom with a somewhat defined low flow channel. This low flow channel exhibited potholes and standing water, although very little running water was observed during the onsite, held in April of 2005. There is a well developed riparian zone along the channel, although only scattered cottonwood trees were observed.

#### **3.5.1. Groundwater**

The Wyoming Department of Environmental Quality (WDEQ) water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for total dissolved solids (TDS): 500 mg/l TDS for drinking water (Class I), 2000 mg/l for Agricultural Use (Class II) and 5000 mg/l for Livestock Use (Class III).

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

Specifically related to groundwater, the plan identified the following, PRB 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 total dissolved solids 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.

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

A search of the Wyoming State Engineers Office Ground Water Rights Database for this area showed 10 registered stock and domestic water wells within the POD boundary with depths ranging from 16-1,376 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) and 3-36 through 3-56 (surface water).

### **3.5.2. Surface Water**

The project area is within the Fortification Creek drainage which is a tributary to the Upper Powder River drainage system. Within the POD boundary, all streams are included in the Fortification Creek system. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when they receive water from alluvial groundwater, springs, or other surface sources – PRB FEIS, Chapter 9 Glossary). Fortification Creek is intermittent in the project's immediate area and may become perennial as it flows toward its confluence with the Powder River. During periods of prolonged drought, Fortification Creek may become intermittent throughout its watershed.

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

$\mu$ mhos/cm at Maximum monthly flow to 3,400  $\mu$ mhos/cm at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located on the Powder River at Arvada, Wyoming (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.

The operator has identified a natural spring within this POD boundary at Sec. 27, T51N, R76W. The estimated flow of the spring has been determined to be 1 gpm. Water quality analysis for this spring has not been provided to date. A second spring was identified during the onsite in an unnamed tributary to Fortification Creek. This spring is located in the NESE, Sec 26, T51N, R76W, and was flowing a small amount of water, perhaps less than 1 gpm, during the onsite visit in April of 2005.

### 3.6. Cultural Resources

Class III cultural resource inventories were conducted for the Camp John & Augusta project prior to on-the-ground project work (BFO project no. 070050075 and CRT-05-052). North Platte Archaeological Services conducted a Class III cultural resource inventory following the Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48FR190) for the proposed project. G.L. "Buck" Damone III, Buffalo Field Office Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following sites are near the APE:

**Table 3.3 Cultural Sites Near the Area of Potential Effect**

Site Number	Site Type	Eligibility
48CA5260	Lithic Scatter	Unevaluated
48CA5261	Lithic Scatter/Hearth Feature	Eligible
48CA5262	Lithic Scatter	Unevaluated
48CA5263	Lithic Scatter	Eligible
48CA5264	Lithic Scatter	Unevaluated
48CA5265	Lithic Scatter	Eligible
48CA5266	Cairn	Unevaluated
48CA5267	Historic Trash	Not Eligible
48CA5268	Lithic Scatter/Hearth Feature	Eligible

### 3.7. Other Mineral Resources

There are no other mineral resources that will be adversely impacted by the proposal.

## 4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action plan of development, 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**

Overall impacts to vegetation and soils from surface disturbance should be minor, based on the operator's plans and BLM applied mitigation. Of the 9 proposed well locations (2-wells per location), 1 well pad was built prior to POD submittal (soils from the well pad area were used to upgrade the existing road that parallels the proposed well location). 4 well locations can be drilled without a well pad being constructed and 4 locations will definitely require a constructed (cut & fill) well pad. As such, minor surface disturbance would occur with the drilling of the majority of the wells (4 well locations – 8 wells). This disturbance would only involve minor digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 15 x 30 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 4 well locations would involve approximately 0.1 acre/well for 0.4 total acres. The other 5 well locations requiring cut & fill pad construction would disturb approximately 2.73 acres. The total estimated disturbance for all 18 wells (9 well locations) would be approximately 3.13 acres. This would be a short-term, minor impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD Surface Use Plan and as required by BLM in Conditions of Approval (COAs).

Approximately 7.18 miles of improved roads would be constructed to provide access to various well locations. Approximately 2.83 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.89 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., culverts, rip-rap, gabions, etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

**Table 4.1: <sup>1</sup>SUMMARY OF DISTURBANCE**

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Constructed Pad	4	Site Specific	3.13	Long Term
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0.0	Long Term
Impoundments	11		30.17	Long Term
On-channel	11	Site Specific	30.17	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	10	Site Specific or 0.01 ac/WDP	0.21	
*Wetlands Filled	---	Site Specific	0.0	
Channel Disturbance				
Headcut Mitigation*	20 Headcuts	Site Specific	1.35	
Channel Modification				
Pipeline Crossing*	Corridor w/ roads	Site Spec or 0.01 acres	0	
Road Crossing*	27	Site Spec or 0.01 acres	0.5	
Improved Roads	10.94	30' Width	39.78	Long Term
No Corridor	0		0	
With Corridor	10.94		39.78	
2-Track Roads	2.83			Long Term
No Corridor	0			
With Corridor	2.83	12' Width	4.12	
Pipelines	16.02			Short Term
No Corridor	2.25	20' Width	5.45	
With Corridor	13.77	30' Width	50.07	
Buried Power Cable	0.0			Short Term
No Corridor				
Proposed	2.52	15' Width	4.58	Long Term
Overhead Power lines				
Staging Area @ 41-26 well location		295.16' x 295.16'	2.0	Short Term
Treatment Facility			5.07	Long Term

\*Already included in other categories of disturbance, but separated here for USCOE reporting.

The designation of the duration of disturbance is defined in the PRB FEIS (pg 4-1 and 4-151).

<sup>1</sup> This summary of disturbance relates to Alternative C

“For this EIS, short-term effects are defined as occurring during the construction and drilling/completion phases. Long-term effects are caused by construction and operations that would remain longer”.

#### **4.1.1. Wetland/Riparian**

The project area has no gallery forests of mature cottonwood trees. There are individual mature to decadent cottonwood trees throughout the area, mostly located within the first two terraces of Fortification Creek. Introduction of treated water into Fortification Creek may enhance some cottonwood re-generation in the area.

The introduction of treated CBNG produced water into Fortification Creek will have the effect of turning the channel below outfall 001 from an intermittent into a perennial stream. It is unknown how far downstream the effects of this year round flow will be felt. One of the potential impacts will be a change in the types and amounts of flora and fauna that will develop around the new riparian and wetland areas. During winter, ice jams could become a problem by causing water levels to rise outside the confines of the channel, inundating areas that would normally not be covered with water in the winter. If these inundated areas are located where there is livestock activity, trampling could create significant bog areas.

In the alternative strategy scenario, LOG would construct on-channel impoundments with discharge points in various tributaries of Fortification Creek. Seepage from these impoundments could create wetlands below them, the magnitude of which would be determined by the severity of the seepage.

#### **4.1.2. Invasive Species**

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

#### **4.1.3. Cumulative Effects**

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

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

- They are proportional to the total amount of water predicted to be produced in the Upper Powder River watershed and that amount of cumulatively produced water is only approximately 13.9% of the total predicted for this watershed in the PRB FEIS (see section 4.4.2.1).

- The WDEQ/WQD enforcement of the terms and conditions of the NPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into Fortification Creek and to construct storage capacity, if necessary, to prevent significant volumes of untreated water from flowing into Fortification Creek or the Powder River.
- The water management plan for the Camp John and Augusta POD proposes that treated produced water will not contribute to significant flows downstream.

No additional mitigation measures are required.

## **4.2. Wildlife**

### **4.2.1. Big Game Direct and Indirect Effects**

Under the environmentally preferred alternative, Yearlong range for pronghorn antelope and mule deer, Winter-yearlong range for mule deer, and elk crucial winter and winter/yearlong range would be directly disturbed with the construction of wells, 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, especially elk, 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). There are numerous studies that have documented the effect of human activity and road densities on elk (Johnson 1987, Van Dyke 1996). These studies found that elk winter and calving areas were affected, with abandonment of winter and calving sites during intense drilling activity. Mitigation and management recommendations included: road closures, placing wells outside crucial habitats, reducing human activity, and placing restrictions on seasonal activity around wells.

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). Probably of higher significance is the effect of roads on elk. A plethora of studies have documented an increase in elk use at greater distances from roads (Rowland 2001). This is particularly important in the Fortification elk herd where cover from forested stands of trees is limited. Elk and 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).

Mule deer and antelope are expected to return to the project area following construction; however elk probably will not. Populations will likely be lower than prior to project implementation as the human activities associated with operation and maintenance continue to displace big game. Lower big game numbers would equate to lower harvest success during hunting seasons and a resultant loss of income to the Wyoming Game and Fish Department (license sales) as well as outfitters (clients). Elk and mule deer are more sensitive to operation and maintenance activities than pronghorn, and as previous studies suggests, elk and 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). Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. In order for big game 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. Additional mitigative measures are needed to prevent the loss of elk habitat and numbers in the project area. The seasonal disturbance stipulation of December 1 to April 1 will be applied to those wells and ancillary facilities that occur within elk crucial winter range.

#### **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

#### Mitigation

Roads into crucial elk winter range should be signed and closed to the general public, during the period December 1 to April 1. Access to wells or infrastructure within the CJA POD will only be to authorized personnel and the landowner. This COA affects the following wells: 14-23 WA, BG; 12-26 WA,BG; 41-27 WA, BG; 32-27 WA,BG; 21-27 WA,BG; 12-27WA,BG; and 14-22 WA,BG.

Wells located within crucial elk winter range will be equipped with radio-telemetry to reduce traffic and maintenance service. Individual well access roads will be immediately reclaimed back to a 2 track road.

#### **4.2.2. Aquatics Direct and Indirect Effects**

Produced water will be treated through the use of an ion exchange zeolite system, and discharged directly to Fortification creek – a tributary of the Powder River. The proposed discharge line to the Fortification Creek and treatment facility will be permitted under a federal form 299 right-of-way permit submitted by Lance under a separate EA for the Indian Creek Divide Waterline.

#### **4.2.2.1. Cumulative effects**

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247. No additional mitigation measures are required.

#### **4.2.3. Migratory Birds Direct and Indirect Effects**

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

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

#### **4.2.3.1. Cumulative effects**

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

#### Mitigation

All pits associated with water treatment facilities containing more than 10,000 mg/L of sodium concentration will be netted to prevent access by migratory birds.

Power lines shall be buried wherever feasible.

Overhead lines will be located to minimize the potential for bird collisions. Modifications include avoiding areas of high avian use (for example, ridge lines and across draws), and increasing the visibility (for example, across draws).

#### **4.2.4. Raptors Direct and Indirect Effects**

Nine raptor nest sites were identified by BHEC during aerial flights (Maechtle 2004, 2005). Follow up ground surveys were completed by BHEC. These nests include: three active red-tailed hawks, three active great horned owls, one active golden eagle and one American kestrel, and one unknown. All raptor nests located are greater than .5 miles of proposed well locations.

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).

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 four 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 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

**4.2.5.1. Threatened and Endangered Species Direct and Indirect Effects**

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<b>Endangered</b>				
Black-footed ferret ( <i>Mustela nigripes</i> )	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat not present.
<b>Threatened</b>				
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Mature forest cover often within one mile of large water body.	S	LAA	Overhead power and improved roads present.
Ute ladies'-tresses orchid ( <i>Spiranthes diluvialis</i> )	Riparian areas with permanent water	NP	NE	Historically perennial water 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.

**Effect Determinations**

Listed Species

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

#### **4.2.5.1.1. Black-footed ferret**

Because no black-tailed prairie dog colony(s) occur within the CJA project, implementation of the proposed development should have no effect on the black-footed ferret.

#### **4.2.5.1.2. Bald eagle**

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

There are 5.8 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. Lance is proposing an additional 2.5 miles of overhead three-phase distribution lines. There are currently 5.6 miles of improved roads within the project area, with 7.4 miles improved and 2.7 miles 2-track, proposed respectively.

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 Coulter II project area. Twenty-two raptors including 16 golden eagles were electrocuted within Wyoming's Powder River Basin in 2003; 12 electrocutions were on recently constructed lines which did not fully meet APLIC standards (Rogers pers. Comm.). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

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

#### **Mitigation**

Power lines shall be buried wherever feasible.

Overhead power lines will be built to standards identified by the Avian Power Line Interaction Committee (1996) and additional specifications identified by the U.S. Fish and Wildlife Service to minimize electrocution potential. The Service specifications are detailed within the Powder River Basin Oil and Gas Project Biological Opinion.

Operator constructed roads will be designed for a maximum travel speed of 25 mph to minimize road related wildlife mortality (CM11). Maximum travel speeds on operator maintained roads shall not exceed 25 mph.

#### **4.2.5.1.3. Ute's Ladies Tresses Orchid**

Produced water will be treated through the use of an ion exchange zeolite system, and discharged directly to the Fortification creek. The proposed discharge line to the Fortification creek, an ephemeral creek, will be permitted under a federal form 299 right-of-way permit submitted by Lance under a separate EA. No springs have been identified within the project area. Suitable habitat is not present within the CJA project area. Implementation of the proposed coal bed natural gas project should not affect the Ute ladies'- tresses orchid as neither suitable habitat nor a seed source is present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.3 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

**Presence**

**K** Known, documented observation within project area.

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

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

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

**Project Effects**

**NI** No Impact.

**MIH** May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.

**WIFV** 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. (Trigger for a Significant Action as defined in NEPA)

**BI** Beneficial Impact

#### 4.2.5.2.1. Black-tailed prairie dog

No new facilities are proposed in prairie dog towns.

#### 4.2.5.2.2. Greater sage grouse

Suitable sage grouse habitat is present throughout the CJA project area, sage grouse scat was occasionally found during the onsite visit at several proposed locations.

Wells and other infrastructure located within sagebrush communities will result in direct habitat loss. Sage grouse avoidance of these facilities produces even greater indirect habitat loss. The WGFD feels a well density of eight wells per section creates a high level of impact for sage grouse and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). Well houses and power poles may provide habitats for mammal and avian predators increasing sage grouse predation. Mineral traffic may result in occasional collisions with sage grouse, particularly during the construction phase when traffic is heaviest. Overhead power lines may also present a collision risk for sage grouse. Sage grouse may avoid suitable habitat containing overhead power lines to reduce their exposure to predation.

It is BLM Wyoming policy to limit disruptive activities within a two mile radius of occupied lek sites during the nesting season; this radius may be expanded based on site-specific criteria (Bennet 2004). The Western Association of Fish and Wildlife Agencies (WAFWA) sage grouse management guidelines (Connely et. al. 2004) recommend the protection of suitable habitats within 5 km of leks where habitats are not distributed uniformly such as the CJA project area. Most of the area except the western portion is within 5km of the Hayden II lek. The Fortification Lek was not active in 2004, 2005 and no indication of recent years occupancy was observed by BHEC. The Partners in Flight's Western Working Group recommend no net loss of sagebrush habitats (Paige and Ritter 1999). BLM Wyoming policy also states that rehabilitation activities will include sagebrush and appropriate forb species (Bennet 2004).

#### Mitigation

Power lines shall be buried wherever feasible. The previously constructed power line providing power to this project will be retrofitted with perch guards within .25 miles of the Hayden II lek.

Operator constructed roads will be designed for a maximum travel speed of 25 mph to minimize road related wildlife mortality (CM11). Maximum travel speeds on operator maintained roads shall not exceed 25 mph.

No surface disturbing activities are permitted within two miles of active leks between March 1 and June 15, prior to completion of a greater sage grouse lek survey. This condition will be implemented on an annual basis for the duration of surface disturbing activities. **This timing stipulation affects all the wells in the project except for the 11-22 well.**

If an active lek is identified during the survey, the two 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 will 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 BLM and WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist prior to surface disturbing activities.

Appropriate forb species shall be included in reclamation seed mixtures.

Sagebrush shall be re-established, seedlings present, within three years for all sagebrush areas disturbed, (Northeastern Wyoming Sage Grouse Working Group. 2004).

#### **4.2.5.2.3. Mountain plover**

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 and metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

The project area is highly dissected with sagebrush as the predominant vegetation cover. Suitable mountain plover habitat is not present within the project area. The project should not affect mountain plovers.

#### **4.2.5.2.4. 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 condition of approval 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.

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

### **4.4. Water Resources**

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed and a commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the

environment and landowner concerns. Allegedly qualified hydrologists developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should minimize 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 Wyoming State Engineers Office (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 25.0 gpm per well or 450 gpm (1.0 cfs or 723 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 by year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B, page 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 167,608 acre-feet in 2005 (maximum production is estimated in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells is 0.43% of the total volume projected for 2005, which will result in an insignificant increase to the present volume of water produced from coal bed natural gas in the Powder River Basin. This volume of produced water is also within the predicted parameters of the PRB FEIS.

#### **4.4.1. Groundwater**

The PRB FEIS predicts an infiltration rate of 29-40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS, page 4-5). For this action, it may be assumed that a maximum of 180 gpm will infiltrate at or near the discharge points and impoundments (94,608,000 gallons 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, page 4-54). Therefore, the chemical nature and the volume of the discharged water will not degrade the antecedent groundwater.

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 in the water wells in the area. The permitted water wells in the area produce from alluvial zones above the targeted coal bed natural gas producing zones (16 to 1,376 feet range in depths for the stock and domestic wells compared to 1,400 feet to the Big George and 2,100 to the Wall ). 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 of the proposed wells.

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

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

In order to determine the actual water quality of the producing formations in this POD, and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well to each coal zone within the POD boundary. The wells will be sampled 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 several 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.

However, site characteristics can be compared between the proposed impoundments in the Camp John and Augusta POD and the currently most intensively monitored site along Beaver Creek which is showing elevated constituents in sub-surface water bearing zones. The sites differ in that the proposed reservoirs associated with the Camp John and Augusta POD are high in drainages. It cannot categorically be stated that infiltrating water would not affect sub-surface water bearing zones to the degree evidenced at the Beaver Creek site. However, the reservoirs proposed for this POD will only be constructed if the quantity of produced water exceeds the capacity of the proposed treatment plan.

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. 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 ground water. NPDES permits received by DEQ prior to August 1<sup>st</sup> for discharging to impoundments will be assessed through the "Impoundment Monitoring Plan". For NPDES permits received by DEQ after the August 1<sup>st</sup> effective date, the BLM will require that operators comply with the requirements outlined in the DEQ compliance monitoring guidance document (June 14, 2004) prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

#### **4.4.1.1. Groundwater Cumulative Effects:**

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

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

Potential impacts to shallow groundwater would most likely be seen downstream of the discharge point in Fortification Creek, unless proposed reservoirs are constructed. These impacts might be manifested in a rise of water table in the Fortification Creek valley. Should proposed reservoirs be built, potential

impacts to groundwater could be felt in the tributaries where the dams are constructed.

#### 4.4.2. Surface Water

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, page 4-69). The water quality of the untreated produced water projected for this POD is 2,580.0 mg/l TDS, which is not within the WDEQ criteria for agricultural use (2000 mg/l TDS). The treated water is projected to have 2400 mg/l TDS, which is also above the WDEQ criteria for agricultural use. 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.

A maximum volume of 25.0 gallons per minute (gpm) per well is projected to be produced from the 9 Big George wells, for a total of 225 gpm for the POD. The quality for the water produced from the Big George coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. That water quality was determined to be 3,910.0  $\mu$ mhos/cm electrical conductivity (EC), 2,580.0 mg/l total dissolved solids (TDS) and 36.2 sodium adsorption ratio (SAR). A comparison of this expected water quality to Upper Powder River water quality criteria is shown in Table 4.5 below.

A maximum volume of 25.0 gpm is projected is to be produced from the 9 Wall wells, for a total of 225 gpm for the POD. The quality for the water produced from the Wall target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. That water quality was determined to be 2,040.0  $\mu$ mhos/cm EC, 1,260 mg/l TDS and 30.9 SAR. For more information, please refer to the WMP included in this POD and table 4.5 below.

Based on the onsite review of discharge points, the primary point has been appropriately sited and utilizes an appropriate water energy dissipation design. Additional discharge points and impoundments will only be constructed if the proposed treatment facility is incapable of treating the total proposed production. The anticipated total maximum volume of water discharged in this POD is 225 gpm from the Wall + 225 gpm from the Big George, for a total of 450 gpm. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

#### **Table 4.4: Summary of Water Management Strategy**

##### Upper Powder River Watershed

Primary Water Management Strategy  
100% Active Treatment and discharge

##### Backup Water Management Strategy

10 % Direct Discharge P  
0 % Containment Pond P  
37% Infiltration Pond P  
0 % Injection P

53 % Active Treatment P  
0 % Direct Discharge S  
0 % Containment Pond S  
0 % Infiltration Pond S

To manage the produced water, one treatment facility is proposed whose treated effluent would be discharged directly to Fortification Creek. As a backup, should the produced water exceed the capacity of the treatment facility, or should the treatment technology not be permitted by the WDEQ, 9 impoundments (80 acre feet) would potentially be constructed, on an as needed basis, within the project area. These impoundments would disturb approximately 20 acres including the dam structures. Of these

water impoundments, all 9 would be on-channel reservoirs. Existing impoundments would be upgraded to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. Headcuts below discharge points and reservoirs would be evaluated and remediated on an as needed basis as produced water reached them. Any channel modifications required to minimize soil and vegetation disturbances in draw bottoms would be installed on an as needed basis as well. Total potential disturbances for these actions, should they become necessary, would be between 1.5 and 5 acres. 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 would re-surface as channel flow (PRB FEIS, page 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.15 cfs below the lowest reservoir (after infiltration and evapo-transpiration losses and assuming total failure of the treatment facility). The operator has committed to monitor the condition of the channels and address any problems resulting from these discharges. Sedimentation in the impoundments will occur, 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 necessary 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 produced as a result of CBNG activity will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 171,423 cfs (PRB FEIS, page 4-86). The predicted maximum discharge rate from these 18 wells is anticipated to be a total of 450 gpm or 1.0 cfs to Fortification Creek. Using an assumed stream loss rate of 0.9 acre feet per mile (PRB FEIS, page 4-3), the produced water traveling down Fortification Creek would disappear within the first mile of stream, never reaching the Upper Powder River which is several miles downstream of the proposed outfall for this project. The addition of the water produced from these wells will not significantly impact the water quantity in the mainstem of the Upper Powder River. For more information regarding the maximum predicted water impacts to the Powder River resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS, page 4-85).

Construction of proposed reservoirs will potentially disturb 20 acres including the area within the reservoir (to the high water line) plus the footprint of the dam structure. Reservoirs will require detailed reclamation plans once they are no longer utilized for disposal of CBNG water.

The operator did not provide an analysis of the potential development in the watershed above the project area. However, based on the area of the Fortification Creek watershed above the POD (77 sq mi) and an assumed density of 2 wells per location every 80 acres, the potential exists for the development of 1,232 wells which could produce a maximum water volume of 30,800 gpm or 69 cfs. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum volume of produced water within the watershed upstream of the project area, 69 cfs, is much less than the volume of run off estimated from the 2-year storm event for Fortification Creek. Therefore, the estimated volume of water produced from the full development in the watershed above the project area is significantly less than the natural run off from the area.

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 applied for a Wyoming Pollutant Discharge Elimination System (WPDES) permit from the WDEQ for the discharge of water produced from this project.

A condition of approval has been added to this analysis that will limit the volume of water discharged within this project area to that which was analyzed in the WYPDES permit application. The analysis for the permit included produced water from a total of 60 Fee, State and Federal wells which the operator has drilled or has proposed to drill within the Camp John and Augusta area.

The WDEQ limits applied to waters of the Upper Powder River are listed in table 4.5 below.

The quality for the water expected to be produced from the Big George and Wall target coal zones is predicted to be similar to the sample water quality collected from a location near the POD. That water quality is compared to WDEQ limits applied to the Upper Powder River and are shown in table 4.5 below, Comparison of Regulated Water Quality Parameters to Predicted Water Quality.

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

Predicted Values	TDS, mg/l	SAR	EC, $\mu$ mhos/cm
Most Restrictive Proposed Limit –		2.0	1,000
Least Restrictive Proposed Limit		10	3,200
Powder River at Arvada, Wyoming			
Historic Data Average at Maximum Flow		4.76	7,797
Historic Data Average at Minimum Flow		7.83	3,400
WDEQ Quality Standards for Wyoming			
Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
Predicted Produced Water Quality			
Big George	2,560	36.2	3,910
Wall	1,260	30.9	2,040

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

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

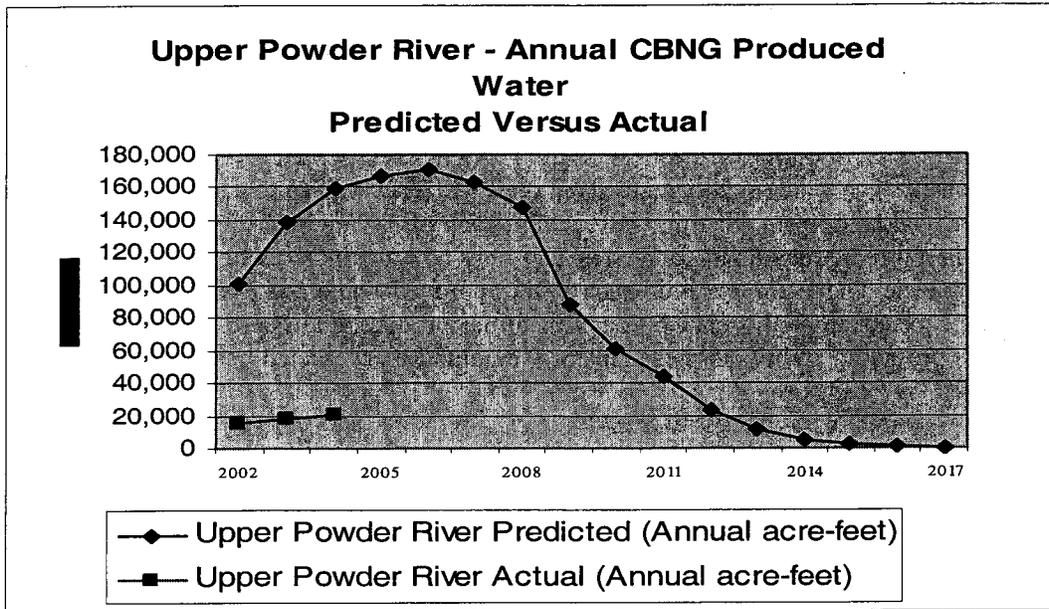
The development of coal bed natural gas and the production and discharge of water in the area surrounding the existing natural springs may affect the flow rate or water quality of the spring.

**4.4.2.1. Surface Water Cumulative Effects**

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

As of December 2004, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 55,414 acre-ft of water compared to the predicted 397,488 acre-ft disclosed in the PRB FEIS (Table 2-8, page 2-26). These figures are presented graphically in Figure 4.1 and in tabular form in Table 4.6 following. This volume is 87% less than the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

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



**Table 4.6: PRB FEIS predicted vs. actual produced water volumes (Upper Powder River)**

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				
2006	171,423	736,519				
2007	163,521	900,040				
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				

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
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				
<b>Total</b>	<b>1,285,233</b>					

The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Conductivity (EC) and Sodium Adsorption Ratio (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 BLM requires each POD approved under the PRB FEIS to have a designated reference well to be sampled within 60 days of initial production. There is also a series of monitoring wells that are providing additional data. This new data will be evaluated periodically to assess effects.

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 to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects relative to this project are anticipated to be minimal for the following reasons:

- They are proportional to the total amount of water predicted to be produced in the Upper Powder River 4<sup>th</sup> level watershed and that amount of cumulatively produced water is only approximately 13.9% of the total predicted in the PRB FEIS.
- The WDEQ/WQD enforcement of the terms and conditions of the NPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator) to monitor the volume of water flowing into Fortification Creek

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

According to the Wyoming State Protocol Section VII (B)(5), the Bureau of Land Management notified the Wyoming State Historic Preservation Officer (SHPO) on 8/3/05 that no historic properties exist within the area potential of effect. 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 Conditions of Approval* (General)(A)(1).

#### 5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite?
Kerry Hayden	Surface Owner		Yes
Naomi Morton-Knight		Knight Technologies	Yes
Greg Hicks		WWC	Yes
Rusty Rouse		Lance Oil & Gas	Yes
Ethan Jahnke		Lance Oil & Gas	Yes
Claudia Nissley	Wyoming SHPO	Wyoming SHPO	No
Ben Adams		BLM	Yes
Steve Janzen		BLM	Yes
Paul Rau		BLM	Yes
Larry Gerard		BLM	Yes
David G. Seward		BLM	Yes

#### 6. OTHER PERMITS REQUIRED

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

#### 7. REFERENCES AND AUTHORITIES

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