FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
J.M. Huber Corporation
Badger Creek
ENVIRONMENTAL ASSESSMENT –WY-070-07-051

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize J.M. Huber Corporation's Badger Creek Coal Bed Natural Gas (CBNG) Plan Of Development (POD) comprised of the following 13 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well Number	Qtr/Qtr	Sec	TWP	RNG	Lease Number
1	Badger Creek Dow Trust	9MK-20	NESE	20	58N	82W	WYW164345
2	Badger Creek Dow Trust	7MK-20	SWNE	20	58N	82W	WYW164345
3	Badger Creek Dow Trust	3MK-20	NENW	20	58N	82W	WYW164345
4	Badger Creek Dow Trust	1MK-20	NENE	20	58N	82W	WYW164345
5	Badger Creek Dow Trust	11MK-21	NESW	21	58N	82W	WYW164345
6	Badger Creek Dow Trust	15MK-21	SWSE	21	58N	82W	WYW164345
7	Badger Creek Dow Trust	9MK-21	NESE	21	58N	82W	WYW164345
8	Badger Creek Dow Trust	7MK-21	SWNE	21	58N	82W	WYW164345
9	Badger Creek Dow Trust	5MK-21	SWNW	21	58N	82W	WYW164345
10	Badger Creek Dow Trust	5MK-27	SWNW	27	58N	82W	WYW116641
11	Badger Creek Dow Trust	13MK-27	SWSW	27	58N	82W	WYW116641
12	Badger Creek Dow Trust	5MK-28	SWNW	28	58N	82W	WYW116641
13	Badger Creek Dow Trust	5MK-34	SWNW	34	58N	82W	WYW116641

The following impoundments were also inspected and approved for use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
1	Moreland #1 15-21	SWSE	21	58	82	WYW164345
2	Muller #1 7-21	SWNE	21	58	82	WYW164345
3	Dow 10-28-58 -82 Pit	NENE	28	58	82	Fee
4	Dow 9-28-58-82 Pit	NESW	28	58	82	Fee

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

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

1. The Operator, in their POD, has committed to:
    - Comply with all applicable Federal, State and Local laws and regulations.
    - Obtain the necessary permits from other agencies for the drilling, completion and

production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.

- Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
- Provide water analysis from a designated reference well in each coal zone.

2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.

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

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

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

Field Manager:_____ Date: _____

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
J.M. Huber Corporation
Badger Creek
PLAN OF DEVELOPMENT
WY-070-07-051

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

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: J.M. Huber Corporation's Badger Creek Plan of Development (POD) for 13 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 13 wells proposed within this POD, as follows:

	Well Name	Well Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
1	Badger Creek Dow Trust	9MK-20	NESE	20	58N	82W	WYW164345
2	Badger Creek Dow Trust	7MK-20	SWNE	20	58N	82W	WYW164345
3	Badger Creek Dow Trust	3MK-20	NENW	20	58N	82W	WYW164345
4	Badger Creek Dow Trust	1MK-20	NENE	20	58N	82W	WYW164345
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12	Badger Creek Dow Trust	5MK-28	SWNW	28	58N	82W	WYW116641
13	Badger Creek Dow Trust	5MK-34	SWNW	34	58N	82W	WYW116641

County: Sheridan

Applicant: J.M. Huber Corporation

Surface Owners: Bert Dow

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

- Drilling of 13 total federal CBM wells which will be completed in the following coal zones in the listed intervals below the ground surface:
  - Smith Coal depth 198 to 565 feet
  - Anderson Coal depth 325 to 625 feet
  - Deitz 2 Coal depth 588 to 775 feet
  - Deitz 3 Coal depth 630 to 910 feet.
  - Monarch Coal depth 736 to 1016 feet.
  - Carney Coal depth 750 to 1225 feet.

  The drilling and completion phase of the project is projected to last a maximum of 10 days per well or 130 days from the time of initiation.

- An unimproved and improved road network.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 4 discharge points and 2 on channel stock water impoundments and 2 off channel pits within the Upper Tongue River primary watershed. The water produced in association with this project will be completely contained within these impoundments. The operator has submitted an application for a water discharge permit under the National Pollutant Discharge Elimination System (WYPDES) to the Wyoming Department of Environmental Quality (WDEQ). The permit (WY0055301) is available in draft as of 2-28-07.

- A buried gas, water and power line network, and no central gathering/metering facilities. The amount of gas produced will be measured at the well head.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

At the on-sites, 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 Badger Creek POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well #	QTR	Sec	Onsite Notes
1MK-20*	NENE	20	Operator will submit new pad design to incorporate the road approach. (Received 3-16-07)
3MK-20	NENW	20	Operator will submit new pad design which reduces amount of sagebrush habitat and surface disturbance. (Received 11-28-06)
7MK-20	SWNE	20	No changes.
9MK-20	NESE	20	No changes.
5MK-21	SWNW	21	Relocated well to the SE to reduce amount of construction required for the pad. Operator will provide a new APD, Plat and pad design. (Received 03-16-07)
7MK-21	SWNE	21	Relocate well to the S to reduce amount of construction required for pad and minimze habitat disturbance. Operator will provide a new APD, Plat and pad design. (Received 11-28-06)
9MK-21	NESE	21	Pad large for turnaround area, but operator will round the edges of the pad to reduce the disturbed area. (Received 11-28-06)

Well #	QTR	Sec	Onsite Notes
15MK-21	SWSE	21	Relocate power lines to the north of the drainage to corridor with the access road.
5MK-27	SWNW	27	Construction must avoid the emphemeral drainage to the SE.
13MK-27	SWSW	27	Location good. Access road should be changed from improved to primitive along this fence and to this location.
5MK-28	SWNW	28	Eliminated pad. Will slot a flat area 15' x 120' for the fracture tanks to the N of the wellbore. Power will be buried from the power drop to the location.
5MK-34	SWNW	34	Pit will be lined due to proximity to ephemeral drainage. Land owner wants stock tanks on both sides of the fence. Access road at Badger Creek Crossing will be need to be designed/cross sectioned. (Received 11-28-06)
Moreland #1			No changes. (New design with by-pass channel received 3-13-07)
Muller #1	NWNE	21	Water Discharge Point (WDP) relocated to below by-pass channel inlet. (New design with by-pass channel received 3-13-07)
Pit 9-28	SESE	28	No changes. Provide proof of bonding through WOGCC. (Received 3-13-07)
Pit 10-28	NESE	28	No changes. Provide proof of bonding through WOGCC. (Received 3-13-07)

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Surface Water

1. Channel Crossings:
   a) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
   b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.

2.3.2.2. Soils

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

2.3.2.3. Vegetation

1. Temporarily fence reseeded areas, if not already fenced, for at least two complete growing seasons to

insure reclamation success on problematic sites (e.g. close to livestock watering source, erosive soils etc.).

2.3.2.4. Wetland/Riparian

1. 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.

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

3. The lower edge of soil or other material stockpiles will be located outside the active floodplain.

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

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

2.3.2.5. Wildlife

1. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.

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

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

4. 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. Mountain Plover

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

2. When above ground markers are used on capped and abandoned wells they will identified with markers no taller than four feet with perch inhibiting devices on the top to avoid creation of raptor hunting perches within 0.5 mile of nesting areas.

2.3.2.7. Visual Resources

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

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

General

1. All changes made at the onsite will be followed. They have all been incorporated into the operator's POD.
2. Please contact Kathy Brus, Natural Resource Specialist, @ (307) 684-1087, Bureau of Land Management, Buffalo, if there are any questions concerning these COAs.

Surface Use

1. 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 colors selected for the Badger Creek POD is Juniper Green for the 1-MK-20 and the 7MK-20 and Covert Green (PANTONE for Architecture Color Guide 18-0617 TPX) or Carlsbad Canyon (Munsell Soil Color 2.5Y 6/2) for the remaining wells.

2. Provide 4" of aggregate where grades exceed 8% for stability and erosion prevention.

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

4. 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 water bars shall be placed according to the following spacing:

Grade	Drainage Spacing
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
13-15%	150 ft.

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

Reclamation Standards:

C. 3. The reclaimed area shall be stable and exhibit none of the following characteristics:
   a. Large rills or gullies.
   b. Perceptible soil movement or head cutting in drainages.
   c. Slope instability on, or adjacent to, the reclaimed area in question.

C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.

C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
   a. Successful onsite establishment of species included in the planting mixture or other desirable species.
   b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.

C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

6. 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. Attachment 1 is a map of the project area which identifies the ecological sites and designates the seed mix preference. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

Clayey Ecological Site Seed Mix		
Species	**% in Mix**	**Lbs PLS***
Western Wheatgrass (Pascopyrum smithii)	35	4.2
Green needlegrass (Nassella viridula)	30	4.8
Slender Wheatgrass (Elymus trachycaulus ssp. trachycaulus)	20	1.2
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata)/or ***American vetch***(Vicia americana)	5	0.6
Totals	**100%**	**12 lbs/acre**

Loamy Ecological Site Seed Mix		
Species	**% in Mix**	**Lbs PLS***

Loamy Ecological Site Seed Mix		
Species	**% in Mix**	**Lbs PLS***
Western Wheatgrass (Pascopyrum smithii)/or ***Thickspike Wheatgrass*** (Elymus lanceolatus ssp. lanceolatus)	30	3.6
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	10	1.2
Green needlegrass (Nassella viridula)	25	3.0
Slender Wheatgrass (Elymus trachycaulus ssp. trachycaulus)	20	2.4
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata) /or ***American vetch***(Vicia americana)	5	0.6
Totals	**100%**	**12 lbs/acre**

Sandy Ecological Site Seed Mix		
Species	**% in Mix**	**Lbs PLS***
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	20	2.4
Prairie sandreed (Calamovilfa longifolia)	30	3.6
Indian ricegrass (Achnatherum hymenoides)	20	2.4
Needleandthread (Hesperostipa comata ssp. comata)	15	1.8
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Scarlet Globemallow (Sphaeralcea coccinea) / or ***Blue flax***(Linum lewisii)	5	0.6
Totals	**100%**	**12 lbs/acre**

*PLS = pure live seed
*Northern Plains adapted species
*Double this rate if broadcast seeding

7. Changes in the approved plan of development, including power line placement, will require a sundry to the POD.

8. The Badger Creek POD area is in a known Leafy Spurge infestation area. The operator will use extreme caution during the construction phase to prevent spreading plant material and seed from an

infested area to a clean area. After construction activities across the Badger Creek channel and flood plain, the construction equipment should be washed to remove potential contamination.

9. Well 1MK-20 NENE Sec 20: This well is sited on Sandy shallow location which will require expedient stabilization to prevent erosion. The access road to the well from the N-NW will minimize disturbance through existing vegetation to reduce the erosion potential. Trees at the edge of the location will be preserved. The pipeline corridor to the S-SW will also require immediate stabilization.

10. Well 7MK-21 SWNE Sec 21: The access road to this well crosses areas of relatively steep slopes and shallow soils. The operator will expediently reclaim the access route and pipeline corridor in order to reduce erosion potential.

11. Well 3MK-20 NENW Sec 20: Construction activity at this location must be confined to the revised pad and access road area. No disturbance to the surrounding sagebrush habitat will be allowed.

12. The operator will install silt control devices at the toe of all fill areas on the constructed pads, such as silt fences or bale check dams.

Wildlife

1. Observations of any threatened, endangered, proposed, or candidate species within the project area shall be reported to the BLM Buffalo Field Office (307-684-1100).
2. All other conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion shall be complied with.
3. If any dead or injured sensitive species is located during construction or operation, the BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
4. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, "The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time". The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, Huber-Baker Energy will coordinate with the BLM to determine if additional resurveys will be required.
5. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.
6. No disruptive activities are permitted in suitable mountain plover habitat from March 15-July 31, unless a mountain plover survey has been conducted during the current breeding season. Suitable mountain plover habitat exists within the Badger Creek flood plain and the prairie dog colonies.
    a. Mountain plover nesting surveys shall be conducted by a biologist following the most current U.S. Fish and Wildlife Service Mountain Plover Survey Guidelines (the survey period is May 1-June 15). All survey results must be submitted in writing to the BFO and approved prior to initiation of disturbing activities (i.e. drilling, road/pipeline construction and overhead powerline construction).
    b. If a mountain plover is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15) if there are no other issues.
8. No disruptive activities shall occur within a ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This condition will be implemented on an annual basis for the duration of construction activities. No project related activities (i.e. drilling, construction, overhead powerline installation, well enhancements, vehicle traffic, human presence, etc) will be allowed. This timing limitation will affect the following proposed wells and their associated infrastructure:

Township/Range	Section	Affected Wells and Infrastructure
T58N, R82W	20	3MK20, 7MK20, 1MK20, 9MK20, and all associated infrastructure.
T58N, R82W	21	5MK21 and associated infrastructure.
T58N, R82W	27	5MK27, 13MK27, DOW 9-28 Pit, associated infrastructure and main gas/waterline along county road.
T58N, R82W	34	5MK34, staging area, associated infrastructure and main water/gas line along county road.

a. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to any surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.

b. Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. Nests to be checked are within a ½ mile or less of the proposed development. The nests are listed below:

BLM ID#	UTM N (NAD 83)	UTM E (NAD 83)	LEGAL
3553	4983907	360550	NWSE Sec. 20, T58N,R82W
3554	4983515	359890	NWSE Sec. 20, T58N,R82W
New	4981521	363212	NESW Sec. 27, T58N, R82W
New	4980998	362935	SWSW Sec. 27, T58N, R82W
New	4980453	363215	NENW Sec. 34, T58N, R82W
New	4979959	363362	SENW Sec. 34, T58N, R82W
New	4979929	363367	SENW Sec.34, T58N, R82W

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

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

10. The following conditions will minimize the impacts to sage-grouse:
No disruptive activities are permitted within 2 miles of the PPL lek between March 1 and June 15, prior to completion of a greater sage-grouse lek survey**.** This timing limitation will affect the following proposed wells and their associated infrastructure:

Township/Range	Section	Affected Wells and Infrastructure
T58N, R82W	20	Access road to the 7MK20 well
T58N, R82W	28	5MK28 well – only the well itself.

11. Annual sage grouse and sharp-tailed grouse surveys are required. Surveys shall occur within the project area and will extend out 2 miles from all project related activities. The operator is required to conduct surveys during established time frames (April 1-May 15). **This condition will be implemented on an annual basis for the duration of project related activities.**
    a. If an active sage-grouse lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, then project related activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
    b. If an active sharp-tailed grouse lek is identified during the survey, the 0.67 mile timing restriction (April 1-May 31) will be applied and no surface disturbing activities will be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, then project related activities may be permitted within the buffer until the following breeding season. The required survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
    c. Creation of raptor hunting perches will be avoided within 0.5 mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.

13. Power lines will be buried whenever possible in the project area to protect bald eagles and other important wildlife. When it is not possible to bury them, overhead power lines will be constructed to the most recent standards identified by the Avian Power Line Interaction Committee and the additional measures outlined in the PRBEIS to minimize raptor electrocution potential..

13. No disruptive activity shall occur within one mile of bald eagle winter roosting habitat annually from November 1 through April 1, prior to a winter roost survey or from February 1 through August 15 prior to a nesting survey. This condition will be implemented on annual basis for the duration of the surface disturbing activities. **This condition will be implemented on an annual basis for the duration of project related activities and will affect the following wells:**

Township/Range	Section	Affected Wells and Infrastructure
T58N, R82W	20	1MK20, 7MK20, 3MK20, and associated infrastructure
T58N, R82W	21	5MK21 well and infrastructure

    a. If a roost is identified and construction has not been completed, a year round disturbance-free buffer zone of 0.5 mile and a seasonal (November 1 - April 1) minimal disturbance buffer zone of 1 mile will be established for all bald eagle winter roost sites. Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
    b. If a nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimal disturbance buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).
    c. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.

Water Management

1. To control erosion, no water will be allowed to overflow the tire stock water tanks.
2. The operator shall submit to the BLM a copy of the WYPDES Permit(s) as they become available from the WDEQ. The operator has committed to comply with all the regulations and reporting requirements of the WYPDES permits as issued by the WDEQ for this action.
3. The operator will provide copies of the Authorization to Correct the Record (ACR) forms showing the bypass channels as filed with the WSEO for alterations to the approved SW-4 permits.
4. Muller #1 Impoundment, SWNE Sec 21:
   a. As stated in the Wyoming Reclamation Policy, the interim reclamation goal for this structure will be to approximate the original vegetative community. The operator intends to remove silt which has reduced the pool area volume. This clean out will disturb the willows and trees growing around the pool area.
      - For interim reclamation, the operator will transplant half of the plants (willows, etc) removed just above the designed high water line.
      - The operator will also plant trees (other than the willows) to replace those removed from the pool area or which will be inundated with the addition of CBNG produced water.
   b. The installation of the bypass channel would generate over 2600 cubic yards of excess fill. Discharge of water produced in association with Federal minerals to this impoundment will not be allowed until the operator has identified an acceptable alternate location for the fill dirt.

Cultural

1. Proposed developments within site 48 SH 1390 have been determined to be located in non-contributing portions of this eligible site, and include the existing access road, and well 7MK-20. No new disturbance will be permitted in contributing portions of the site without consultation with BLM and SHPO.

2.4. Alternatives considered but not analyzed in detail

Most of the alternatives discussed for this project concerned water management. The operator and contractors mentioned the following alternatives in the water management plan (WMP), but did not include them in the water management strategy. There may be potential that the water produced in association with this project could be used for conventional or sub-surface irrigation.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 09-01-06. Field inspections of the proposed Badger Creek CBM project were conducted on 10/31/2006 by:

- James Hansen and Paul Woody – JM Huber Corporation
- Larry Bridger, Rick Estes, Chad Fladland, Rick Hendricks, Terry Kruse, John Vaselin, and Ace Armann – Baker Energy
- Dale Hoffman – EMATS
- Kim Brown – Thunderbird – Jones & Stokes
- Brent Sobotka – SWCA
- Guymen Easdale, BJ Earle, Lee Harrelson, and Kathy Brus - BLM

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Wilderness Values			X	Kathy Brus
ACECs			X	Kathy Brus
Prime or Unique Farmlands			X	Kathy Brus
Hazardous Wastes or Solids		X		Kathy Brus
Wetland/Riparian	X			Kathy Brus
Floodplains		X		Kathy Brus
Invasive, Nonnative Species	X			Kathy Brus
Threatened and Endangered Species	X			Guymen Easdale
Water Resources	X			Kathy Brus
Wild & Scenic Rivers			X	Kathy Brus
Cultural or Historical Values		X		BJ Earle
Native American Religious Concerns			X	BJ Earle
Air Quality		X		Kathy Brus
Environmental Justice		X		Kathy Brus

3.1. Topographic Characteristics of Project Area

The Badger Creek POD project area is located northeast of Sheridan, WY primarily along the east side of the Badger Creek drainage. The area is mixed grass prairie sagebrush plateau typical of upland plains. Annual precipitation averages 12 to 15 inches. Primary uses of the area are private residences, livestock grazing with irrigated and dryland hay production, as well as existing CBNG production. Some of the roads proposed to be used in this action were constructed or improved to accommodate the current CBNG production. There are active coal mines in Montana to the north and numerous historic coal mining locations throughout the area. All surface drainage flows to the Tongue River. Elevations range from 3520' along the Badger Creek drainage in the northwestern section of the POD to 3860' in the NE section of the POD.

Badger Creek County Road (Sheridan County Road 122) runs diagonally northwest to southeast through the project area. There are several private residences to the north, south and west of the POD area. The Historic NX Bar Ranch is located in the NWNE Sec 34 just outside the POD boundary to the SE.

The majority of the surface in the project area is privately owned. There is one 40 acre block of Federally managed surface in SENE Section 21 T58N R82W. There is not public access to this acreage. Total area within the designated POD boundary is 1428 acres.

According to the Wildlife Survey Report submitted with the POD (K. Brown – Thunderbird-Jones&Stokes, 08-29-06), the project area is 58% grassland, 30% sagebrush grasslands, 10% greasewood grasslands, 1% woodlands and 1% other (bare rock or soil, agriculture lands, residences, gas wells, roads or water).

3.2. Soils and Vegetation

3.2.1. Soils

Soils within the project area were identified from the *Sheridan County Survey Area, Wyoming (WY633).*

The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards and published in 2000. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

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

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

Table 3.2 Soil Map Units and Associated Ecological Sites – Badger Creek POD

Map Unit	Map Unit Name	Ecological Site	Acres	Percent POD Area
268	SHINGLE-THEEDLE-KISHONA ASSOCIATION, 6 TO 25 PERCENT SLOPES	Loamy 10-14" Northern Plains	493.6	34.6
312	WYARNO CLAY LOAM, DRY, 0 TO 3 PERCENT SLOPES	Clayey 10-14" Northern Plains	265.0	18.6
160	HAVERDAD-WORTHENTON COMPLEX, 0 TO 3 PERCENT SLOPES	Lowland 10-14” Northern Plains	146.4	10.3
130	CUSHMAN-WORF ASSOCIATION, 3 TO 25 PERCENT SLOPES	Loamy 10-14" Northern Plains	97.7	6.8
304	WORFKA-SHINGLE-SAMDAY COMPLEX, 6 TO 30 PERCENT SLOPES	Shallow Loamy 10-14” Northern Plains	81.6	5.7
260	SHINGLE-ROCK OUTCROP COMPLEX, 30 TO 50 PERCENT SLOPES	Shallow Loamy 10-14” Northern Plains	74.9	5.2
271	SHINGLE-WIBAUX COMPLEX, 0 TO 60 PERCENT SLOPES	Shallow Loamy 10-14” Northern Plains	49.9	3.5
112	BIDMAN-ARVADA FINE SANDY LOAMS, 0 TO 6 PERCENT SLOPES	Loamy 10-14" Northern Plains	45.1	3.2
279	TALUCE-TULLOCK-VONALEE ASSOCIATION, MOIST, 9 TO 30 PERCENT SLOPES	Sandy 15-19” Northern Plains	38.3	2.7
103	ABSTED-SLICKSPOTS COMPLEX, 0 TO 6 PERCENT SLOPES	Loamy 10-14" Northern Plains	36.0	2.5
281	THEEDLE-KISHONA ASSOCIATION, 6 TO 15 PERCENT SLOPES	Loamy 10-14" Northern Plains	34.3	2.4
201	PARMLEED-BIDMAN ASSOCIATION, 3 TO 15 PERCENT SLOPES	Loamy 10-14" Northern Plains	28.8	2.0
236	RENOHILL-ULM, DRY, ASSOCIATION, 6 TO 15 PERCENT SLOPES	Clayey 10-14" Northern Plains	15.6	1.1
180	MOSKEE-NODEN FINE SANDY LOAMS, DRY, 0 TO 15 PERCENT SLOPES	Sandy 10-14” Northern Plains	8.1	0.6
313	WYARNO CLAY LOAM, DRY, 3 TO 6 PERCENT SLOPES	Clayey 10-14" Northern Plains	7.6	0.5
145	GAYHART-BAHL ASSOCIATION, 6 TO 30 PERCENT SLOPES	Clayey 10-14" Northern Plains	4.9	0.3
207	PARMLEED-WORFKA ASSOCIATION, 0 TO 15 PERCENT SLOPES	Loamy 10-14" Northern Plains	0.5	0.0

Map Unit	Map Unit Name	Ecological Site	Acres	Percent POD Area
		TOTAL POD ACRES	1428.2	

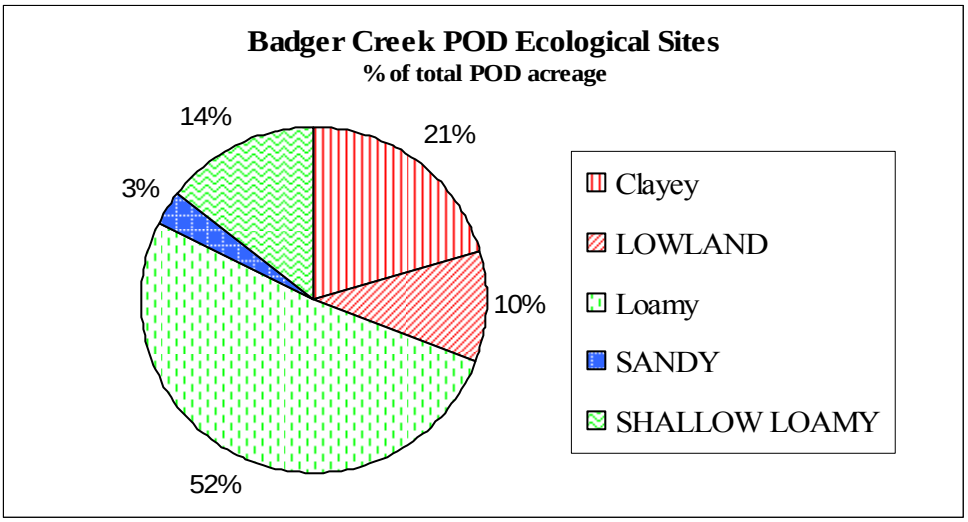
Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 3.2.2.

3.2.2. Vegetation

Ecological Site Descriptions are used to provide soils and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information.

The Ecological Sites and plant communities identified in this POD and its infrastructure are predominately loamy (Mixed Sagebrush/Cheatgrass), clayey (Blue Grama Sod/Plains Pricklypear) and sandy (Threadleaf Sedge/Fringed Sagewort/Plains Pricklypear Cactus). Figure 3.1 summarizes the ecological sites and soil types within the POD boundary. Map unit areas with similar Ecological Site descriptions were consolidated to the primary Sites as identified below.

Figure 3.1 Percentage of Ecological/Soil Types within the Badger Creek POD boundary



Included in the Conditions of Approval for this project is a map (Attachment 1) of the POD area which identifies the primary ecological sites.

Loamy Sites

Loamy ecological sites occur on gently undulating rolling land which includes landform such as hill sides, alluvial fans, ridges and stream terraces, in the 10-14 inch precipitation zone. This category includes loamy and shallow loamy ecological sites.

The soils of this site are moderately deep to deep (greater than 20" to bedrock) for loamy sites, well drained soils that formed in alluvium and residuum. These soils have moderate permeability and may occur on all slopes. The main soil limitations include low organic matter content and soil droughtiness. For the shallow loamy site, the soils are shallow (less than 20”to bedrock) well-drained soils formed in alluvium over residuum or residuum. These soils have moderate permeability and may occur on all slopes.

The Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this site would be a Rhizomatous Wheatgrasses, Needleandthread, Blue Grama Plant Community.

The current plant community is Mixed Sagebrush/Grass. Compared to the HCPC, cheatgrass has invaded with western wheatgrass and thickspike wheatgrass maintained at a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. Blue grama is the same or slightly less than found in the HCPC. Plant diversity is low.

Wyoming big sagebrush is a significant component of the Mixed Sagebrush/Grass plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Due to the history of conventional oil well development and interim reclamation in the area, there is also an abundance of introduced species found throughout the area. An increase in bare ground reduces water infiltration and increases soil erosion.

Dominant grasses identified include: crested wheatgrass, cheatgrass and Japanese brome, blue grama, needleandthread grass, prairie junegrass, western wheatgrass, green needlegrass, bluebunch wheatgrass, threadleaf sedge, and Sandburg's bluegrass. Forbs identified include: field pennycress, fringed sagewort. Other vegetative species identified at onsite: Wyoming big sagebrush, greasewood, prickly pear cactus, and yucca.

Clayey Sites:
This site occurs on nearly level to 30% slopes, on hill sides, in alluvial fans, stream terraces and ridge tops in the 10-14"precipitation zone. This category includes clayey and lowland ecological sites.

The soils of this site are moderately deep (greater than 20" to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow permeability. The bedrock is clay shale which is virtually impenetrable to plant roots. The main soil limitations include shallow depth to bedrock, high clay content and low organic matter content.

The HCPC is the Rhizomatous Wheatgrasses, Green needlegrass Community. Potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. The state is dominated by cool season midgrasses. The major grasses include western wheatgrass, and green needlegrass. Other grasses occurring in this state include Cusick and Sandberg bluegrass, needleleaf sedge, blue grama, and plains reedgrass. Wyoming big sagebrush is a conspicuous element of this state, occurs in a mosaic pattern, and makes up 5 to 10% of the annual production.

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

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

This state is stable and protected from excessive erosion. The biotic integrity of this plant community is not intact. The watershed is usually functioning, although runoff may affect adjoining sites. However, it can become at risk when bare ground increases.

Dominant grasses identified include: western wheatgrass, crested wheatgrass, Sandburg's bluegrass, cheatgrass, and green needlegrass. Forbs identified include: field pennycress. Other vegetative species identified at onsite: sagebrush, greasewood and prickly pear cactus.

Sandy Sites:
Sandy ecological sites occur on nearly level to 50 percent slopes on landforms which include hillsides, plateaus, and ridges in this project area.

The soils of this site are moderately deep (greater than 20" to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have moderate, moderately rapid, or rapid permeability.

The main soil limitations include: depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high wind erosion potential. The low annual precipitation should be considered when planning a seeding.

The HCPC for these soils is a Needleandthread/Prairie sandreed Plant Community. The current plant community is Threadleaf sedge/ Fringed sagewort/ Plains Pricklypear. A sod of threadleaf sedge and needleandthread dominates. Pricklypear cactus can become dense enough so that livestock cannot graze forage growing within the cactus clumps. When the historic climax community is replaced by sod forming communities, grass production is reduced.

The soil is generally protected in this state. The biotic integrity may be reduced due to low vegetative production. The sod formed by these grasses is resistant to water infiltration. While this sod protects the site, off-site areas are affected by excessive runoff that may cause gully erosion. This sod is resistant to change and may require practices such as long-term prescribed grazing to return to a mid grass community.

Dominant grasses identified at the onsite include: crested wheatgrass, cheatgrass and Japanese brome, western wheatgrass and foxtail barley. Forbs identified include: tumble mustard and fringed sagewort. Other vegetative species identified at onsite: Wyoming big sagebrush, prickly pear cactus, and yucca.

For more information, please refer to NRCS Soil Survey WY633.

3.3. Wetlands/Riparian

Badger Creek, an intermittent creek which tributary to the Tongue River, runs diagonally through the project area. The channel of the creek is well defined and incised. There are sporadic isolated soils which include a hydric component and riparian areas located along the course.

The Muller #1 Reservoir located in the SWNE Sec 21 T58N R82W is an existing stock water impoundment which was first permitted in 1953. Over the years, the impoundment has silted in so that the effective pool area has declined from the permitted 8.99 acre feet capacity. The historic ponding of surface flow in this impoundment pool area has created a riparian environment, with willows ringing the current high water line. There are also several deciduous trees growing near the pool area.

3.4. Floodplain

The NRCS has identified the channel area of Badger Creek as subject to frequent flooding. This stream can flow intermittently in response to storm events and snow melt. To date, there has been no permitted direct CBNG produced water discharged to this drainage due to downstream constraints.

3.5. Invasive Species

Leafy spurge, a noxious weed and invasive plant is known to have invaded this area, as was confirmed by

a search of BLM and Sheridan County Weed and Pest inventory maps and databases. The onsite was conducted in late fall, when most of the vegetation had been trampled or eaten. Due to the proximity of Badger Creek and the potential for sub-irrigation, there is also potential for salt cedar infestation as well as other invasive species, although no leafy spurge or salt cedar plants were noted at the onsite.

3.6. Wildlife

Several resources were consulted to identify wildlife species that may occur in the proposed project area. Resources that were consulted include the wildlife database compiled and managed by the BLM Buffalo Field Office (BFO) wildlife biologists, the PRB FEIS, the Wyoming Game and Fish Department (WGFD) big game and sage-grouse maps, and the Wyoming Natural Diversity Database (WYNDD).

A habitat assessment and wildlife inventory surveys were performed by Thunderbird-Jones & Stokes. Thunderbird-Jones & Stokes performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006. A survey was conducted for Ute ladies'-tresses orchid on August 25, 2006 by Western Land Services.

A BLM Biologist conducted a field visit on October 31, 2006. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose. 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.

3.6.1. Big Game

Big game species expected to be within the Badger Creek project area include mule deer, pronghorn antelope, and white-tailed deer. The project area is part of the Clearmont pronghorn antelope herd unit. The 2004 estimated herd population was 4,549 with a population objective of 3,000 (WGFD 2004). The Badger Creek project area is located in yearlong range for antelope. A pocket (approximately 4 Sections) of winter/yearlong range occurs on the western boundary of the Badger Creek project area.

The project area is part of the Powder River mule deer herd unit. The 2004 estimated herd population was 55,561 with a population objective of 52,000 (WGFD 2004). The WGFD has designated the entire project area as winter year long range for mule deer.

The project area is part of the Powder River white-tailed deer herd unit. The 2004 estimated herd population was 12,716 with a population objective of 8,000 (WGFD 2004). The WGFD has designated the entire project area as winter year long range for white-tailed deer.

Winter-Yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Yearlong** use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.6.2. Aquatics

The project area is drained by ephemeral tributaries of Badger Creek which is an intermittent stream

tributary to the Tongue River. It traverses the project area from the southeast to the northwest emptying into the Tongue River, 2.0 miles northwest of the project area. Cedar Canyon and other unnamed ephemeral drainages are tributaries to Badger Creek and occur within the Badger Creek project area.

No springs were found within the project area (SWCA 2007). Fish that have been identified in the Tongue River watershed are listed in the PRB FEIS (3-156-159).

3.6.3. 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).

3.6.4. Raptors

Nine raptor nest sites were identified by Thunderbird-Jones & Stokes. Five raptor nests are within the Badger Creek project area and four are within 0.5 miles of the project area. Six were active in 2006 (Table 4).

Table 3.3. Documented raptor nests within the Badger Creek project areas in 2006.

BLM ID#	SPECIES	UTM N	UTM E	LEGAL LOCATION	SUBSTRATE	COND	STATUS 2006
New	Cooper's hawk	4984590	360284	NWSE Sec 36, T9S, R40E	Live Pondersoa pine	Fair	Active
3553	golden eagle	4983907	360550	NWNE Sec 20, T58N,R82W	Live Ponderosa pine	Good	Active 3 young
3554	American kestrel	4983515	359890	SWNE Sec. 20 T58N,R82W	Dead Ponderosa pine	Cavity	Inactive
3556	American kestrel	4983515	359890	SENW Sec. 20 T58N,R82W	Live Cottonwood	Not located	Not located
New	burrowing owl	4981521	363212	NESW Sec. 27 T58N,R82W	Prairie dog burrow	NA	Active 4 young
New	burrowing owl	4980998	362935	SWSW Sec.27 T58N,R82W	Prairie dog burrow	NA	Active
New	Unknown	4980453	3632115	NENW Sec. 34 T58N,R82W	Live Boxelder	Good	Inactive
New	great-horned owl	4979959	363362	SENW Sec. 34 T58N,R82W	Live Cottonwood	Poor	Active 3 young
New	red-tailed Hawk	4979929	363367	SENW Sec.34 T58N,R82W	Live Cottonwood	Remnants	Active failed

3.6.5. Threatened and Endangered and Sensitive Species

3.6.5.1. Threatened and Endangered Species

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

3.6.5.1.1. Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and

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

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

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

Eight active black-tailed prairie dog colonies were identified during site visits by Thunderbird-Jones & Stokes. Three colonies occur within the project area and five occur just outside the project boundary (within 0.5 miles or less). The colonies range in size from 0.25 to 72 acres. The average distance between colonies is 0.6 miles.

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

3.6.5.1.2. Bald eagle

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

Bald eagle nesting habitat is generally found along lakes, rivers, and other areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles can be more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, domestic sheep and big game carcasses may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

The project area contains marginal bald eagle winter roosting and nesting habitat. Small pockets (2-5 individuals) of cottonwoods, boxelder and ponderosa pine can be found scattered throughout the project area. The Tongue River is approximately 1.7 miles from the project area. The Tongue River provides large continuous stands of cottonwoods along the flood plain. Bald eagles have been observed in Section 34, Township 9 South, Range 41 East (Montana) approximately 2.0 miles from the Badger Creek project area. According to the BLM Buffalo Field Office database, bald eagles are using the Tongue River riparian areas for nesting and winter roosting. With active prairie dog colonies within the project area, bald eagles maybe using the project area for foraging. With the Tongue River near by and active prairie

dog colonies in and adjacent to the project area, bald eagles may use the area for nesting and roosting.

3.6.5.1.3. Ute's Ladies Tresses Orchid

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

On August 12, 2005 Western Land Services conducted surveys along Badger Creek and its tributaries for Ute ladies' tresses habitat. Badger Creek and its tributaries lack surface and subsurface hydrology, associated vegetation, non hydric soil types, river/drainage channels are steep and contain upland vegetation. Suitable orchid habitat is not present within the Badger Creek project area.

3.6.5.2. Sensitive Species

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

3.6.5.2.1. Black-tailed prairie dog

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

Eight active black-tailed prairie dog colonies were identified during site visits by Thunderbird-Jones & Stokes, the colonies occur partially or wholly within the Badger Creek project area (Table 3.4). Three colonies occur within the project area and five occur just outside the project boundary (within 0.5 miles or less). The colonies range in size from 0.25 acres to 72 acres. The average distance between colonies is 0.6 miles.

Table 3.4 Documented Prairie Dog Colonies within the Badger Creek Project Area 2006

LEGAL LOCATION T, R, AND SECTION	SIZE ACRES	LOCATION TO PROJECT AREA
NENE Sec.19, T58N, R82W	0.25 acres	0.5 miles west of project boundary
SWSW Sec. 21, T58N, R82W	0.25-0.3 acres	0.075 mile west of project boundary (2 colonies within a 100 ft. of each other)
SW Sec.21, T58N, R82W	13.2 acres	Within the project area.
Southern ½ Sec. 22, T58N, R82W	72.5 acres	0.19 miles east of project boundary

LEGAL LOCATION T, R, AND SECTION	SIZE ACRES	LOCATION TO PROJECT AREA
Central part Sec. 27, T58N, R82W	0.4 acres	On the eastern boundary
SW Sec. 27, T58N, R82W	13.7 acres	Within the project area (the county road divides the colony in half).

3.6.5.2.2. Greater sage-grouse

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

Suitable sage-grouse nesting, late brood rearing and winter habitat exists throughout the project area. One lek (PPL lek) is within 2.0 miles from the project boundary (Refer to table 6). The PPL lek has been active 11 out of 12 years surveyed. The PPL lek was active 2005-2006, inactive in 2004 and active in 2003. Four documented sage-grouse leks are present within 7.5 miles of the project area.
This lek site is identified below.

Table 3.5. **Sage-grouse lek(s) surrounding the Badger Creek project area.**

LEK NAME	*UTM NAD83*	*LEGAL LOCATION*	*STATUS IN 2006 (PEAK MALES)*	*DISTANCE FROM PROJECT AREA*
PPL	4980986 N 358251 E	SWSW Sec. 30 T58N, R82W	13	1.8 miles

3.6.5.2.3. Sharp-tailed grouse

Marginal sharp-tailed grouse habitat exists within some of the drainages of the Badger Creek project area. No sharp-tailed grouse were observed in or adjacent to the Badger Creek project area.

3.6.5.2.4. Mountain plover

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

Mountain plover breeding and nesting habitat exists throughout the project area. Suitable habitat occurs primarily in prairie dog colonies and along the Badger Creek flood plain. Surveys for mountain plover occupancy were conducted by Thunderbird-Jones & Stokes on May 4-6, 20, 21 and June 10-11, 2005 and on May 5, June 5, 15, and 16, 2006 according to Fish and Wildlife Service protocol. No mountain plovers were observed within the Badger Creek project area.

3.7. West Nile Virus

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

Since its discovery in 1999 in New York, WNv has become firmly established and spread across the

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

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

Table 3.4 Historical West Nile Virus Information

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

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

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

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

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is

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

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

3.8. Water Resources

The project area lies along Badger Creek which is within the Upper Tongue River drainage system.

3.8.1. Groundwater

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 22 registered stock and domestic water wells within one mile of POD boundary with depths ranging from 60 to 950 feet (average depth 263 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).

As a requirement for obtaining a WYPDES permit from the WDEQ, the presence of shallow groundwater and that groundwater quality must be determined at sites proposed to impound water produced in association with CBNG. For this project area, the results of the investigations at the proposed sites are included in Table 3.5 below.

Table 3.7 Groundwater Quality from Badger Creek POD area

Name	Location	Depth to Ground water, feet	Total Dissolved Solids, TDS mg/l	Sodium Adsorption Ratio, SAR	Electrical Conductivity, EC in µmhos/cm	Class of Use (as per WDEQ)
Moreland #1	SWSE Sec 21 58/82	50 to 85	5090 to 8460	12.5 - 25.0	5970 to 9630	IV
Muller #1	SWNE Sec 21 58/82	27 to 45	3320 to 8380	6.5 – 11.1	4280 to 7950	IV
Dow Pit 10-28	SWSE Sec 28 58/82	40	4640	NA	NA	NA

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

3.8.2. Surface Water

The project area is within the Badger Creek drainage which is tributary to the Upper Tongue River primary watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it

receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The Badger Creek channel is well defined and incised in the secondary flood plain. The ephemeral contributing channels are primarily well vegetated grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Upper Tongue River, the EC ranges from 318 at Maximum monthly flow to 713 at Low monthly flow and the SAR ranges from 0.36 at Maximum monthly flow to 0.86 at Low monthly flow. These values were determined at the USGS station located at the state line near Decker, WY (PRB FEIS page 3-49).

The operator has not identified any natural spring within this POD boundary.

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

3.9. Cultural and Paleontological Resources

A Class III inventory, BFO No.70070001, ACR for Baker Energy: "A Class III Cultural resource Inventory of Baker Energy's Badger Creek Coalbed Methane Plan of Development in Sheridan County, Wyoming", was conducted and covers the project area. A total of 1,282 acres was inventoried, and four sites reported. The report was submitted to SHPO on 1/08/2007 with a fifteen day review request under the Wyoming State protocol, since an unevaluated historic site fell within the viewshed of the project footprint. No response was received from SHPO.

The project area is mapped as Tertiary Wasatch, with a Paleontological sensitivity rating of 5, a high ranking. No Paleontological localities are reported in the area, probably due to lack of research. Medium sized to micro-mammals, turtles and crocodiles, and other reptiles constitute the principal Paleontological finds in this formation. No resources of interest to Native American cultural groups or Traditional Cultural Properties are known to occur in the project area.

Table 3.8 Cultural Resources Inventory Results

Site Number	Site Type	Eligibility
48 SH 529	Historic homestead	Unevaluated
48 SH 1389	Historic site	Not eligible
48 SH 13890	Prehistoric site	Eligible
48 SH 1391	Historic site	Not eligible
NA	13 Isolates and Isolated Resources	Not eligible

4. ENVIRONMENTAL CONSEQUENCES

Under this alternative, 13 wells would be drilled to Federal minerals on 80 acre spacing (see description of alternatives). As discussed, the topography, ecological sites and soils in this area are diverse. Some of the area has been already been developed for fee CBNG production, and with the existing country road, provides the access infrastructure. There are many areas which can be reclaimed by traditional methods, minimizing the overall impact of the project. However, some areas will be challenging for reclamation due to soil properties or site characteristics. The operator planned their project to avoid those areas where possible, however the proposed action may affect some areas of soils with a limited potential for successful reclamation. The operator will be required to monitor all of the associated construction and infrastructure for interim reclamation success and apply additional mitigation if required.

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

4.1. Surface Issues

4.1.1. Soils and Vegetation

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

- Soil Compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Mixing of horizons – occurs where construction or roads, pipelines or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation.
- Loss of soil vegetation cover, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Modification of hill slope hydrology.

Soil productivity would be eliminated along improved roads and severely restricted along two track trails until successful final reclamation is achieved.

Of the 13 proposed well locations, none are on existing or reclaimed conventional well pads, 4 can be drilled without a well pad being constructed and 9 will definitely require a constructed (cut and fill) well pad. Surface disturbance for the four wells without pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 15 x 20 x 12 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 4 wells would involve approximately 0.35 acres/well for 1.4 total acres. The other 9 wells requiring cut and fill pad construction would disturb approximately 0.5 acres/well pad for a total of 4.5 acres. The total estimated disturbance for all 13 wells would be 5.9 acres. This impact will be reduced with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Approximately 4.52 miles of improved roads would be constructed to provide access to various well locations. Approximately 0.25 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors."

Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 0.1 miles of pipeline would be constructed outside of corridors, and 4.0 miles within corridors apart from access routes. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, mulching, erosion blankets, etc.) would ensure that land productivity and stability is regained and maximized.

Several access routes and locations, as listed below, will be challenging for successful reclamation due to the presence of shallow sandy soils. The operator will be required to minimize surface disturbance and provide expedient site stability for construction in these areas.

- Well 1MK-20 NENE Sec 20: Sandy shallow location and pipeline right of way which will require expedient stabilization.
- Well 7MK-21 SWNE Sec 21: Access will require expedient stabilization.
- Well 3MK-20 NENW Sec 20: To avoid excess disturbance to the surrounding sagebrush habitat, construction activities will be confined to the staked pad and road areas.

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

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 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	4	Site Specific	1.4	Long Term
Constructed Pad	9		4.5	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Compressors	0	Site Specific	0.0	Long Term
Monitor Wells		0.1/acre		Long Term
Impoundments	4		27.2	Long Term
On-channel	2	Site Specific	8.9	
Off-channel	2	Site Specific	18.3	
Water Discharge Points	4	Site Specific	0.1	
Channel Disturbance				
Headcut Mitigation*		Site Specific	0.0	
Channel Modification		Site Specific	0.0	
Improved Roads				Long Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
No Corridor With Corridor	1.22 3.3	30' Width 45' Width	4.4 17.8	
2-Track Roads No Corridor With Corridor	0.25	20' Width	0.6	Long Term
Pipelines No Corridor With Corridor	0.1 4.0	15' Width 20' Width	0.2 9.6	Short Term
Buried Power Cable No Corridor	0.1	15'Width	0.2	Short Term
Overhead Powerlines	0.0	15' Width	0.0	Long Term
Additional Disturbance Staging Areas	4	Site Specific	7.35	Short Term
TOTALS Short Term Disturbance Long Term Disturbance			73.4 56.0	

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

RECLAMATION BONDING

One of the greatest potential impacts anticipated following the close of CBNG production will be the presence of all the water impoundments which were constructed specifically for the management of produced water. Most of these impoundments are located high in the drainages and therefore would not contain storm event water for any length of time. It is predicted that these impoundments would become weed pits rather than serve a useful purpose for stock or wildlife watering. In order to ensure expedient reclamation of these impoundments, as of September, 2005, the BLM in coordination with the WDEQ and WOGCC began bonding these structures for the cost of reclamation. These cost estimates are prepared by a licensed Professional Engineer experienced in reclamation. As these impoundments are no longer needed as a part of the water management strategy, the operator will submit a reclamation plan and satisfactorily reclaim each location prior to the release of the bond. This bonding insures that any adverse impacts which could result from these impoundments will be mitigated through final reclamation at no additional cost to the public.

The impoundments and pits included in this project have been bonded with the appropriate entities as follows:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	Lease Number	Bond Number	Bond Location
1	Moreland #1 15-21	SWSE	21	WYW164345	WYB000468	BLM WSO
2	Muller #1 7-21	SWNE	21	WYW164345	WYB000469	BLM WSO
3	Dow 10-28-58 -82 Pit	NENE	28	Fee	6411425	WYOGCC
4	Dow 9-28-58-82 Pit	NESW	28	Fee	6411426	WYOGCC

4.2. Wetland/Riparian

The water management strategy for this project is to fully contain the water produced in association with CBNG in the impoundments and pits located within the POD boundary. Therefore, direct discharge of produced water will not impact the wetland or riparian areas in Badger Creek. There is, however, a potential for impact to the wetland and riparian areas in the Badger Creek channel from the resurfacing of infiltrated water, which will be discussed following in Section 4.7.2 Surface Water.

Access routes and pipeline corridors within the proposed development will cross the Badger Creek channel several times. These crossings will be constructed with minimal disturbance to the channel and any hydric soils will be expediently stabilized and reclaimed.

Improvements to the Muller #1 Reservoir include dredging of the pool area to remove the sediment and restore the impoundment to its original capacity, which will disturb the riparian area vegetation (primarily willows). After discussing the alternatives with the Mr. Bert Dow, the landowner, it was decided that the operator will be required to transplant some of the dislocated willows farther up the side slopes, near or above the designed high water line. Additionally, a condition of approval will be added that if the trees located in the impoundment area are removed or become inundated, the operator will plant replacement trees.

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

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

4.3. Floodplain

Utilization of impoundments for complete containment of the water produced in association with CBNG in this project will prevent surface discharges from reaching the mainstem of Badger Creek. Barring unforeseen events, such as impoundment breech, this project should not change the natural response to storm events in the Badger Creek Floodplain.

"Anticipated CBM flows could increase the frequency or magnitude of flooding anticipated in the Project Area. Minimization of flood hazards within the Project Area would depend on the use of mitigation measures to ensure adequate control of anticipated surface flows and design of impoundments. Comprehensive water management planning, including development and implementation of BMPs for discharge outfalls and water development structures, would mitigate the effects of anticipated CBM

flows. However, lower than anticipated flood damage during an intense storm near Gillette in May 2000 demonstrated that management of existing CBM flows, including construction of many small reservoirs, reduced the severity of flooding in the Project area in one case." PRB FEIS pg 4-130.

4.4. Invasive Species

This project area is within the boundary identified as impacted by leafy spurge invasion. For construction within know areas of infestation in order to control the spread of noxious species, the operator will be required to clean the construction equipment on site prior to moving to the next location. These locations would be Badger Creek crossings as well as any other infected areas identified during construction.

The operator has committed as a weed management plan in their proposal to:

1. Educate their employees for weed identification and prevention.
2. Inspect disturbed areas for weed infestations.
3. Control identified noxious weeds and weeds of concern.

For more information, please refer to the MSUP Appendix 8 - Weed Management Plan in the POD.

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 reduce potential impacts from noxious weeds and invasive plants.

4.4.1. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Tongue River drainage, which is approximately 49.0% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to fully contain the water produced in association with CBNG within the project area.

No additional mitigation measures are required.

4.5. Wildlife

4.5.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, winter yearlong range for mule deer, yearlong range for pronghorn antelope and yearlong range for white-tailed deer would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarized the proposed activities; items

identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

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

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

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

4.5.1.1. Cumulative effects

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

4.5.2. Aquatics Direct and Indirect Effects

Produced water will be contained within 2 on-channel reservoirs, 2 off-channel pits and 6 stock tanks (4 proposed and 2 existing). If a reservoir were to discharge, it is unlikely produced water will reach a fish-bearing stream. It is unlikely downstream species would be affected.

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

4.5.2.1. Cumulative effects

Under permitted conditions, it is not anticipated that existing downstream water uses would be affected. The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247. No additional mitigation measures are required.

4.5.3. Migratory Birds Direct and Indirect Effects

Disturbance of the habitat types within the project area is likely to impact migratory birds. Native

habitats are being lost directly with the construction of wells, roads, and pipelines. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Human activities likely displace migratory birds farther than simply the physical habitat disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003). Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

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

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

With the development of coal bed natural gas, reservoirs are being constructed to handle the produced water. This causes direct habitat loss within the sagebrush and grassland ecosystems and creates more breeding areas for mosquitoes and increases the potential for West Nile virus which may cause direct and indirect (sick birds would be subject to higher predation rates) mortality of migratory birds.

4.5.3.1. Cumulative effects

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

4.5.4. Raptors Direct and Indirect Effects

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

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

BLM ID#	UTM N (NAD 83)	UTM E (NAD 83)	SPECIES	STATUS	WELL / PIT NUMBER AND ASSOCIATED INFRASTRUCTURE	DISTANCE (MILES)
New	4984590	360284	Coopers hawk	Active	3MK20	0.47 miles
3553	4983907	360550	golden eagle	Active 3 young	3MK20 7MK20 1MK20 Access road to wells Staging Area	0.29 miles 0.25 miles 0.21 miles 0.08 miles 0.38

BLM ID#	UTM N (NAD 83)	UTM E (NAD 83)	SPECIES	STATUS	WELL / PIT NUMBER AND ASSOCIATED INFRASTRUCTURE	DISTANCE (MILES)
3554	4983515	359890	American kestrel	Inactive	7MK20 Access road/pipeline 1MK20 3MK20	0.08 miles Within 100ft 0.27 miles 0.31 miles
3556	4983515	359890	American kestrel	Not located	3MK20 7MK20 County Road Access road/pipeline to wells 7MK20	0.23 miles 0.34 miles edge of road 0.29 miles
New	4981521	363212	burrowing owl	Active 4 young	5MK27 13MK27	0.27 miles 0.42 miles
New	4980998	362935	burrowing owl	Active	13MK27	0.07 miles
New	4980453	3632115	Unknown raptor	Inactive	Staging area 5MK33 Access road /pipeline Pipeline/county road	0.04 miles 0.33 miles 0.04 miles 0.12 miles
New	4979959	363362	great-horned owl	Active 3 young	5MK34 Access road /pipeline County road	0.37 miles 0.10 miles 0.29 miles
New	4979929	363367	red-tailed hawk	Active failed	5MK34 Access road /pipeline County road	0.37 miles 0.10 miles 0.29 miles

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

Well 1MK20 is located 0.21 miles from golden eagle nest BLM ID # 3553. The well was not moved. Moving the well to the northeast, east, southeast or south would result in considerable more surface disturbance and moving the well north, northwest or southwest would put the well closer to the nest and would possibly be in line of sight. The golden eagle nest was active 2005-2006.

Well 7MK20 is 0.08 miles from an American kestrel nest. The nest was inactive in 2006 and active in 2005. The well was not moved. Moving the well in any direction would cause considerable more surface disturbance. Relocating the well would require an engineered pad. Also, moving the well to the west, northwest or north would put the well closer to the golden eagle nest. There will be ½ mile radius timing buffer applied around the kestrel nest and the 7MK20 well.

4.5.4.1. 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.

4.5.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed

in a Biological Assessment and a summary is provided in Table 4.3. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.5.5.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Sufficient habitat not present
Threatened				
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body.	S	LAA	Project includes suitable habitat and roads.
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

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

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

4.5.5.1.1. Black-footed ferret

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

4.5.5.1.2. Bald eagle

Existing single phase overhead power lines are located in Sections 20, 21, 27, 28 and 34, Township 58 North, Range 82 West. The existing powerline runs through the middle of the project area. Powder River Energy Corporation is currently working on replacing 4.41 miles of existing single phase powerline with 4.41 miles of new 3 phase powerline within the Badger Creek project area. Three-phase powerlines will increase the potential for bald eagles and other raptors to be electrocuted. The replaced powerline will meet current Avian Power Line Interaction Committee (2006) and Fish and Wildlife Service standards. Powder River Energy Corporation estimates the replacement of the powerline will be completed by mid summer (Frigo 2007). The old lines and poles will be removed (Frigo 2007).

The three phase powerline will be servicing both fee and federal wells and other infrastructure associated with natural gas development and production within the region.

Approximately 6.87 miles of proposed and existing improved CBNG constructed roads will be used to access the Badger Creek project area.

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

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 BFO 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 were observed feeding on 16 of the reported road-side carcasses (<4%).

The Badger Creek POD provides suitable bald eagle nesting and winter roosting habitat. Prairie dog colonies within the POD and the nearby Tongue River provide a prey base and the cottonwood trees along Badger Creek provide nesting and roosting substrate. Bald eagles are sensitive to human activities and tend to seek nesting and roosting areas away from human disturbance. CBNG activities in close proximity to a nest or roost may lead to nest or roost abandonment; to reduce the potential for nest or roost site abandonment, the BLM provides a permanent ½ mile buffer and a 1 mile temporal buffer around bald eagle nests and roosts. JM Huber will survey the suitable habitat along Badger Creek prior

to construction during the nesting and winter roosting seasons to identify whether bald eagles may have initiated a new nest or winter roost.

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

4.5.5.1.3. Ute's Ladies Tresses Orchid

Suitable habitat is not present within the Badger Creek project area. Badger Creek and its tributaries lack surface and subsurface hydrology, associated vegetation, non hydric soil types, river/drainage channels are steep and contain upland vegetation.

Produced water will be contained within 2 on-channel reservoirs, 2 off-channel pits and 6 stock tanks (4 proposed and 2 existing). Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within the project area. Implementation of the proposed coal bed natural gas project should not affect the Ute ladies'- tresses orchid because there is no potential habitat present.

4.5.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

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

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

4.5.5.2.1. Black-tailed prairie dog

All proposed infrastructure is located outside or on the edge of the prairie dog colonies.

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

4.5.5.2.2. Greater sage-grouse

The PPL lek was active 2005-2006.

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

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

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

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

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

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

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

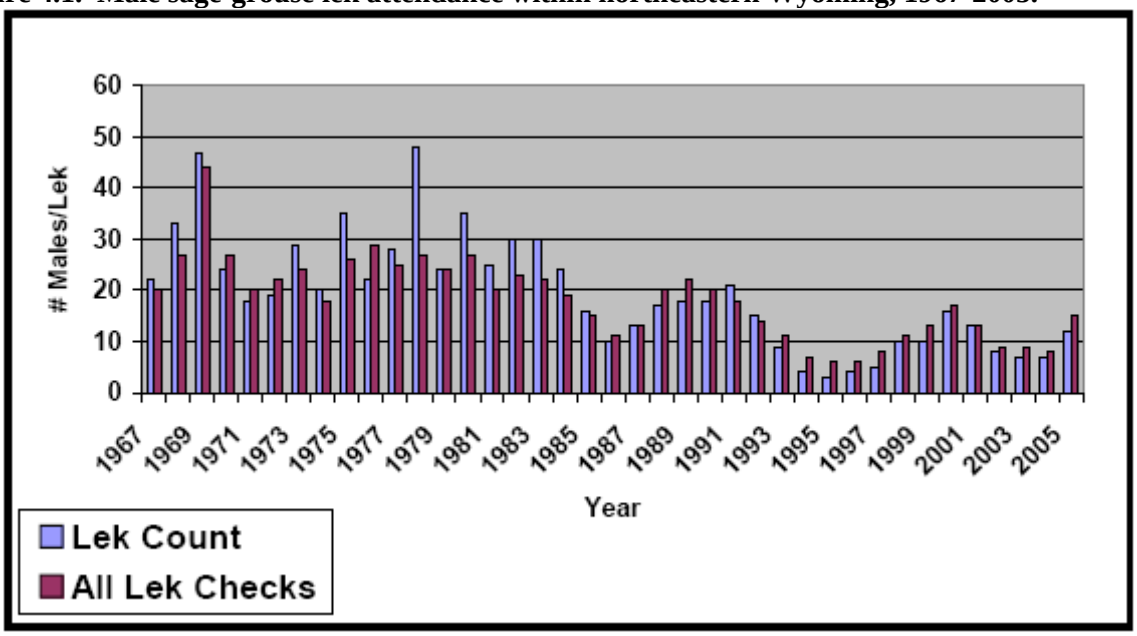
(1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found 36% of their grouse nesting within 3 km of the capture leks. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being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

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

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

The sage grouse population within northeast Wyoming is exhibiting a steady long term downward trend (Figure 4.1) (Thiele 2005). The figure illustrates a ten year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak and each periodic low is lower than the previous population low. Long-term harvest trends are similar to that of lek attendance (Thiele 2005).

Figure 4.1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



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

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

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

4.5.5.2.3. Mountain plover

Suitable mountain plover habitat is present within the Badger Creek floodplain and eight prairie dog colonies. Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors and roads may be attractive to plovers while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase

their vulnerability to vehicle collision. The existing overhead power lines provide perch sites for raptors potentially resulting in increased mountain plover predation. CBNG infrastructure such as the well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

With the loss or alteration of their natural breeding habitat, mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat, such as heavily grazed land, burned fields, fallow agriculture lands, roads, oil and gas well pads and pipelines. These areas could become reproductive sinks. Adult mountain plovers may breed there and lay eggs and hatch chicks, however the young may not reach fledging age due to the poor quality of the habitat.

Recent analysis of the US Fish and Wildlife Service (USWFS) Breeding Bird Survey (BBS) data suggests that mountain plover populations have declined at an annual rate of 3.7 % over the last 30 years which represents a cumulative decline of 63% during the last 25 years (Knopf 1995).

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

4.5.5.3. Cumulative effects

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

4.6. West Nile Virus

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

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

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

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

4.7. 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 integrates sound water management practices, monitoring of downstream impacts within the Badger Creek and Upper Tongue River watersheds and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts

to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should reduce project area and downstream potential impacts from proposed water management strategies.

The water management strategy for the Badger Creek POD is to fully contain all the water produced in association with CBNG within impoundments in the POD boundary. According to the WYPDES Permit, the on-channel impoundments may discharge as a result of storm events larger than the 50 year, 24 hour occurrence. However, the water quality for these discharges will be a mixture of produced water and surface run off.

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

The maximum water production is predicted to be 23.0 gpm per well or 299.0 gpm (0.67 cfs or 482 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Tongue River drainage, the projected volume produced within the watershed area was 22,351 acre-feet in 2006 (maximum production). As such, the volume of water resulting from the production of these wells is 2.16 % of the total volume projected for 2006. This volume of produced water is within the predicted parameters of the PRB FEIS.

4.7.1. Groundwater

The PRB FEIS predicts an infiltration rate of 39% to groundwater aquifers and coal zones in the Upper Tongue River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 116.6 gpm will infiltrate at or near the discharge points and impoundments (188 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, "the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater." (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 60 to 950 feet compared to 198 to 1225 feet to six different coal zones. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence of the proposed wells.

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

Adherence to the drilling plan, the setting of casing at appropriate depths, following safe remedial

procedures in the event of casing failure, and utilizing proper cementing procedures will protect any potential fresh water aquifers above the target coal zone. This will ensure that ground water will not be adversely impacted by well drilling and completion operations.

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

To address the potential impacts from infiltration on shallow ground water, the WDEQ has developed a guidance document, "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments. To comply with those requirements, the operator has installed investigative wells at the impoundment sites proposed for this project. The existing water quality for the shallow groundwater encountered is listed in Table 3.5. Because the water quality was categorized as Class IV and not suitable for livestock use, the WDEQ has determined that there would be no risk of additional degradation to the groundwater due to infiltration from the impounded water. There will not be additional shallow groundwater monitoring required at these sites.

4.7.1.1. Groundwater Cumulative Effects:

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

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

4.7.2. Surface Water

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

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

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Tongue River Watershed at Decker, WY Gauging station #06306300			
Historic Data Average at Maximum Flow		0.36	318
Historic Data Average at Minimum Flow		0.86	731
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			

Predicted Values	TDS, mg/l	SAR	EC, μmhos/cm
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirement for WYPDES Permit # WY0055301 (Draft)			
At discharge point	5,000	NA	7,500
Shallow Groundwater Quality (From Table 3.5)			
Minimum	3,320	6.5	4,280
Maximum	8,460	25.0	9,630
Predicted Produced Water Quality			
Comingled Sample (Smith, Anderson, Dietz 2, Dietz 3, Monarch and Carney)	1,590	81.7	2,520

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1620 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application was mentioned but not included and analyzed in this proposal. The application of water with this high SAR concentration (81.7) without treatment of the soil or water would have the potential to impact the soils. 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.

There are 4 discharge points proposed for this project. They have been appropriately sited and will utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 2 off-channel pits (133.9 acre feet capacity) would potentially be constructed and 2 existing impoundments (17.88 acre feet capacity) improved within the project area. The operator has committed to fully contain all produced water within these impoundments. No undiluted water produced in association with CBNG will be discharged to the channels below the on-channel impoundments, as required by the conditions of the WYPDES Permit. For storm events exceeding the 50 year event, CBNG produced water diluted with precipitation could be discharged downstream via the emergency spillway. These impoundments will disturb approximately 27.2 acres including the dam structures. Of these water impoundments, 2 would be on-channel reservoirs disturbing 8.9 acres, and 2 would be off-channel ponds disturbing 18.3 acres. Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

At both of the impoundments, the operator has proposed to install bypass channels to pass any run-off resulting from a storm event around the impoundments back to the downstream channel. For the Muller #1 impoundment, the installation of this bypass channel would generate over 2600 cubic yards of excess fill. The operator is proposing to spread the fill over the toe of the dam. This volume would be added to the silt removed from the pool area. Spreading this dirt on the dam face could increase the height of the dam, increase the footprint of the dam, place additional fill in the channel and potentially impact the dam structural integrity. For this reason, a COA will be added which states that the discharge of water produced in association with Federal minerals to this impoundment will not be allowed until the operator has identified an alternate location for the fill dirt.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.10 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Additionally, as a condition in the draft WYPDES Permit, the operator will be required to monitor the water quality within the impoundment for the following parameters: TDS, EC, total Radium 226, dissolved manganese, total recoverable arsenic, chlorides, dissolved iron, sulfates, dissolved fluoride, and total recoverable selenium (WYPDES Permit SB p 2). If the results of the monitoring reveal an increase in these constituents above levels acceptable for Class 3B waters, the operator will be required to apply mitigation to protect the water quality within the impoundment.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Tongue River of 5 cfs (PRB FEIS pg 4-94). The predicted maximum discharge rate from these 13 wells is anticipated to be a total of 299.0 gpm or 0.67 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in Badger Creek from this action (0.1 cfs) may add a maximum 0.08 cfs to the Upper Tongue River flows, or 1.6% of the predicted total CBNG produced water contribution. The lowest impoundment in this project is over 3 stream miles from the confluence of Badger Creek and the Upper Tongue River. The water produced from these wells should not impact the water quantity in the mainstem of the Upper Tongue River. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP Section D). Based on the area of the areas of watershed above the on-channel impoundments in the POD (2.81 sq mi) and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 22 wells which could produce a maximum flow rate of 506 gpm (1.13 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watersheds upstream of the project area, 1.1 cfs, is much less than the volume of runoff estimated from the 2-year storm event of 586 cfs for the drainage. Therefore, the estimated flow rate of water produced from the full development in the watershed above the project area is less than the natural runoff from the area.

The operator has applied for a WYPDES permit for the discharge of water produced from this project from the WDEQ. This permit (WY0055301) has been published in draft form as of 2-28-07.

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

pH	6.5 to 9.0
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Dissolved iron	1000 µg/l max
Total Recoverable Arsenic	150 µg/l max
Chlorides	230 mg/l

The WYPDES permit also addresses existing downstream concerns in the COA for the permit. Because this permit is based on full containment, there are designated flow monitoring points downstream of the pits and on-channel impoundments. The operator is required to daily inspect these monitoring points for flow.

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

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

In-channel downstream impacts are addressed in the WMP Section E for the Badger Creek POD prepared by SWCA Environmental Consultants for JM Huber. Although there are some breeched impoundments in the Badger Creek channel downstream of the project area, because the operator will fully contain the produced water in the impoundments, no undiluted produced water will be allowed to reach Badger Creek.

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

4.7.2.1. Surface Water Cumulative Effects

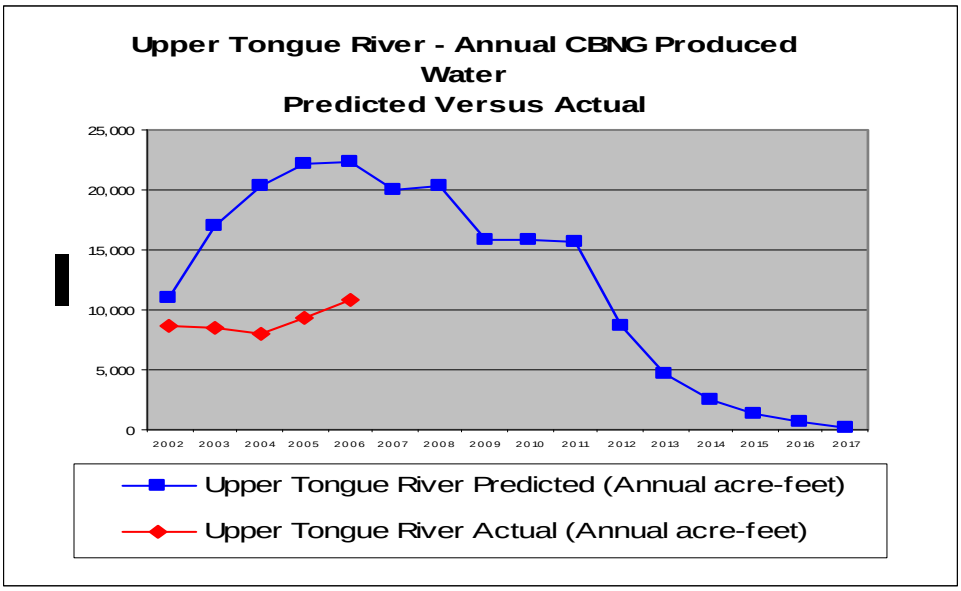
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Tongue River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2006, all producing CBNG wells in the Upper Tongue River watershed have discharged a cumulative volume of 45,412 acre-ft of water compared to the predicted 70,374 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.6 and Figure 4.2 following. This volume is 49.0 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Tongue River watershed.

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

Year	Upper Tongue River Predicted (Annual acre-feet)	Upper Tongue River Predicted (Cum acre-feet from 2002)	Upper Tongue River Actual (Annual acre-feet)		Upper Tongue River Actual (Cumulative acre-feet beginning 2002)	
			Ac-ft	% of Predicted	Ac-ft	% of Predicted
2002	11,019	11,019	8,675	78.7	8,675	78.7
2003	16,950	27,969	8,574	50.6	17,248	61.7
2004	20,272	48,241	7,971	39.3	25,220	52.3
2005	22,133	70,374	9,397	42.5	34,617	49.2
2006	22,351	92,725	10,795	48.3	45,412	49.0
2007	19,945	112,670				
2008	20,282	132,952				
2009	15,782	148,734				
2010	15,782	164,516				
2011	15,654	180,170				
2012	8,646	188,816				
2013	4,721	193,537				
2014	2,522	196,059				
2015	1,290	197,349				
2016	601	197,950				
2017	214	198,164				
Total	**198,164**		**45,412**			

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



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation water. The water quality analysis in the PRB FEIS was conducted using produced water quality data, where

available, from existing wells within each of the ten primary watersheds in the Powder River Basin. These predictions of EC and SAR can only be reevaluated when additional water quality sampling is available.

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

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Tongue River drainage, which is approximately 49.0% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to fully contain the produced water discharged.

No additional mitigation measures are required.

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

4.8. Cultural Resources

The historic homestead 48 SH 529 is outside the immediate project area, and the viewshed is evaluated as compromised by previous development; this site is unevaluated for National Register eligibility. Site 48 SH 1390 has been evaluated as an eligible property, but associated developments have been designed to take place only in non-contributing portions of the site, and development will have no effect on contributing portions. There will be no effect from this project on sites 48 SH 1389 and 1391, but these sites have been determined to be not eligible to the Register. With the Conditions of Approval restricting development within site 48 SH 1390 and limiting disturbance to non-contributing portions of the site, cultural clearance is recommended for this undertaking.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
James Hansen	Ops. Superintendent	JM Huber	Yes
Paul Woody	Landman	JM Huber	Yes
Larry Bridger	Civil Engineer	Baker Energy	Yes
Rick Estes	Civil Engineer	Baker Energy	Yes
Chad Fladland	Construction Supervisor	Baker Energy	Yes
Rick Hendricks	Construction Manager	Baker Energy	Yes
Terry Kruse	Technical Manager	Baker Energy	Yes
John Vaselin	Environmental/Permitting Specialist	Baker Energy	Yes
Ace Armann	Field Operations Superintendent	Baker Energy	Yes
Dale Hoffman	Professional Engineer	EMATS	Yes
Kim Brown	Wildlife Biologist	Jones & Stokes	Yes
Brent Sobotka	Hydrologist	SWCA	Yes
Bert Dow		Landowner	No
Sara Needles	Acting State Historic Preservation Officer	WY SHPO	No

6. OTHER PERMITS REQUIRED

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

7. REFERENCES AND AUTHORITIES

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

Avian Power Line Interaction Committee. 2006/2007. Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996. Edison Electric Institute. Washington, D.C. 125pp.

Bennett, Robert A. 2004. Instruction Memorandum No. WY-2005-057: Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

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

Braun, C.E., O.O. Oedekoven, and C.L. Aldridge. 2002. Oil and Gas Development in Western North America: Effects on Sagebrush Steppe Avifauna with Particular Emphasis on Sage Grouse. In: Transactions of the 67th North American Wildlife and Natural Resources Conference. pp337-349.

Brown, Kimberley. 2006. J.M. Huber Corporation's Badger Creek Plan of Development Wildlife and Ute Ladies tresses Surveys and Habitat Assessments . Thunderbird – Jones and Stokes, Gillette, Wy. pp 18.

Buffalo Field Office. 2003. Record of Decision and Resource Management Plan Amendments for the Powder River Oil and Gas Project. USDI Bureau of Land Management, Buffalo Field Office.

Buffalo, WY.

Buffalo Field Office. 1999. Wyodak Coal Bed Methane Project: Final Environmental Impact Statement. USDI Bureau of Land Management, Buffalo Field Office. Buffalo, WY.

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

Cooper, Cathy. 2006. Baker Energy Badger Creek POD Ute ladies' tresses Survey Report. Western Land Services. Sheridan, Wy, pp14.

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

Cornish, Todd. Personal Communication. Wyoming State Veterinary Laboratory, University of Wyoming. Laramie, WY. (307) 742-6638. tcornish@uwyo.edu.

Danvir, Rick E. 2002. Sage Grouse Ecology and Management in Northern Utah Sagebrush-Steppe: A Deseret Land and Livestock Wildlife Research Report. Deseret Land and Livestock Ranch and the Utah Foundation for Quality Resource Management. Woodruff, UT.

Easdale, Guymen. 2006. Onsite Field Notes for the Badger Creek project area. BLM Buffalo Field Office, Buffalo, Wy.

Easdale, Guymen.2006. Badger Creek POD Biological Assessment. BLM Buffalo Field Offfice, Buffalo, Wy.

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

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

Holloran, Matthew J.; Brian J. Heath; Alison G. Lyon; Steven J. Slater; Jarren L. Kuppiers; and Stanley H. Anderson. 2005. Greater sage-grouse nesting habitat selection and success in Wyoming. J. Wildl. Manage. 69(2):638-649.

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

Jellison, Bert. 2005. Sage-Grouse Restoration Project: Lake DeSmet Conservation District. Wyoming Game and Fish Department. Sheridan, WY.

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

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

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

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

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

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

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

Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003

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

Moynahan, Brendan J.; Mark S. Lindberg; Jay J. Rotella; and Jack Ward Thomas. In Press. Factors Affecting Nest Survival of Greater Sage-Grouse in North central Montana. J. Wildl. Manage.

Moynahan, Brendan J. and Mark S. Lindberg. 2004. Nest Locations of Greater Sage-Grouse in Relation to Leks in North-Central Montana. *Presented at* Montana Sage-Grouse Workshop, Montana Chapter of The Wildlife Society, Billings.

Murkin, James W. 1990. Instruction Memorandum No. WY-90-564: Resource Management Plan Action and Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

Natural Resources Conservation Service 2000. Soil Survey for Sheridan County, Wyoming.

Naugle, David E.; Cameron L. Aldridge; Brett L. Walker; Todd E. Cornish; Brendan J. Moynahan; Matt J. Holloran; Kimberly Brown; Gregory D. Johnson; Edward T. Schmidtmann; Richard T. Mayer; Cecilia Y. Kato; Marc R. Matchett; Thomas J. Christiansen; Walter E. Cook; Terry Creekmore; Roxanne D. Falise; E. Thomas Rinkes; and Mark S. Boyce. 2004. West Nile virus: Pending Crisis of Greater Sage-grouse. Ecology Letters. 7:704-713.

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

Oedekoven, Olin O. 2004. Sheridan Region Wyoming Game and Fish Department: Annual Sage-Grouse Completion Report for 2004. Wyoming Game and Fish Department. Gillette, WY.

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

Patterson, Craig T. and Stanley H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (Haliaeetus leucocephalus) Wintering in

Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.

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

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

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

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

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

Rowland, M. M., M. Leu, , S. P. Finn, S. Hanser, L. H. Suring, J. M. Boyd, C. W. Meinke, S. T. Knick, and M. J. Wisdom. 2005. Assessment of threats to sagebrush habitats and associated species of concern in the Wyoming Basins. Version 1.1, June 2005, unpublished report on file at USGS Biological Resources Discipline, Snake River Field Station, 970 Lusk St., Boise, ID 83706.

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

Sheldon, Daly and Fred Lindzey. 2003. "Movement and Dispersion of Pronghorn in Relation to Fences". In: Program and Abstracts for the Annual Meeting at the Inn in Lander, WY: Wildlife – Human Interactions: Disease, Recreation, and Development, Fragmentation and Urban Issues. The Wildlife Society Wyoming Chapter. Lander, WY. Nov. 18-21, 2003.

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

SWCA Environmental Consultants. 2007. Water Management Plan for the Badger Creek Plan of Development . SWCA Environmental Consultants. Sheridan, Wy.

SWCA Environmental Consultants. 2006. Master Surface Use Plan for the Badger Creek Plan of Development. SWCA Environmental Consultants. Sheridan, Wy.

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

Thiele, Dan. 2005. Northeast Wyoming Local Working Group Area: Annual Sage-Grouse Completion Report for 2005. Wyoming Game and Fish Department. Buffalo, WY. 42pp.

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

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

Field Office April 2001.

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

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

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

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

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

Wyoming Game and Fish Department (WGFD). 2004. Minimum Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats on BLM Lands. WGFD. Cheyenne, WY

WGFD. 2003. Wyoming Greater Sage-Grouse Conservation Plan. WGFD. Cheyenne, WY

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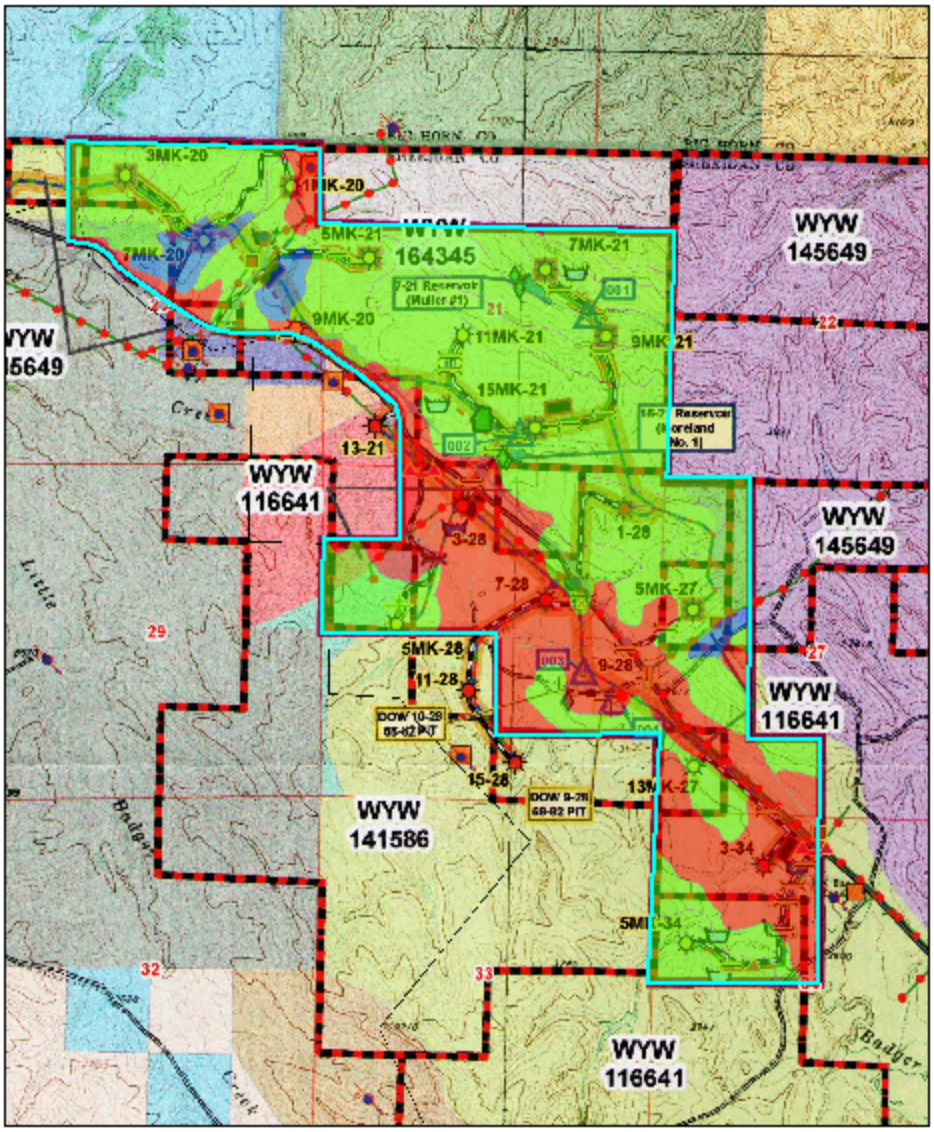
Gerald Queen, Geologist
Tom Bills, Project Manager – NEPA Coordinator
Buddy Green, Assistant Field Manager, Resources
Paul Beels, Associate Field Manager, Minerals & Lands
Chris E. Hanson, Field Manager

Interdisciplinary Team Lead: Kathy Brus

Attachment 1
Badger Creek POD JM Huber Corporation
Ecological Sites



0 750 1,500 3,000 4,500 6,000 Feet

Badger Creek POD
JM Huber Corp
Ecological Sites

Clayey
Sandy
Loamy