FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Lance Oil & Gas Company, Inc.
River Unit Gamma POD
ENVIRONMENTAL ASSESSMENT –WY-070-**07-113**

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Lance Oil & Gas Company, Inc.'s River Unit Gamma PODCoal Bed Natural Gas (CBNG) POD comprised of the following 29 Applications for Permit to Drill (APDs), as follows:

	Well name	Well #	QTR	Sec	TWP	RNG	Lease
1	LEATH	34-8*	SWSE	8	49N	77W	WYW156694
2	RU	12-15	SWNW	15	49N	77W	WYW128631
3	RU	21-15	NENW	15	49N	77W	WYW128631
4	RU	32-15	SWNE	15	49N	77W	WYW128631
5	RU	41-15	NENE	15	49N	77W	WYW128631
6	RU FEDERAL	14-20	SWSW	20	49N	77W	WYW147346
7	RU	12-29	SWNW	29	49N	77W	WYW129048
8	RU	21-29	NENW	29	49N	77W	WYW129048
9	RU	23-29	NESW	29	49N	77W	WYW129048
10	RU	24-29	SESW	29	49N	77W	WYW129048
11	RU	31-29	NWNE	29	49N	77W	WYW129048
12	RU	43-29	NESE	29	49N	77W	WYW129048
13	RU	12-31	SWNW	31	49N	77W	WYW145626
14	RU	14-31	SWSW	31	49N	77W	WYW145626
15	RU FEDERAL	21-31	NENW	31	49N	77W	WYW145626
16	RU	23-31	NESW	31	49N	77W	WYW145626
17	RU	32-31	SWNE	31	49N	77W	WYW145626
18	RU	34-31	SWSE	31	49N	77W	WYW145626
19	RU	41-31	NENE	31	49N	77W	WYW145626
20	RU	43-31	NESE	31	49N	77W	WYW145626
21	RU	12-32	SWNW	32	49N	77W	WYW145626
22	RU	14-32	SWSW	32	49N	77W	WYW145626
23	RU	21-32	NENW	32	49N	77W	WYW145626
24	RU	23-32	NESW	32	49N	77W	WYW145626
25	RU	32-32	SWNE	32	49N	77W	WYW132936
26	RU	42-32	SENE	32	49N	77W	WYW132936
27	RU	32-33	SWNE	33	49N	77W	WYW132936
28	RU	41-33	NENE	33	49N	77W	WYW132936
29	RU	43-33	NESE	33	49N	77W	WYW132936

The following impoundments were inspected and approved for use, once all conditions have been met.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
*1	Pit 12-5-4877	SWNW	5	48	77	WYW145623
2	Pit 33-32-4977	NWSE	32	49	77	Fee

***Note: The Pit 12-5-4877 location is approved but construction of the impoundment is pending approval of the required ROW as per COA.**

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
Lance Oil & Gas Company, Inc.
River Unit Gamma POD
PLAN OF DEVELOPMENT
WY-070-07-113

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

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on 6 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: Lance Oil & Gas Company, Inc.'s River Unit Gamma POD Plan of Development (POD) for 31 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 31 wells proposed within this POD, as follows:

Proposed Well Information: There are 31 wells proposed within this POD; the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from 1 coal seam. Proposed well house dimensions are 4 ft wide x 4 ft length x 4 ft height with a 3 ft wide x 3 ft long

x 9 ft high metering house located 20 feet from the well house. Well and metering house color will be Covert Green, 18-0617 TPX; selected to blend with the surrounding vegetation. Wells are located as follows:

	Well name	Well #	QTR	Sec	TWP	RNG	Lease
1	LEATH	34-8*	SWSE	8	49N	77W	WYW156694
2	RU	12-15	SWNW	15	49N	77W	WYW128631
3	RU	21-15	NENW	15	49N	77W	WYW128631
4	RU	32-15	SWNE	15	49N	77W	WYW128631
5	RU	41-15	NENE	15	49N	77W	WYW128631
6	RU FEDERAL	14-20	SWSW	20	49N	77W	WYW147346
7	RU	12-29	SWNW	29	49N	77W	WYW129048
8	RU	21-29	NENW	29	49N	77W	WYW129048
9	RU	23-29	NESW	29	49N	77W	WYW129048
10	RU	24-29	SESW	29	49N	77W	WYW129048
11	RU	31-29	NWNE	29	49N	77W	WYW129048
12	RU	43-29	NESE	29	49N	77W	WYW129048
13	RU	12-31	SWNW	31	49N	77W	WYW145626
14	RU	14-31	SWSW	31	49N	77W	WYW145626
15	RU FEDERAL	21-31	NENW	31	49N	77W	WYW145626
16	RU	23-31	NESW	31	49N	77W	WYW145626
17	RU	32-31	SWNE	31	49N	77W	WYW145626
18	RU	34-31	SWSE	31	49N	77W	WYW145626
19	RU	41-31	NENE	31	49N	77W	WYW145626
20	RU	43-31	NESE	31	49N	77W	WYW145626
21	RU	12-32	SWNW	32	49N	77W	WYW145626
22	RU	14-32	SWSW	32	49N	77W	WYW145626
23	RU	21-32	NENW	32	49N	77W	WYW145626
24	RU	23-32	NESW	32	49N	77W	WYW145626
25	RU	32-32	SWNE	32	49N	77W	WYW132936
26	RU	42-32	SENE	32	49N	77W	WYW132936
27	RU	14-33	SWSW	33	49N	77W	WYW132936
28	RU	32-33	SWNE	33	49N	77W	WYW132936
29	RU	34-33	SWSE	33	49N	77W	WYW132936
30	RU	41-33	NENE	33	49N	77W	WYW132936
31	RU	43-33	NESE	33	49N	77W	WYW132936

The following APD's were replaced due to re-staking at alternate locations during the onsite inspection:

Well name	Well #	QTR	Sec	TWP	RNG	Lease
RU	14-29	SWSW	29	49N	77W	WYW129048
RU	41-29	NENE	29	49N	77W	WYW129048
RU	12-33	SWNW	33	49N	77W	WYW132936

Proposed Off-Channel Pits analyzed for water discharge within the River Unit Gamma POD:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
1	Pit 12-14-4977	SWNW	14	49	77	WYW145624
2	Pit 12-5-4877	SWNW	5	48	77	WYW145623
3	Pit 13-27-4977	NWSW	27	49	77	WYW132936
4	Pit 14-33-4977	SWSW	33	49	77	WYW132936
5	Pit 41-5-4877	NENE	5	48	77	WYW145623
6	Pit 33-32-4977	NWSE	32	49	77	Fee
7	Pit 33-33-4977	NWSE	33	49	77	WYW132936
8	Pit 43-28-4977	NESE	28	49	77	WYW129048

County: Johnson

Applicant: Lance Oil & Gas Company, Inc.

Surface Owners: BLM, Wardner Ranch, Blue Butte Ranch, J2 Land & Livestock, Leath Trust, Peterson Ranch

Project Description:
The proposed action involves the following:

- Drilling of 31 total federal CBM wells into the Big George coal zone to depths ranging from 1,251 to 1,792 feet. A singe well bore will be installed at each location.

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

- Well metering and maintenance shall be accomplished by a combination of telemetry and well visitation. Metering will entail approximately 1 visit per 6 months to each well. Well maintenance will be as needed with the operator's personnel in the field daily.

- Development of a set of deep ground water monitoring wells where BLM will retrieve ground water data once every 6 weeks.

- Development of 28 shallow ground water monitoring wells.

- An unimproved and improved road network.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy:
  8 discharge points and 8 off-channel pits within the Upper Powder River primary watershed.
  One proposed stock tank.
  Use of 3 existing EMIT treatment facilities (previously analyzed and approved) with direct discharge to the Upper Powder River or its tributaries:
  - River Unit Alpha with one existing outfall (WY0051861_001) at the Upper Powder River.
  - River Unit Beta with one existing outfall (WY0053392_001) at the Upper

Powder River.

- Merril Meadows with one existing outfall (WY0052248_002) at, 3 previously analyzed outfalls (WY0052248_001, 003 & 004) to be constructed and one newly proposed outfall (WY0051934_014) all within of Dead Horse Creek near its confluence with the Upper Powder River.
    - In addition to outfall WY0051934_014 and associated waterlines, a second Higgins Loop counter current ion exchange system may be added to the existing approved Merrill meadows treatment facility in order to increase treatment capacity.

- A buried gas, water and power line network.

- An above ground power line network to be constructed by a contractor. The proposed route has not been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. Power line construction has not been scheduled and will not be completed before the CBNG wells are producing. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the 6 proposed power drops.

  A storage tank of 500 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 24 months. Fuel deliveries are anticipated to be 3 times per week. Generator volume is approximately 150 decibels at the generator site but is not expected to exceed 49 decibels at any surrounding sage-grouse or sharp-tail grouse display grounds or 10dBA above background.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as

Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to reduce potential impacts to natural resources. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental impacts.

Prior to the onsite inspection of the River Unit Gamma POD the BLM-ID Team identified that 3 of the proposed off-channel pits fell within the area considered Visual Resource Management Class II (VRM II) along Interstate 90. The objective of VRM II provides for activities that would not be evident in the characteristic landscape; contrasts are seen, but must not attract attention. These lands are sensitive to public view (PRB-FEIS, 3-253). BLM brought the issue to the operator and recommended that the operator consider the impoundments as secondary locations to be analyzed at a later date or revise the proposal to incorporate visual resources mitigation for the 3 impoundments. The operator did not accept the BLM's recommendations. BLM could not consider these three impoundments in Alternative C, the environmentally preferred alternative. These 3 off-channel pits and the associated linear disturbances are not considered in this alternative: Pit 12-14-4977, Pit 13-27-4977 and Pit 43-28-4977

Following the onsite inspection of the River Unit Gamma POD Wildlife Biologist received updated wildlife info for the project area that showed consistent use by bald eagles. The following eagle observations occurred in the same area on separate surveys; 3 eagles on 1/16/2007, 2 eagles on 1/23/2007 and 1 eagle on 1/31/2007. Due to this, a 0.5 mile no disturbance zone will be applied that affects the following wells and their associated infrastructure: RU Fed.14-33-4977, RU Fed. 34-33-4977 well, Pit 14-33-4977, Pit 41-5 and Pit 33-33-4977.

Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator's proposal. The specific changes identified for the River Unit Gamma POD POD are listed below in under 2.3.1a in Table and Table 2.3.1b

2.3.1. Changes as a result of the on-sites

Table 2.3.1a

Well #	QTR	Sec	TWP	RNG	Lease	Changes
34-8	SWSE	8	49N	77W	WYW156694	The pad was withdrawn and replaced with a 30' x 120' rig slot.
21-15	NENW	15	49N	77W	WYW128631	The well was re-staked approximately 500' south to avoid 3 erosion features and mitigate effects to the visual resources. Surface owner approved.
12-15	SWNW	15	49N	77W	WYW128631	The well was re-staked approximately 70' north to allow more working room and truck turn around.
14-20	SWSW	20	49N	77W	WYW147346	The well was re-staked approximately 100' east toward the existing oil & gas road and outside the 1/4 mile buffer of an active raptor nest and in front of trees to absorb the outline of the well box.
12-29	SWNW	29	49N	77W	WYW129048	The designed road segment was shifted east and down hill approximately 70' to avoid erosive soils.

Well #	QTR	Sec	TWP	RNG	Lease	Changes
14-29	SWSW	29	49N	77W	WYW129048	LOG re-staked the well to the 24-29 spot. A rig slot is required with drainage ditches needed on the north and south edges of the work area. The designed access and well pad were withdrawn.
21-29	NENW	29	49N	77W	WYW129048	LOG re-staked the well approximately 750' west to accommodate better spacing for drainage since the 41-29 well was re-staked west. The proposed rig slot just off the proposed Road 12-29 was withdrawn.
23-29	NESW	29	49N	77W	WYW129048	BLM requires designs for the segment of Road A-1 just to the north to well 21-32 showing soil stabilization measures; this includes PCULV(s)32-29b, 32-29C, 32-29D, 33-29A and 33-29B. Construct road according to design specifications before the commencement of drilling activities. Install hydrologic and erosion control measures to optimize road stabilization.
41-29	NENE	29	49N	77W	WYW129048	The well was re-staked to the 31-29 location to avoid highly erosive soils, multiple erosion features and 25% side slopes. The designed well pad was replaced with a 30' x 120' rig slot. This mitigates potential effects to the visual resources by placing it behind a small hill.
43-29	NESE	29	49N	77W	WYW129048	LOG re-staked the well 30' SE outside a 1/4 mile raptor nest buffer and still 60' from a P&A well on an abandoned conventional well location.
14-31	SWSW	31	49N	77W	WYW145626	Oil & gas access will not follow the utility corridor crossing Indian Cr. Well access is by the existing improved road from the south via Schoonover Road. The existing primitive road crossing Indian Creek will remain Wardner Ranch access and will be signed "Road Closed to all Oil & Gas Traffic" on both side of the creek crossing.
21-31	NENW	31	49N	77W	WYW145626	The designed well pad was withdrawn and replaced by a 30' x 120' rig slot.
32-31	SWNE	31	49N	77W	WYW145626	BLM requires detailed design to show soil stabilization measures for designed access Road 32-31. The well was re-staked 100' east to allow for more work room and buffer the adjacent drainage.

Well #	QTR	Sec	TWP	RNG	Lease	Changes
34-31	SWSE	31	49N	77W	WYW145626	The location was re-staked 150' NE to buffer the drainage below and reduce the side slope.
41-31	NENE	31	49N	77W	WYW145626	Access was changed to begin at the 12-32 location avoiding erosion feature at the ridge top. It will follow the west side of the ridge
43-31	NESE	31	49N	77W	WYW145626	To balance the cut/fills at the LWRC 33-31, there is up to 8' of fill for this segment of Road D on either side to the low water crossing. LOG requested that they be allowed to stockpile the spoil rather than use it as road fill; BLM will allow this and requires the road design diagram to include the stockpile including stabilization methods and onsite the staked location. Construct road according to design specifications before the commencement of drilling activities.
12-32	SWNW	32	49N	77W	WYW145626	The proposed well access from the east was withdrawn to avoid a cultural site. LOG investigated an alternate route requiring a LWRC through Indian Cr. requiring a design accepted by BLM. During a subsequent onsite of the new route it was agreed to mow the area left of road (STA 0+00 to 1+00) to increase turning radius for large equipment at road intersection during initial well development. Reclaim mowed area as necessary to repair disturbance upon well completion.
14-32	SWSW	32	49N	77W	WYW145626	BLM requires detailed design for Road 14-32 to show soil stabilization measures. Construct road according to design specifications before the commencement of drilling activities. Install hydrologic and erosion control measures to optimize road stabilization. Use ditching to route water away from headcuts as much as possible. The beginning of the access road was shifted west to follow an old 2-track that will avoid erosive soil. A stock tank was added to this location.
23-32	NESW	32	49N	77W	WYW145626	The access was shifted uphill from the well to avoid the headcut and the rig slot was incorporated into the access road.

Well #	QTR	Sec	TWP	RNG	Lease	Changes
32-32	SWNE	32	49N	77W	WYW132936	The well was re-staked approximately 1000' west and behind an old sheep pen to shield it from raptor nests.
12-33	SWNW	33	49N	77W	WYW132936	The well was re-staked to the 43-32 spot to avoid a cultural site & flood plain. The designed road segment was withdrawn.
14-33	SWSW	33	49N	77W	WYW132936	The 2007 wildlife surveys identified consistent bald eagle use within the project area. Due to this, a 0.5 mile NSO buffer will be applied. The well and associated infrastructure are not authorized with the project design.
34-33	SWSE	33	49N	77W	WYW132936	The 2007 wildlife surveys identified consistent bald eagle use within the project area. Due to this, a 0.5 mile NSO buffer will be applied and the well and associated infrastructure are not authorized with the project design.
41-33	NENE	33	49N	77W	WYW132936	The well was re-staked approximately 700' NE out of line of sight of a raptor nest and the access was rerouted to begin at Dead Horse Road @ SE section 28. LOG submitted design plans and staked the new route for BLM inspection.
43-33	NESE	33	49N	77W	WYW132936	The well was re-staked approximately 150' south placed opposite the existing stock tank to shield the well from a raptor nest to the NW.
CBM-MON	NENW	16	49	77	STATE	This was not included with the POD submittal. BLM requested that it be added to the POD. Lance has an obligation to install a CBM-Monitoring well set. Lance has offered the State 11-16-4977, an existing coal well, in addition to a commitment to install 2 additional wells completed in the over-burden sand zones at this same location. LOG will submit well logs of the State 11-16-4977 well to BLM as well as a signed surface use agreement with the surface owner(s) to guarantee access to the well for BLM employees to monitor the wells.

Table 2.3.1b

Impoundment	QTR	Sec	TWP	RNG	Lease	Changes
Pit12-5	SWNW	5	49	77	WYW130110	This impoundment had to be reduced in size due to a new road & corridor LOG built through the location. LOG submitted a new permit/application/reclamation estimate for the impoundment.
Pit 41-5	NENE	5	49	77	WYW132936	The 2007 wildlife surveys identified consistent bald eagle use within the project area. Due to this, a 0.5 mile NSO buffer will be applied. The off-channel pit, outfall and associated infrastructure are not authorized with the project design.
Pit 22-27	SENW	27	49	77	WYW145625	The landowner asked LOG to shift the proposed pit east into the hill side to use the existing cultivated field for land application of treated CBNG effluent water. LOG withdrew the impoundment from the POD.
Pit 12-14	SWNW	14	49	77	WYW145624	The impoundment is proposed within the VRM II area, approximately 500 feet from Interstate 90 and would be very visible. BLM recommended the operator withdraw the impoundment or consider it a secondary impoundment not to be approved at this time due to VRM issues. The operator did not accept the recommendation. The off-channel pit, outfall and associated infrastructure are not authorized.
Pit 42-31	SENE	31	49	77	WYW145626	Withdrawn by the operator prior to the onsite inspection.
Pit 13-27	NWSW	27	49	77	FEE	The impoundment is proposed within the VRM II area and would be very visible from Interstate 90. BLM recommended the operator consider it a secondary impoundment not to be approved at this time and/or submit mitigation to address VRM issues. The operator did not accept the recommendation. The off-channel pit, outfall and associated infrastructure are not authorized.
Pit 43-28	NESE	28	49	77	WYW129048	The impoundment is proposed

Impoundment	QTR	Sec	TWP	RNG	Lease	Changes
						within the VRM II area and would be very visible from Interstate 90. BLM recommended the operator consider it a secondary impoundment not to be approved at this time and/or submit mitigation to address VRM issues. The operator did not accept the recommendation. The off-channel pit, outfall and associated infrastructure are not authorized.
Pit 14-33	SWSW	33	49	77	WYW132937	The 2007 wildlife surveys identified consistent bald eagle use within the project area. Due to this, a 0.5 mile NSO buffer will be applied. The off-channel pit, outfall and associated infrastructure are not authorized with the project design.
Pit 33-33	NWSE	33	49	77	WYW132937	The 2007 wildlife surveys identified consistent bald eagle use within the project area. Due to this, a 0.5 mile NSO buffer will be applied. The off-channel pit, outfall and associated infrastructure are not authorized with the project design.
P14-27	SWSW	27	49	77	WYW129048	Withdrawn by the operator prior to the onsite inspection.
P23-32	NESW	32	49	77	WYW145626	Withdrawn by the operator prior to the onsite inspection.
P23-27	NESW	27	49	77	WYW132936	Withdrawn by the operator prior to the onsite inspection.
P42-10	SENE	10	49	77	WYW145624	Withdrawn by the operator prior to the onsite inspection.
P34-10	SWSE	10	49	77	WYW145625	Withdrawn by the operator prior to the onsite inspection.
E12-14	SWNW	14	49	77	WYW145623	Withdrawn by the operator prior to the onsite inspection.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

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

require that operators comply with the latest DEQ standards and monitoring guidance.

2.3.2.2. Surface Water

1. Channel Crossings:
   a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
   b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
   c) 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.
   d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.

3. Concerns regarding the quality of the discharged CBNG water on downstream irrigation use may require operators to increase the amount of storage of CBNG water during the irrigation months and allow more surface discharge during the non-irrigation months.

2.3.2.3. Soils

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

2.3.2.4. Wetland/Riparian

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

2. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.

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

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

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

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

2.3.2.5. Wildlife

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

proposed activities.

2. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.

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

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

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

2.3.2.6.2. Black-footed Ferret

2. Prairie dog colonies will be avoided wherever possible.

2.3.2.6.3. Mountain Plover

1. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ¼ mile of occupied mountain plover nesting habitat.

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

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

4. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

2.3.2.6.4. Ute Ladies'-tresses Orchid

1. Suitable habitat will be avoided wherever possible.

2. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly revegetated if construction activities impact the vegetation in these areas. Revegetation will be designed to avoid the establishment of noxious weeds.

2.3.2.7. Visual Resources

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

2.3.2.8. Noise

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

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

locations.

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

1. All changes made at the onsite are listed in Table 2.3.1a & 2.3.1b will be followed. They have all been incorporated into the operator's POD.

2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The color selected for the River Unit Gamma POD is Covert Green, 18-0617 TPX.

3. The approval of this project does not grant authority to use off lease federal lands. No surface disturbing activity, or use of off-lease federal lands, is allowed on affected leases until right-of-way grants become effective on the date in which the right-of-way grant is signed by the authorized officer of the BLM. This includes the construction of Pit 12-5-4878 as well as the installation of infrastructure to this facility.

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

10-14" Precipitation Zone Shallow Loamy Ecological Site

Species	**% in Mix**	**Lbs PLS***
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	50	4.2
Bluebunch wheatgrass (Pseudoroegneria spicata ssp. Spicata)	35	6
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
Chapter 2 Totals	**100%**	**12 lbs/acre**

This is a recommended seed mix based on the native plant species listed in the NRCS Ecological Site

descriptions, U.W. College of Ag. and seed market availability.

5. All impoundments used for the storage of CBNG produced water for the River Unit Gamma POD will be fenced per BLM range management guidelines as follows:
    - All fences around reservoirs should be wildlife friendly. Fences should be placed far enough away from the high water mark to insure deer can jump the fence without landing in water/ice.
    - Fences should have a gate installed that is large enough to accommodate reclamation equipment entering the dry reservoir bed when CBM begins their reclamation.
    - Fences must stay in place until the reclamation process is complete and native rangeland plants are established and stable.
    - Fence maintenance must be the responsibility of the CBM Company. Maintenance must continue until reclamation is completed and native rangeland plants are established and are stable.
    - Fences should follow specifications listed below:
        a. Three-strand wire fence with the bottom wire smooth
        b. Top strand to ground level will be 40 inches
        c. Second strand to ground level will be 28 inches
        d. Bottom strand smooth wire to ground level will be 18 inches

6. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according to the following spacing:

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

7. Provide 4" of aggregate where grades exceed 8%. Surfacing material must meet requirements set forth in Wyoming Supplement to BLM Road Manual 9113.

8. Disturbance areas mentioned below have fragile soils and erosive conditions that shall be stabilized in a manner which eliminates erosion until a self-perpetuating non-weed native plant community has stabilized the site. Stabilization efforts shall be finished within 30 days of the completion of construction activities.
    - Well site(s): RU 21-15, RU 32-15, RU 41-15, RU 12-29, RU 24-29, RU 23-29, RU Fed. 21-31, RU 32-31, RU 41-31, RU 12-32, RU 14-32, RU 32-33, and RU 41-33
    - Road / Pipeline segments associated with well(s): RU 21-15, RU 32-15, RU 41-15, RU 12-29, RU 24-29, RU 23-29, RU 12-31, RU Fed. 21-31, RU 32-31, RU 41-31, RU 12-32, RU 14-32, and RU 41-33
    - Roads and Pipeline segment(s): LWRC-12-32, LWRC-22-32, LWRC-23-31, LWRC-33-31 and related spoil pile, LWCR-42-31; PCULV(s) 32-29B, 32-29C, 32-29D, 33-29A, 33-29B 43-31 and 13-32; as well as the utility corridor crossing west of the end of Road D.

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

Reclamation Standards:

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

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

C. Vegetation canopy cover (on 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:
   1. Successful onsite establishment of species included in the planting mixture or other desirable species.
   2. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.

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

10. No surface disturbance will be authorized on federal lands prior to the approval of a Pesticide Use Plan submitted by the operator to the Buffalo Field Office.

11. The operator will eradicate salt cedar present within 500 feet of all disturbances crossing Indian Creek including the following locations: LWRC-12-32, LWRC-22-32, LWRC-23-31, LWRC-33-31, LWCR-42-31 and the utility corridor crossing west of the end of Road D.

12. The operator will construct the following road segments according to design specifications before the commencement of drilling activities: LWRC-12-32, LWRC-22-32, LWRC-23-31, LWRC-33-31, LWCR-42-31; PCULV(s) 43-31 and 13-32; Road A-1, between STA 3+00 and 12+00 including PCULV(s)-32-29B, 32-29C, 32-29D, 33-29A and 33-29B.

13. To minimize the disturbance width, the operator will place the utility corridor within the roadway disturbance of Road A-1, between STA 3+00 and 12+00.

14. All roads, pads, impoundments and locations where engineered construction will occur will be completely slope staked for the pre-construction meeting.

15. Reserve pit will be lined at the following locations: RU Fed. 14-20, RU 23-29, RU 24-29, RU 43-29, RU 42-32, RU 32-32 and RU 21-32.

16. Erosive soils upslope of the RU 32-33 location will be avoided.

17. The access and utility corridor disturbance for the following wells will be a maximum of 35 feet: RU Fed 12-29 and RU Fed. 12-31.

18. Disturbance for pipelines and utility corridors adjacent to access roads will be contained within the disturbance allowed for road construction.

19. Improved roads with utility corridor will not exceed a disturbance width of 50 feet unless specific design is included in the plan and profile section of the master surface use plan.

20. Primitive roads (2-tracks) with utility corridor will not exceed a disturbance width of 45 feet.

21. Pipeline installation and/or corridors without road access will not exceed a disturbance width of 45 feet.

22. Utility corridors will be expediently reclaimed following construction and maintained in a professional and workmanship manner avoiding tire rutting, settling and erosion.

23. A minimum 20 foot undisturbed vegetative buffer will be maintained for erosion features along the following access roads: Road 21-31 and Road 12-29.

24. Mowing at the well site where a constructed pad is not approved as designed will be minimized to a 30 foot radius of the well stake.

25. The operator will maintain well drilling, completion and associated construction operations within a 150 foot by 150 foot work area for those locations where a constructed pad is not approved as designed including the following well locations: Leath 34-8, RU 12-15, RU 32-15, RU Federal 14-20, RU 21-29, RU 23-29, RU 31-29, RU 43-29, RU 12-31, RU 14-31, RU Federal 23-31, RU 32-31, RU 41-31, RU 43-31, RU 12-32, RU 21-32, RU 23-32, RU 32-32, RU 42-32, RU 32-33, RU 41-33 and RU 43-33.

26. Liberal travel space beyond the well location will be allowed to facilitate truck turn around at the following locations: RU Fed.12-29 and RU Fed. 21-31. The operator will rip the surface to a depth of 12 inches and seed the area(s) compacted by truck traffic following well completion.

27. This decision does not approve water disposal from federal wells in the River Unit Gamma POD to be discharged into any impoundments until the operator supplies a copy of the complete approved SW-4, SW-3, or SW-CBNG WSEO permits with a description of facilities as required in Onshore Oil and Gas Order No. 7 (59 FR 47365) to BLM authorized officer, and approval is obtained.

28. This decision does not approve water disposal from federal wells within the River Unit Gamma POD into impoundments. Prior to discharging water from the approved wells to impoundments the operator is required to submit a copy of the State of Wyoming approved WYPDES permit, including a current water quality analysis and description of facilities as required in Onshore Oil and Gas Order No. 7 (59 FR 47365).

29. An impoundment will be non-compliant if the proposed mitigation, or approved action, is not successful, i.e. leaking if permitted under full-containment. Disposal of federally produced water will cease into the non-compliant impoundment until successful mitigation is achieved. If produced water resurfaces below the mitigation site, or in adjacent drainages, the mitigation will be deemed unsuccessful and the impoundment will be lined or reclaimed.

30. Construction associated with the outfall 014 included in WYPDES permit WY0051934 is not allowed prior to the approval of a sundry notice requesting an addendum to the operator's Powder Valley Unit Gamma POD water management plan in association with the Merrill Meadows EMITs facility.

31. The following conditions will alleviate impacts to nesting and roosting bald eagles;
    a. No surface disturbing activity shall occur within one mile of bald eagle habitat (Powder River and Dead Horse Creek) annually from November 1 through April 1, prior to a winter roost survey or from February 1 through August 15 prior to a nesting survey. This

affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
49/77	8	**Well: Leath Fed 34-8-4977** **ALL** project related activities within this **ENTIRE** section.
49/77	15	**Wells: RU Fed: 12-15-4977, 21-15-4977, 32-15-4977, and 41-15-4977** **ALL** project related activities within this **ENTIRE** section.
49/77	20	**Well: RU Fed 14-20-4977** **ALL** project related activities within this **ENTIRE** section.
49/77	28	**ALL** project related activities within this **ENTIRE** section.
49/77	29	**Wells: RU Fed: 12-29-4977, 21-29-4977, 23-29-4977, 24-29-4977, 31-29-4977, and 43-29-4977** **ALL** project related activities within this **ENTIRE** section.
49/77	31	**Wells: RU Fed 32-31-4977, 34-31-4977 and 41-31-4977 and 43-31-4977** **ALL** project related activities within the **eastern ½** of this section.
49/77	32	**Wells: 12-32-4977, 14-32-4977, 21-32-4977, 23-32-4977, 32-32-4977, and 42-32-4977** **Impoundment: Pit 33-32-4977** **ALL** project related activities within this **ENTIRE** section.
49/77	33	**Wells: 41-33-4977 and 43-33-4977** **ALL** project related activities within this **ENTIRE** section.
48/78	5	**Impoundment: Pit 12-5-4878** **ALL** project related activities within this **ENTIRE** section.

b. If a roost is identified and construction has not been completed, a year round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimum disturbance buffer zone of 1-mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.

c. If a nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).

d. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.

32. The following conditions will alleviate impacts to raptors:

a. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the

current breeding season. This affects the following:

Township/Range	Section	Wells and Infrastructure
49/77	8	**Well: Leath Fed 34-8-4977** **ALL** project related activities within the **east ½** of this section.
49/77	9	**ALL** project related activities within this **ENTIRE** section.
49/77	15	**ALL** project related activities within the **SE ¼** of this section.
49/77	20	**ALL** project related activities within this **ENTIRE** section.
49/77	28	**ALL** project related activities within the **NW, SW, and SE ¼s** of this section.
49/77	29	**Wells: 31-29-4977 and 43-29-4977** **ALL** project related activities within the **east ½** of this section. The road corridor north of the 21-29 well.
49/77	31	**Well: 41-31-4977**
49/77	32	**Wells: 21-32-4977, 32-32-4977, and 42-32-4977 Impoundment: Pit 33-32-4977** **ALL** project related activities within this **ENTIRE** section **east of the existing stock tank in the NWSW ¼ ¼** of this section.
49/77	33	**Wells: 41-33-4977 and 43-33-4977** **ALL** project related activities within this **ENTIRE** section.
48/77	5	**Impoundments: Pit 12-5-4877 and Pit 41-5-4877** **ALL** project related activities within this **ENTIRE** section.
48/77	6	**ALL** project related activities within this **ENTIRE** section.

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

c. Nest productivity checks shall be completed for all raptor nests within the River Unit Gamma POD listed in the table below. The productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success/production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year.

BLM ID	UTM E	UTM N	Species
2140	412378	4896263	RTHA
2688	408145	4890586	GOEA
2728	408103	4897032	RTHA

BLM ID	UTM E	UTM N	Species
2730	409056	4898269	GOEA
2731	409329	4898664	Unknown
2732	409201	4897402	RTHA
2733	410207	489275	AMKE
3194	409628	4892352	Unknown
3196	409381	4892471	GOEA
3199	412995	4896263	RTHA
3200	412917	4896579	RTHA
3231	410319	4892257	Unknown
3495	407823	4895044	Unknown
4127	409025	4893829	GOEA
4128	410210	4892941	GHOW
4129	410187	4892948	GHOW
4130	410165	4892954	GHOW
4131	410334	4892534	UNK
4132	410319	4892168	UNK
4133	410336	4892544	RTHA
4134	412644	4892667	AM KE
4135	410158	4892199	AM KE
4136	409588	4891167	AM KE
4137	410329	4892450	UNK
4138	410329	4892520	AM KE
4139	413244	4892579	LEOW
4140	408470	4892424	UNK
4141	408695	4892451	RTHA
4142	410475	4892195	UNK

d. Routine maintenance should be scheduled outside the nesting season (Feb 1-July 31) for all active nests. Activities should be reduced as much as possible and restricted between the hours of 9:00 am and 3:00 pm.

33. A mountain plover nesting survey is desired in suitable habitat prior to commencement of surface disturbing activities in the prairie dog towns located in Sections 27-29 and 31-33 in Township 49 North, Range 77 West and Section 5 of Township 48 North, Range 77 West. If the survey is not conducted prior to commencement of surface disturbing activities, it shall be conducted during the first breeding season following POD approval. No surface disturbing activities are permitted in suitable habitat areas listed above, from March 15-July 31, until a mountain plover nesting survey has been conducted for the current breeding season. This affects the following:

Township/Range	Section	Wells and Infrastructure
49/77	**28**	**ALL** project related activities within the **east ½, SW ¼ and SWNW ¼ ¼** of this section.
49/77	**29**	**Well: RU Fed 43-29-4977** **ALL** project related activities within the **SE ¼ and SENE ¼ ¼** of this section.
49/77	**32**	The **proposed water line in the southern half** of this section.
49/77	**33**	**Well: RU Fed 43-33-4977** **ALL** project related activities within the **SE ¼ and the NENW, NWNW, NWSW, and**

		SWSW ¼ ¼s of this section.
48/77	**5**	**Impoundments: Pit 12-5-4877 and Pit 41-5-4877** **ALL** project related activities within this **ENTIRE** section.
48/77	**6**	**ALL** project related activities within this **ENTIRE** section.

a. If a mountain plover is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).
b. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.
c. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

34. The following conditions will reduce impacts to sage-grouse:
    a. A survey is required for sage-grouse between April 1 and May 7, annually, within the project area for the life of the project and results shall be submitted to a BLM biologist. The required sage grouse survey will be conducted by a biologist following the most current PRB IWG 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 lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1).
    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.
    d. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15), and restricted to between 0900 and 1500 hours.

37. All earth moving activity in the following areas will be monitored by an archeologist who meets or exceed the qualification standards recommended by the Secretary of the Interior. The Bureau has identified these areas as containing the potential for buried cultural deposits (areas containing alluvial and colluvial deposits with a nearby eligible prehistoric site). The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of all monitoring work.

    a. **Buried pipelines between the 32-32 well and the 42-32 well in T49N R77W Section 32:** All earth moving activity associated with pipeline trenching must be monitored.

    b. **Construction of pits associated with the 42-32 well in T49N R77W Section 32:** Excavation of the pit associated with the well must be monitored. Additionally, the archeologist should ensure that no surface disturbance occurs within site 48CA3395. As appropriate, the monitor may suggest that temporary fencing is placed to protect the site.

2.4. Alternatives considered but not analyzed in detail

Direct Discharge
Direct discharge to Dead Horse Creek and its tributaries is not a feasible water management strategy because there are not a sufficient number of tributaries to contain the proposed water production volume prior to reaching the Powder River, as required by the WDEQ. Downstream landowners have expressed concern to ranching operations as a result of discharge directly into channels, including erosion, deposition and vegetation change.

Re-injection
Re-injection of produced water within the River Unit Gamma POD has also been considered. A review of the well logs on file with the Wyoming Oil and Gas Conservation Commission and available geologic information suggests that there are no aquifers within the immediate area that have sufficient storage capacity to accept the volume of CBNG water that would be produced within the River Unit Gamma POD. Re-injection into deep saltwater aquifers would also render the relatively high quality produced water unsuitable for future use. Therefore, re-injection is not a reasonable solution for the disposal of produced water within the River Unit Gamma POD. However, Lance may transport water via the Salt Creek Pipeline to an area near Midwest, Wyoming, where it would be re-injected into the Madison or Tensleep formations.

Land Application
Land application of produced water within the River Unit Gamma POD has also been considered. Land application would involve applying the water to cropland at agronomic rates through an irrigation system. Land application is at best a seasonal approach and would require the construction of several reservoirs to store produced water during the non-irrigation season. There is an existing center pivot adjacent to an EMITs facility that may take some of the produced water from this project.

Produced Water Treatment Alternatives
Treatment of produced water from the River Unit Gamma POD with subsequent discharge into the Powder River has been extensively researched to examine the full range of possibilities. EMITs technology has been incorporated into the water management plan, however the following treatment technologies were also considered but determined not to be practical: Sulfur burners, constructed wetlands, rapid spray distillation, electrodialysis reversal, electronic water purification, reverse osmosis, ion exchange with resins, ion exchange with zeolites and cation exchange and cation removal. Sulfur burner technologies were rejected since they will not address sodium concentrations in the produced water. Use of constructed wetlands was determined to not be a reasonable alternative since they have limited utility in removing total dissolved solids and salts. Rapid spray distillation and electronic water purification are emerging technologies that are unproven and have not been demonstrated to effectively treat CBNG water. Electrodialysis reversal has not been cost effectively applied the treatment of CBNG water. Both electrodialysis reversal and reverse osmosis would generate a brine reject stream of up to 20 percent of the design flow of the treatment system. With ion exchange technologies, it is possible to substantially reduce the volume of brine reject water however the resulting reject stream would be more concentrated. The concentrated brine from these treatment systems would need to be appropriately managed to address potential environmental concerns. The brine waters could potentially be trucked off-site for disposal, which given the volumes associated with electrodialysis reversal and reverse osmosis, would render those options uneconomic. Other options for managing the brine reject streams include evaporation in a lined pit; or dilution to stock water standards and discharge to total containment reservoirs.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on October 5, 2006. Field inspections of the proposed River Unit Gamma POD CBNG project were conducted on 4/20/2007 through 4/22/2007 by the following

individuals:
Representing BLM:

- Jim Verplancke, Natural Resource Specialist
- Arlene Kosic, Wildlife Biologist
- Mike McKinley, Hydrologist
- Buck Damone, Archeologist
- Diane Adams, GIS/VRM Specialist
- Lee Harrelson, Civil Engineer

Representing Lance Oil & Gas Company, Inc./Anadarko:

- Joy Kennedy - Permitting
- Craig Knight, Knight Technologies
- Naomi Morton Knight, Knight Technologies
- Sara King, Knight Technologies
- Pat Walker, Anadarko/Wardner Ranch Inc.
- Ethan Jahnke - Permitting
- Colt Rodeman – Pre-drilling
- Craig Klaahsen – Construction
- Shane Guasbota – Water Management
- Nathan Rager, WWC Engineering

Representing the Landowners:

- John D. Robertson – J2 Land & Livestock
- Tommy Jones – Blue Butte Ranch

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species	X			Arlene Kosic
Floodplains		X		Jim Verplancke, Mike McKinley
Wilderness Values			X	Jim Verplancke
ACECs			X	Jim Verplancke
Water Resources	X			Jim Verplancke, Mike McKinley
Air Quality	X			Jim Verplancke
Cultural or Historical Values		X		G.L. “Buck” Damone III
Prime or Unique Farmlands			X	Jim Verplancke
Wild & Scenic Rivers			X	Jim Verplancke

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Wetland/Riparian			X	Jim Verplancke, Mike McKinley
Native American Religious Concerns			X	G.L. "Buck" Damone III
Hazardous Wastes or Solids		X		Jim Verplancke
Invasive, Nonnative Species	X			Jim Verplancke
Environmental Justice		X		Jim Verplancke

3.1. Topographic Characteristics of Project Area

Topographically, the area consists of a series of ridges, steep ravines and hill slopes. The northern portion of the POD drains into Dead Horse Creek with direct connectivity to the Upper Powder River. The western most portion of the POD drains into Indian Creek with direct connectivity to the Upper Powder River. The eastern most portions of the POD drains into Van Houten Draw with direct connectivity to the Upper Powder River. The entire project area drains into the Upper Powder River with the entire project area within 2.25 mile of the mainstem river located between Schoonover Road on the south and ending just north of Interstate 90. Indian Creek and Dead Horse Creek have historically exhibited ephemeral and/or intermittent flows while Van Houten Draw , also historically ephemeral, has received year round discharge of CBNG produced water exhibiting perennial flow beginning in 2004. Perennial flow through Van Houten Draw has resulted in erosion and deposition within the channel as well as a change from rangeland to riparian vegetation.

The geomorphology of this and the surrounding area was primarily formed by erosion of the poorly consolidated Wasatch and associated formations and can be identified as being within the western extent of the Powder River Breaks. The area is characterized by steep slopes, active headcutting and deeply incised drainages brought about by the systematic erosion of the predominantly shallow and highly erosive soils. Elevations range from 4,000 to 4,200 feet within the proposed project area.

The regional climate is mid-latitude, interior continental, with relatively long, cold winters and relatively short, warm-hot summers and distinct spring and fall shoulder seasons. The summer growing season (frost free) typically ranges from 95-130 days (ave. = 120 days) between late May and mid-September, with considerable daily variation and occasional cool periods. On the plains, average daily temperatures typically range from 5-10 (low) and 30-35 (high) degrees Fahrenheit in mid-winter, and between 55-60 (low) and 80-85 (high) degrees Fahrenheit in mid-summer. The regional climate is considered semi-arid, and typically, total annual precipitation ranges from 10-14 inches, with most of that coming as rain between May and September. Snowfall varies from year-to-year, but it is common to have continuous snow cover for a period of 60 days or more in a "normal" winter. Annual prevailing winds are from the southwest, but local conditions vary. Arctic air masses with strong winds commonly occur during the winter months, and air masses from the Gulf of Mexico sometimes influence summer weather conditions.

3.2. Vegetation & Soils

The Natural Resource Conservation Service, (NRCS, USDA), Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains indicates that the project area falls in the 10-14" Northern Plains precipitation zone. The dominant landforms and the soils of this area are hill sides, ridges, and escarpments with sandy to loamy soils and intermittent shale outcroppings. The predominant ecological site occurring within the proposed River Unit Gamma POD is Shallow Loamy and the plant

communities vary from Mixed Sagebrush /Grass Plant Community along the south facing hill sides and draw bottoms to mixed sagebrush and grass with juniper and ponderosa over story on north facing slopes and ridge tops.

Sites regularly observed throughout the project area, represent the Shallow Sandy ecological site. This site occurs on nearly level to 50% slopes over landforms including hill sides, ridges and escarpments.

The shallow loamy and shallow sandy soil sites are shallow (less than 20"to bedrock) well-drained soils formed in eolian deposits or alluvium over residuum. These soils have moderately rapid to rapid permeability and may occur on all slopes. The bedrock may be of any kind except igneous or volcanic and is virtually impenetrable to plant roots. The surface soil will be one or more of the following textures: fine sandy loam, sandy loam, loamy fine sand, loamy sand, or sand. Thin ineffectual layers of other soil textures are disregarded. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick.

The main soil limitations include: depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high erosion potential especially in areas of steep slopes. Approximately 1,220 acres within the POD boundary has been identified by BLM as being susceptible to degradation due to steep slopes and/or highly erosive soil utilizing Soil Survey Geographical Data (SSURGO). The low annual precipitation should be considered when planning a seeding.

Lowland ecological sites are found long the banks of the Upper Powder River running north and south through the POD. These sites are also prevalent where the 3 main tributaries Indian Creek, Dead Horse Creek and Van Houten Draw converge with the mainstem river. These sites are located on nearly level land adjacent to streams that run water at least during the major part of the growing season with landforms consistent with alluvial fans, drainage ways & stream terraces. The soils of these sites are deep to very deep well-drained soils formed in mixed alluvium. These soils have moderate permeability. The surface soil will be highly variable and vary from 2 to 8 inches in thickness. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. The surface soil will be one or more of the following textures: very fine sandy loam, fine sandy loam, sandy loam, loam, silt loam, clay loam, clay, or silty clay. A fluctuating water table occurs in these areas and ranges from 1 to 5 feet, but is usually deeper than 3 feet. The main soil limitations include: depth to water table. The low annual precipitation should be considered when planning a seeding.

3.2.1.1. Shallow Loamy Ecosite-Mixed Sagebrush/Grass Plant Community

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

Dominant grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, and blue grama. Grasses of secondary importance include little bluestem, prairie junegrass, and Sandberg bluegrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Big sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear and winterfat can also occur.
When compared to the Historical Climax Plant Community, big sagebrush and blue grama have increased. Bluebunch wheatgrass has decreased, often occurring only where protected from grazing by the sagebrush canopy. Production of cool-season grasses has also been reduced. Cheatgrass (downy brome) has invaded the state. The overstory of big sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope.

The state is stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact. However, it can be at risk depending on how far a shift has occurred in plant composition toward blue grama, sagebrush, and/or cheatgrass. The watershed is usually functioning. However, it can become at risk when canopy cover of sagebrush, blue grama sod, and/or bare ground increases.

3.2.1.2. Lowland Ecosite-Mature cottonwoods/Cool-Season Grass Plant Community

This plant community evolved under moderate grazing by domestic livestock. 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. Mature cottonwoods make up the overstory.

Dominant grasses include rhizomatous wheatgrasses, Kentucky bluegrass, needleandthread, and green needlegrass. Grasses of secondary importance include prairie junegrass, Sandberg bluegrass, and slender wheatgrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Silver sagebrush and snowberry canopy cover may be 20-40%.

When compared to the Historical Climax Plant Community, western wheatgrass and green needlegrass have decreased. Needleandthread and Sandberg bluegrass have increased. Silver sagebrush has increased. Reproduction of cottonwoods is limited. The overstory of cottonwoods and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as birds, mule deer and antelope.

This site is stable and protected from excessive erosion. The biotic integrity of this plant community is intact. There is evidence of cottonwood reproduction where Dead Horse Creek converges with the Powder River that enhances the wildlife habitat. The watershed is functioning.

3.2.2. Wetlands/Riparian

No wetland areas were noted during the onsite. The proposed impoundments are off-channel and produced water should not resurface creating wetland/riparian areas.

Riparian areas noted within the project area include the banks of the Powder River as well as tributaries Dead Horse Creek and Van Houten Draw. Both tributaries to the Powder River exhibit a defined flow path with riparian vegetation established along the channel where sediment deposition has occurred. Both tributaries have mature cottonwood trees present along the channel banks in small groups or single trees. As Dead Horse Creek converges with the Powder River, the number of cottonwood trees increases with all age classes present and consolidated into a gallery forest established at the confluence. Cottonwood trees and riparian vegetation are prominent through the project area within the flood plains and oxbows along the Powder River.

3.2.3. Invasive Species

A search of inventory maps and databases provided by the Johnson County Weed and Pest District identified a number of state-listed noxious weeds to be present within the project area. Russian knapweed, diffuse knapweed, spotted knapweed and Scotch thistle were identified to have a presence within the project area. During subsequent field visits salt cedar (*Tamarix*) was also identified throughout the project area along the banks of the Powder River and within it tributaries. The operator submitted an integrated pest management plan developed in coordination with the Johnson County Weed and Pest District. The goal of the plan is to minimize impacts on the current plant community and to avoid promoting the encroachment of these invasive species throughout the project area. In addition, Lance Oil and Gas will submit a Pesticide Use Proposal (PUP) form WY-04-9222-1 to the BLM for the chemical

treatment of noxious weeds. A COA has been applied to this approval that no surface disturbance will be authorized on federal lands prior to the approval of a Pesticide Use Plan submitted by the operator to the Buffalo Field Office.

3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Big Horn Environmental Consultants (Big Horn). Big Horn performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, prairie dog colonies, and Ute ladies'-tresses orchid according to protocol in 2006 and 2007.

A BLM Biologist conducted a field visit on March 20, 2007. During this time, she reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the project area include pronghorn antelope, white-tailed deer, and mule deer. The WGFD has determined the project area to contain Yearlong and Winter Yearlong range for big game. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

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

The project area is part of the Pumpkin Buttes and Crazy Woman pronghorn antelope, Pumpkin Buttes mule deer, and Powder River white-tailed deer herds. There was a 2004 population estimate of 27,109 for the Pumpkin Buttes pronghorn antelope herd and a population objective of 18,000. The 2004 population estimate for the Crazy Woman pronghorn antelope herd was 7,650 with a population objective of 7,000. The 2004 population estimate for the Pumpkin Buttes mule deer herd was 14,800 and an objective of 11,000. The 2004 population estimate for the Powder River white-tailed deer herd was 12,716 and an objective of 8000 (WGFD 2004).

3.3.2. Aquatics

The River Unit Gamma project area is located within the Powder River and Dead Horse Creek watersheds. The Powder River originates in the Big Horn Mountains in Wyoming. The Powder River runs in a general northerly direction and is perennial throughout its entire length to the Yellowstone River. Dead Horse Creek is an ephemeral stream that is characterized by well developed channels and floodplain system near the confluence with the Powder River (WWC 2007).

The Powder River Basin is one of the last free-flowing prairie stream ecosystems left in the United States, and still supports an intact native aquatic community. Native fish species include sauger, shovelnose sturgeon, goldeye, plains minnow, sand shiner, flathead chub, plains killifish, river carpsucker, sturgeon chub, western silvery minnow, channel catfish, fathead minnow, longnose dace, mountain sucker, shorthead redhorse, longnose sucker, stonecat, and white sucker. Six of these are designated as either Native Species Status (NSS) 1, 2, or 3 species by the Wyoming Game and Fish Department. Species in these designations are considered to be species of concern, in need of more immediate management attention, and more likely to be petitioned for listing under the Endangered Species Act.

NSS1 species (sturgeon chub and western silvery minnow) are those that are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions are declining or vulnerable. NSS2 species (goldeye, shovelnose sturgeon, and sauger) are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions appear to be stable. NSS3 species (plains minnow) are widely distributed throughout their native range and appear stable; however, habitats are declining or vulnerable. For these species, our Department has been directed by the Wyoming Game and Fish Commission to recommend that no loss of habitat function occur. Some modification of the habitat may occur, provided that habitat function is maintained (i.e., the location, essential features, and species supported are unchanged).

3.3.3. Migratory Birds

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

3.3.4. Raptors

Raptors species expected to occur in suitable habitats within the project area include northern harrier, golden eagle, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, osprey, bald eagle, rough-legged hawk, merlin, and burrowing owl. Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities (PRB FEIS 3-145-148).

The BLM database and Big Horn identified 25 raptor nests within 0.5 miles of the River Unit Gamma project area. Table 4 lists the species and activity status of these nests in 2006.

Table 4. Raptor Nests identified within 0.5 miles of the River Unit Gamma POD.

BLM ID	UTM E	UTM N	Species	2006 Activity
2140	412378	4896263	RTHA	Active
2688	408145	4890586	GOEA	Active
2728	408103	4897032	RTHA	Active
2730	409056	4898269	GOEA	Active
2731	409329	4898664	Unknown	Inactive
2732	409201	4897402	RTHA	Active
2733	410207	489275	AMKE	Active
3194	409628	4892352	Unknown	Inactive
3196	409381	4892471	GOEA	Inactive
3199	412995	4896263	RTHA	Active
3200	412917	4896579	RTHA	Inactive
3231	410319	4892257	Unknown	Inactive

BLM ID	UTM E	UTM N	Species	2006 Activity
3495	407823	4895044	Unknown	Inactive
4127	409025	4893829	GOEA	Active
4128	410210	4892941	GHOW	Active
4129	410187	4892948	GHOW	Inactive
4130	410165	4892954	GHOW	Inactive
4131	410334	4892534	UNK	Inactive
4132	410319	4892168	UNK	Inactive
4133	410336	4892544	RTHA	Active
4134	412644	4892667	AM KE	Active
4135	410158	4892199	AM KE	Active
4136	409588	4891167	AM KE	Active
4137	410329	4892450	UNK	Inactive
4138	410329	4892520	AM KE	Active
4139	413244	4892579	LEOW	Active
4140	408470	4892424	UNK	Inactive
4141	408695	4892451	RTHA	Active
4142	410475	4892195	UNK	Inactive

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 1988, the WGFD identified four prairie dog complexes (Arvada, Recluse, Thunder Basin National Grasslands, and Midwest) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Oakleaf 1988).

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

Active reintroduction efforts of black-footed ferrets 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 BFO administrative area as potential black-footed ferret reintroduction sites (Oakleaf 1988). Today, 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 USFWS has also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

Six prairie dog towns are located in Sections 27-29 and 31-33 of Township 49 North and Range 77 West and Section 5 of Township 48 North and Range 77 West. The towns total approximately 195 acres in size.

3.3.5.1.2. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered in all of the continental United States except for Minnesota, Wisconsin, Michigan, Oregon, and Washington. In these states the bald eagle was listed as Threatened. On July 12, 1995 the eagle's status was changed to Threatened throughout the United States. Species-wide populations are recovering from earlier declines, and the bald eagle was proposed for de-listing in 2000.

Bald eagle nesting habitat is generally found in areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles can be more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, domestic sheep and big game carcasses may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles 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 River Unit Gamma project area is highly suited for bald eagle roosting and nesting. Potential roost and nesting habitat is present in the cottonwood riparian habitat along the Powder River and Dead Horse Creek. Big Horn observed 2 individual bald eagles roosting in December of 2006 and additional observations in 2007. The project area shows consistent use by bald eagles. The following eagle observations occurred in the same area on separate surveys; 3 eagles on 1/16/2007, 2 eagles on 1/23/2007 and 1 eagle on 1/31/2007. Consistent use has also been demonstrated in the Merril Meadows Treatment facility area including the construction of a potential nest site. No observations were recorded within one-mile of the facility once construction commenced.

3.3.5.1.3. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

The River Unit Gamma project area is located within the Powder River and Dead Horse Creek watersheds. The Powder River originates in the Big Horn Mountains in Wyoming. It is perennial throughout its entire length to the Yellowstone River. Dead Horse Creek is an ephemeral stream that is characterized by well developed channels and floodplain system near the confluence with the Powder River. (WWC 2007)

3.3.5.2. Sensitive Species

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

Prairie dogs colonies create a biological niche or habitat for many species of wildlife (King 1955, Reading 1989). Agnew (1986) found that bird species diversity and rodent abundance were higher on prairie dog towns than on mixed grass prairie sites. Several studies (Agnew 1986, Clark 1982, Campbell and Clark 1981 and Reading1989) suggest that richness of associated species on black-tailed prairie dog colonies increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of numerous prey species (Clark 1982, Agnew 1986, Agnew 1988).

In South Dakota, forty percent of the wildlife taxa (134 vertebrate species) are associated with prairie dog colonies (Agnew 1983, Apa 1985, Mac Cracken 1985, Agnew 1986, Uresk 1986, Deisch 1989). Of those species regularly associated with prairie dog colonies, six are on the Wyoming BLM sensitive species list. The species of concern are swift fox (*Vulpes velox*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), long-billed curlew (*Numenius americanus*).

3.3.5.2.1. 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.

Six prairie dog towns were identified within the River Unit Gamma project area. The size, activity status, and locations of the towns are listed below.

Section	Township/Range	Acres	Activity
31	49/77	1.0	Occupied
32-33	49/77	70	Occupied
33	49/77	10	Occupied
27-28	49/77	85	Occupied
28-29	49/77	25	Occupied
5	48/77	3	Occupied

3.3.5.2.2. Greater sage-grouse

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

The River Unit Gamma project area is marginally suited for sage-grouse breeding, nesting, and wintering grounds. The Maycock lek is located 1.70 miles north of the project area. Big Horn conducted aerial and ground surveys for sage-grouse and sharp-tailed grouse in 2006 and 2007. No birds were observed within the project area or at the Maycock lek.

3.3.5.2.3. Mountain plover

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

Suitable mountain plover habitat is present within the River Unit Gamma project area. Six prairie dog towns exist within the project area. Surveys were conducted in 2006-2007. No mountain plovers were observed.

3.4. West Nile Virus

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

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

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

Table 3.4 Historical West Nile Virus Information

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

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

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

Mosquitoes can potentially breed in any standing water that lasts more than four days. In the Powder River Basin, there is generally increased surface water availability associated with CBNG development.

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

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

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

3.5. Water Resources

The project area is within Dead Horse Creek, Indian Creek, Van Houten Draw, and unnamed tributaries to the Upper Powder River drainage system. Dead Horse Creek is primarily an ephemeral stream with areas of intermittent flow in lower reaches of the stream. Due to the effects of pool and riffle sequences occurring in the lower reaches, some portions of Dead Horse Creek hold water throughout the year. The headwaters of Dead Horse Creek are typified by steep-gradient gully systems intersected by randomly degraded claystone exposures with sparse vegetation.

3.5.1. Groundwater

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

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

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

- The effects of infiltrated waters on the water quality of existing shallow groundwater aquifers are not well documented at this time;
- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions;
- It may be necessary to conduct investigations at representative sites around the basin to quantify these impacts;

- Provide site specific guidance on the placement and design of CBM impoundments, and;
- Shallow groundwater wells would be installed and monitored where necessary.

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

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 33 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 40 to 1,170 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.1.1. BLM-CBM Monitor Well

Lance has a Unit obligation to install a set of CBM-Monitoring wells for the BLM. Lance has offered the State 11-16-4977, an existing coal well, in addition to a commitment to install 2 additional wells completed in the over-burned sand zones at this same location. Lance will submit well logs of the State 11-16-4977 well to BLM as well as a signed surface use agreement with the surface owner(s) to guarantee access to the well for BLM employees to monitor the wells. The location is on Wyoming state surface over State minerals therefore no APD's are required by the BLM. It is the responsibility of the operator not only to receive the proper approval of the state but also to secure access for BLM through private surface to access the monitor wells as well as to afford any rental fees the state may require for the monitor wells.

Lance Oil & Gas Company Inc. proposes to install the Coal Bed Methane (CBM) monitor wells in conformance with the current groundwater monitoring approach supported by the PRB FEIS, Wyodak EIS and previous CBM planning documents. BLM requires the installation and operation of approximately two pairs of monitor wells per township throughout the CBM possible development area. The goal is to complete these wells as far ahead of development as possible. Data collection efforts are for comprehensive, inter-aquifer information throughout the basin for regional analysis. Drilling these CBM water monitor wells is needed to collect baseline water aquifer data prior to development of the surrounding CBM field. Refer to page 2-44, PRB FEIS for more information.

3.5.2. Surface Water

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

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

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

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the River Unit Gamma POD project prior to on-the-ground project work (BFO project no. 070070044).). North Platte Archaeological Services conducted a Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. G.L. "Buck" Damone III, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following cultural resources are located in or near the area of potential effect.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48JO74	Lithic Scatter	Not Eligible
48JO1473	Lithic Scatter/Historic Trash	Not Eligible
48JO3384	Lithic Scatter	Not Eligible
48JO3385	Lithic Scatter	Not Eligible
48JO3386	Historic Features	Not Eligible
48JO3387	Lithic Scatter	Not Eligible
48JO3388	Lithic Scatter	Not Eligible
48JO3389	Lithic Scatter	Eligible
48JO3390	Historic Homestead	Not Eligible
48JO3391	Lithic Scatter	Not Eligible
48JO3392	Lithic Scatter	Not Eligible
48JO3393	Historic Features	Not Eligible
48JO3394	Lithic Scatter	Not Eligible
48JO3395	Lithic Scatter	Eligible

Some of the project area analyzed in this EA occurs on deep alluvial deposits. Alluvial deposits typically have a high potential for buried cultural resources, which are nearly impossible to locate during a Class III inventory.

3.7. Visual Resource Management

Approximately 3416 acres, or 46 percent, of the River Unit Gamma POD is within the Visual Resource Management (VRM) Class II corridor. Class II objectives are to retain the existing character of the landscape. The level of change to the characteristic landscape should be low and not attract the attention of the casual observer. Current visual resource management directed in the EIS Record of Decision states, "Within the designated VRM Class II corridors along Interstate 90 and State Highway 14, all project facilities on BLM surface will be screened completely from these highways or camouflaged to retain basic elements of form, line, color and texture of the landscape". The Class II area in the River Unit Gamma POD includes over half of the northern section of the POD, on both sides of Interstate 90. The southern portion of the POD within the Class II area includes a large basin south of the Interstate and east of the Powder River. The remainder of the POD is within Visual Resource Management Class IV, which allows major modification of the existing landscape character.

Key observation points for this project are the east-bound lane of Interstate 90, approximately one-half mile east of the Powder River exit, and the west-bound lane of Interstate 90 approximately 3.3 miles east of the Powder River exit. Some well locations and several impoundments are visible from the first observation point. The remainder of the well locations and proposed roads to the south are hidden by topography. One well location and a large impoundment in the northern portion are visible from the second observation point; the remainder of the proposed facilities is hidden from this point but visible from other points along the highway corridor.

The project area is a mixture of sagebrush and grass on the edge of the Powder River Breaks and cultivation above the river floodplain. The terrain is hilly north of the Interstate and river plain and breaks south of the highway. CBNG development, ranching, and farming is evident in the area, with the River Unit and Big George PODs located to the south and southeast of the project area and the Router, Powder Valley Unit, and Williams Draw Unit Beta PODs located to the north. Visual management mitigation has been successfully applied to these existing federal oil and gas projects to minimize visual impacts.

3.8. Foot Rot

Foot rot, also called infectious pododermatitis, foul claw, or hoof rot, is an acute or chronic infection of cattle characterized by lameness, swelling, and inflammation of the skin of the coronary band and the skin between the claws. The disease is seen most commonly in feedlot cattle or in the winter and spring months when mud, urine, and manure are the greatest problem. There is no indication that incidence of foot rot has occurred or increased anywhere in the Powder River Basin in association with coal bed methane development. It is extremely unlikely foot rot problems will occur or increase as a result of this project, therefore it will not be discussed further in this analysis.

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

The majority of the proposed disturbance was planned within the shallow loamy and shallow sandy ecological sites with efforts made to avoid soil conditions with limited reclamation potential. However,

in those areas where erosion concerns associated with proposed disturbance could not be avoided, mitigation and/or site specific COA's to address soil stabilization in a timely fashion have been applied. Portions of the project are planned within lowland ecological sites and measures have been taken to provide adequate buffers for riparian areas.

The predominance of shallow soils, steep slopes and climatic limitations throughout the POD as identified by the NRCS Soil Survey for Northern Johnson County and the BLM onsite investigationswarrants the need for additional reclamation related conditions of approval (COA's) and the use of best management practices (BMP's) to help assure that the reclamation requirements of the Wyoming Reclamation Policy will be met.

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 29 proposed well locations, 1 is on an existing conventional well pad, 12 can be drilled without a well pad being constructed, 13 can be drilled using a 30 x 120 foot rig slot, and 4 will require a designed/constructed (cut & fill) well pad 150 x 150 feet. Surface disturbance associated with the drilling of the 12 wells without a rig slot or designed/constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 32 x 20 feet), and compaction (from vehicles driving/parking at the drill site). The 13 wells where a rig slot is proposed allows for leveling a 30 x 120 foot space with a maximum of 4 foot excavation depth in conjunction with excavation of the reserve pit and compaction from equipment traffic. Estimated disturbance associated with these 25 wells would involve approximately 0.5 acre/well for 12.5 total acres. The other 4 wells requiring cut & fill pad construction would disturb an average of 0.83 acres/well pad for an approximate total of 3.3 acres. The total estimated disturbance for all 29 wells would be 15.8 acres. Much of this would be a short-term impact 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 3.4 miles of existing improved road and 10.4 miles of newly constructed improved roads would provide access to the various well locations. Approximately 1.3 miles of existing two-track trails and 3.4 miles of existing improved road 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 4.0 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

Proposed stream crossings, including culverts and 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 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	25	0.5/acre	12.5	Long Term
Constructed Pad	4	Site Specific	3.3	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Shallow Ground Water Compliance Monitoring Wells	6	0.01/acre	0.06	Long Term
Impoundments	2		11.23	Long Term
On-channel	0	Site Specific	0.0	
Off-channel	2	Site Specific	11.23	
Water Discharge Points	0	Site Specific or 0.01 ac/WDP	0.0	
Channel Disturbance				
Headcut Mitigation*	0.0	Site Specific	0.0	
Channel Modification	0.0		0.0	
Channel crossings	23	Site Specific	0.3	Short Term
Improved Roads				Long Term
No Corridor	0.0		0.0	
With Corridor	10.7	50' Width	63.0	
2-Track Roads	0.0	12' Width or Site Specific	0.0	Long Term
No Corridor				
With Corridor	0.0	20' Width or Site Specific	0.0	
Pipelines				Short Term
No Corridor	4.0	45' Width	21.8	
With Corridor	0.42	45' Width	2.3	
Buried Power Cable No Corridor	0.0	12' Width or Site Specific	0.0	Short Term
Overhead Powerlines	1.1	30' Width	3.79	Long Term
CBNG-Monitor well set	1	0.5	0.5	Long Term

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

4.1.1. Wetland/Riparian

No wetland areas were noted during the onsite. Riparian areas within the River Unit Gamma project area can be found along the banks of the Powder River as well as along its tributaries Dead Horse Creek and Van Houten Draw. The proposed action was modified and COA's have been applied to alleviate effects

to these riparian areas. Utilization of off-channel infiltration pits should not contribute to produced water resurfacing.

4.1.2. Invasive Species

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

The operator submitted an integrated pest management plan developed in coordination with the Johnson County Weed and Pest District. The goal of the plan is to minimize impacts on the current plant community and to avoid promoting the encroachment of these invasive species throughout the project area. In addition, Lance Oil and Gas will submit a Pesticide Use Proposal (PUP) form WY-04-9222-1 to the BLM for the chemical treatment of noxious weeds. Mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants including that no surface disturbance will be authorized on federal lands prior to the approval of the Pesticide Use Plan submitted by the operator to the Buffalo Field Office.

4.1.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 16.8% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into Upper Powder River and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Upper Powder River Watershed.
- The WMP for the River Unit Gamma POD proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, suitable habitat for pronghorn antelope, white-tailed deer, and mule deer will 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 may provide

some habitat value as these areas are reclaimed and native vegetation becomes established. Although, when these reclaimed areas are located along road sides, vehicular collisions may increase.

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

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

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

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

The water management plan for the River Unit Gamma POD will include discharging produced CBNG water into off-channel reservoirs, piping discharge to an existing water treatment facility (River Unit) then direct discharge into the Powder River and Dead Horse Creek, and land application. (WWC 2007)

Change in Water Quality

Fish and amphibian species have evolved and adapted to existing conditions. Changes in water quality may have detrimental impacts on the native aquatic fauna. Major information gaps for these species include feeding habits, reproduction, specific habitat preference (pools, riffles, runs, backwaters, side channels, or a combination), and seasonal habitat use.

Wyoming Game and Fish Department initiated a detailed fish and amphibian survey of the main-stem Powder River in 2004 to determine baseline species composition and distribution in the Basin. In accordance with the PRB FEIS, a monitoring plan was establish by the Interagency work group. The plan calls for baseline data collection over a three year period which is intended to provide information relative to the effects upon the aquatic biota of CBNG water.

Changes in the conductivity and sodium absorption ratio may occur as increased flows move sediment from channel bottoms and potentially increase erosion of floodplains. Confluence Consulting reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage in their recently released report on the Powder River. This report indicated that CBNG discharges could affect native species in the drainage.

Change In Water Quantity

Native fauna in the Powder River drainage have evolved and adapted to a very dynamic hydrograph with high sediment loads. Changes in this flow regime (i.e., perennial flows) may seriously impact native fauna by altering their use of historical habitats for spawning, rearing, and reproduction. Alterations that impact channel morphology is an issue, and will have impacts to the aquatic biota due to changes in sediment loads, loss of habitat, and possible disruption of migration movements due to barriers created by culverts and/or head cuts. This is a monitoring and adaptive management issue for CBNG development.

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG treated water would be more noticeable during the late summer months or winter months when the mean monthly flow is smaller than during the remainder of the year. An addition of approximately 1.9 cfs per day of CBNG treated water to an average flow of 30 cfs into the Powder River is unlikely to affect its hydraulic regime or alter surface water quality. The flow attributable to project produced water is very small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to 18,065 cfs for a 100- year storm event. Channel erosion, and/or channel sedimentation would be very unlikely to occur. Addition of the treated produced water would facilitate beneficial uses such as livestock and wildlife supply and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

Wyoming Game and Fish (G&F) submitted comments to WDEQ on Lance's application for NPDES. Initially, Lance applied for a treated discharge volume of 100 cfs to accommodate much of their development along the Powder River. Because of G&F concerns, WDEQ settled on a much reduced permitted volume of 12.5cfs. WDEQ felt that that reduced volume would protect aquatic life standards until additional information could be collected to provide a better understanding of the dynamics of the aquatic system.

4.2.2.1. Cumulative effects

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

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

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

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

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

Four well locations were originally proposed less than 0.25 miles and in direct line of sight of six raptor nests. The 43-33, 32-32 and 14-20 wells were relocated out of direct line of sight. The 41-33 well and road corridor were relocated. A portion of the road corridor will be visible from the nest; however, vehicles and personnel will not be visible.

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.

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.

Despite commitments such as telemetry metering to limit well visits, well visits during the nesting season will occur 2 to 3 times per week which may lead to nest failure through nest abandonment, displacement, and increased predation. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

4.2.4.1. Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

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

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

4.2.5.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat of insufficient size.
Threatened				
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body.	K	LAA	Overhead power proposed.
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	NE	Historically perennial water present, no orchids identified.

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

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

4.2.5.1.1. Black-footed ferret

The 43-33 well, its associated road corridor, the 33-33, 43-28, and 13-27 pits are proposed within active prairie dog towns. Two of the pits are located on the edge of the towns and the well is located off an existing road.

It is highly unlikely that ferrets are present and the suitable habitat is insufficient in size to support ferrets. Implementation of the proposed development should have "***no effect***" on the black-footed ferret.

4.2.5.1.2. Bald eagle

A bald eagle roost site was identified within the project area during 2007 surveys in Section 33, T49N:R77W. Bald eagles are sensitive to human activities and can abandon an area due to the activity. Construction of the Merril Meadows Treatment Facility is a good example. Bald eagles were observed on multiple occasions during the winter of 2006-2007 within a mile of the facility prior to construction and the eagles may have been constructing a nest site (Big Horn 2007). The potential nest site was not visible and located just over 0.5 miles, the standard disturbance-free zone, from the treatment facility. Once facility construction commenced in January 2007, no eagles were observed at the potential nest site or anywhere closer to the treatment facility (Big Horn 2007). A **disturbance-free** (no occupancy) zone has been established within 0.5 mile of the roost site. Construction of the following wells, pits, and associated infrastructure have been removed from the project design;

Township/Range	Section	Wells and Infrastructure
49/77	33	34-33 & 14-33 wells and their associated infrastructure, and the 33-33 & 14-33 pits and their associated access roads, water pipelines, and monitoring wells.
48/78	5	41-5 pit and its associated access road, water pipelines, and monitoring wells.

The proposed project is also likely to affect bald eagles due to the presence of overhead powerlines. Lance/Anadarko proposes 1.0 mile of three phase overhead powerlines throughout the project area. Approximately 6.0 miles of overhead power exists within the project boundaries and over 15 miles of overhead power is located south of the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (2006) suggested practices and with the Service's standards (USFWS 2002).

The presence of overhead power lines may adversely affect foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin, particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through 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.

The proposed project is "***likely to adversely affect***" bald eagles due to the presence of proposed and existing overhead powerlines lines.

4.2.5.1.3. Ute's Ladies Tresses Orchid

Produced water will be piped to proposed off-channel pits, used for irrigation systems, and piped to the existing River Unit treatment facility, then directly discharged into the Powder River and Dead Horse Creek.

Well locations and their related infrastructure are proposed in dry upland vegetation with no source of perennial water. No populations of orchids have been identified within the project area. The ephemeral drainages are comprised of heavy clay soils and immediately rise to upland vegetation, reducing the potential for the orchid. Proposed discharge points location along the Powder River and Dead Horse Creek were surveyed in 2006 and no orchids or potential habitat were identified. (Maechtle 2006) Implementation of the proposed project should have "***no effect***" on the Ute ladies'-tresses orchid as suitable habitat is not present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Continued loss of prairie dog habitat and active prairie dog towns will result in the decline of numerous sensitive species decline in the short grass prairie ecosystem.

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	NI	Additional water will affect existing waterways.
Spotted frog (*Ranus pretiosa*)	Ponds, sloughs, small streams	NP	NI	Prairie not mountain habitat.
Birds				
Baird's sparrow (*Ammodramus bairdii*)	Grasslands, weedy fields	S	MIIH	Sagebrush cover will be affected.
Brewer's sparrow (*Spizella breweri*)	Basin-prairie shrub	S	MIIH	Sagebrush cover will be affected.
Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	S	MIIH	Disturbance proposed in prairie dog towns.
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	S	MIIH	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	Grasslands will be affected.
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	S	MIIH	Prairie will be affected.
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	Existing reservoirs may increase usage during migration.
White-faced ibis (*Plegadis chihi*)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (*Coccyzus americanus*)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (*Oncoryhynchus clarki bouvieri*)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (*Cynomys ludovicianus*)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIIH	Disturbance proposed in prairie dog towns.
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 affected.
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

4.2.5.2.1. Black-tailed prairie dog

The 43-33 well, its associated road corridor, are proposed within active prairie dog towns. The well was relocated closer to the existing road. The disturbance created by this activity could stimulate more activity and/or a return of prairie dogs as it may loosen the soil. The 33-33, 43-28, and 13-27 pits are proposed within active prairie dog towns. Two of the pits are located on the edge of the towns. Direct loss of prairie dogs and their habitat will occur from the implementation of this project. The project may impact the black-tailed prairie dog or its habitat.

4.2.5.2.2. Greater sage-grouse

Project activities will result in the direct loss of 216 acres of year-round sage-grouse habitat. The proposal would also create extensive habitat fragmentation due to the introduction of new linear features (roads, pipelines, and overhead powerlines). Sage-grouse avoidance of these facilities produces even greater indirect habitat loss. Sage-grouse use of previously suitable habitat may decline. The Wyoming Game and Fish Department (WGFD) feels a well density of eight wells per section creates a high level of impact for sage grouse and that sage-grouse avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004).

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

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

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

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

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

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

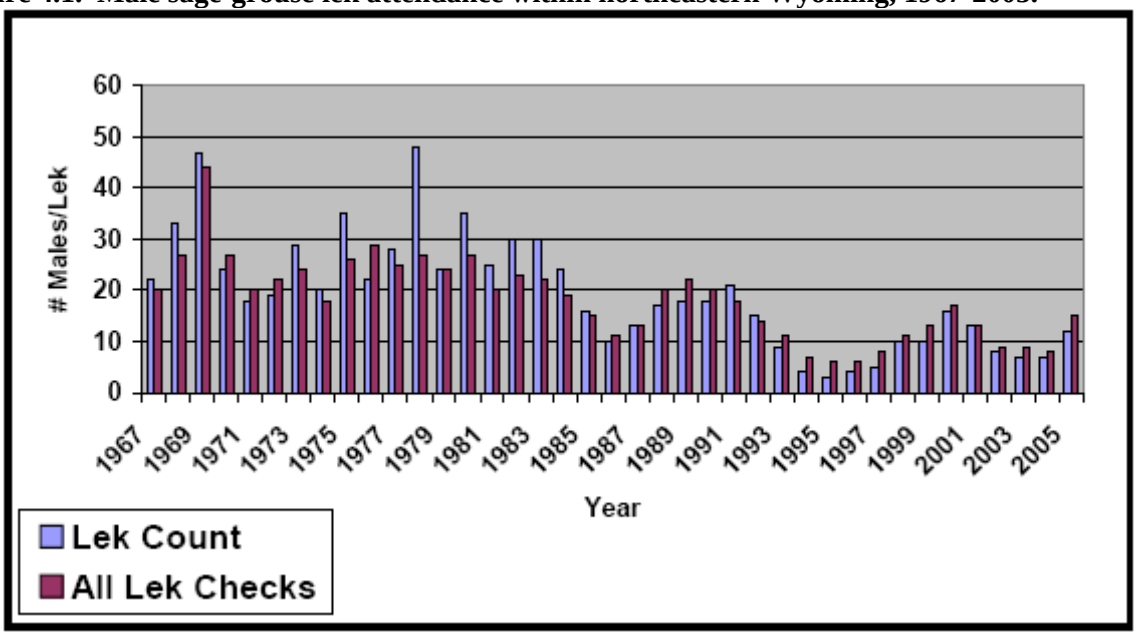
(1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found 36% of their grouse nesting within 3 km of the capture leks. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being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

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

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

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

Figure 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).

4.2.5.2.3. Mountain plover

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipeline corridors and roads may be attractive to plovers, while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. Overhead power lines provide perch sites for raptors that could

potentially result in increased mountain plover predation. CBNG infrastructure such as well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

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

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

The 43-33 well, its associated road corridor, the 33-33, 43-28, and 13-27 pits are proposed within active prairie dog towns. Two of the pits are located on the edge of the towns. The well was relocated closer to the existing road. Additional surveys will be required if disturbance is proposed during the mountain plover breeding season. Disturbance to mountain plover habitat will occur from the implementation of this project. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

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

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

4.4. Water Resources

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

landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should minimize project area and downstream potential impacts from proposed water management strategies due to full-containment in off-channel pits.

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 20.0 gpm per well or 580.0 gpm (1.30 cfs or 1,000 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 171,423 acre-feet in 2006 (maximum production). As such, the volume of water resulting from the production of these wells is 0.6% of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 248 gpm will infiltrate at or near the discharge points and impoundments (400 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 40 to 1,170 feet compared to 1,500 to 2,150 feet to the Big George. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

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

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

In order to determine the actual water quality of the producing formations in this POD, and to verify the

water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well within the POD. The reference well will be sampled at the well head for analysis within sixty days of initial production and a copy of the water analysis will be submitted to the BLM Authorizing Officer.

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

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

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gaging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in the WDEQ's WYPDES permit, and the levels found in the POD's representative water sample. The River Unit Gamma POD has the ability to discharge under 4 separate WYPDES permits: WYW0051934, WYW0051861, WYW0053392, and WYW0052248.

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

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** µmhos/cm
Most Restrictive Proposed Limit –		2	1,000

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** µmhos/cm
Least Restrictive Proposed Limit		10	3,200
Primary Watershed at Arvada Gauging station Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		 4.76 7.83	 1,797 3,400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	 500 2,000 5,000	 8	
WDEQ Water Quality Requirement for WYPDES Permit # WYW0051861 At discharge point	5,000	7.5	2,500
Predicted Produced Water Quality Big George Coal Zone	2,610	39.7	4,110

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 2610.0 mg/l TDS which is not within the WDEQ criteria for agricultural use (2000 mg/l TDS). Direct land application utilizing EMIT treated water was approved via Sundry in the River Unit Alpha POD

The quality for the water produced from the Big George target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 20.0 gallons per minute (gpm) is projected is to be produced from these 29 wells, for a total of 580 gpm for the POD. See Table 4.5.

The quality for the water produced from the target coal zone from these wells is predicted to be similar to For more information, please refer to the WMP included in this POD.

There are 6 previously approved and one proposed discharge points for the 3 existing EMITs facilites associated with this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite. These facilities are as follows:

- River Unit Alpha with one existing outfall (WY0051861_001) at the Upper Powder River.
- River Unit Beta with one existing outfall (WY0053392_001) at the Upper Powder River.
- Merril Meadows with one existing outfall (WY0052248_002) at, 3 previous approved outfalls (WY0052248_001, 003 & 004) to be constructed and one newly proposed outfall (WY0051934_014) all within of Dead Horse Creek near its confluence with the Upper Powder River.
    - In addition to outfall WY0051934_014 and associated waterlines, a second Higgins Loop counter current ion exchange system may be added to the existing approved Merrill Meadows treatment facility in order to increase treatment capacity.

To manage the produced water, 2 off-channel impoundments (70 acre-ft of storage) would potentially be constructed within the project area which would disturb approximately 11.23 acres including the dam structures. The off-channel impoundments would result in evaporation and infiltration of CBNG water. Criteria identified in "Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming" (WDEQ, 2002) was used to locate these impoundments. In order to address the

potential impacts from infiltration on shallow ground water, the Wyoming DEQ had developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004). This guidance document was revised and is superseded by the "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. Approximately 1,106 new impoundments have been investigated to date (3/07) with 161 impoundments being regulated under 71 permits. Of these impoundments 7 have caused exceedance of the class of use of the receiving aquifer, of which only 1 has not returned to existing class of use of the shallow ground water beneath it. Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.21 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from on-channel impoundments will likely allow for streambed enhancement through wetland-riparian species establishment. However, the 2 proposed off-channel impoundments are full containment and produced water should not resurface creating wetland/riparian areas. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 29 wells is anticipated to be a total of 580 gpm or 1.30 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in the Upper Powder River from this action (0.21 cfs) may add a maximum 0.16 cfs to the Upper Powder River flows, or 0.24% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Upper Powder River (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

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

The operator has obtained 3 and applied for one additional Wyoming Pollutant Discharge Elimination System (WYPDES) permits for the discharge of water produced from this project from the WDEQ.

Permit effluent limits for WYW0051861 were set at (WYPDES, Attachment B):

pH	6.5 to 9.0
TDS	5,000 mg/l max
Specific Conductance	2500 mg/l max
SAR calculated (March through October)	7.5
SAR calculated (November through February)	9.75
Sulfates	3,000 mg/l max
Radium 226	1 pCi/l max
Dissolved iron	1,000 µg/l max
Dissolved manganese	630 µg/l max
Total Barium	1,800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	46 mg/l

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The designated point of compliance identified for this permit are TRIB1 (NWNW, Sec. 28, T49N, R77W), UPR (NESE, Sec. 29, T49N, R77W), DPR (NESE, Sec. 29, T49N, R77W).

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

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

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

In-channel downstream impacts are addressed in the WMP (page 25) for the River Unit Gamma POD prepared by Western Water Consultants for Lance Oil & Gas Company, Inc.

4.4.2.1. Surface Water Cumulative Effects

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

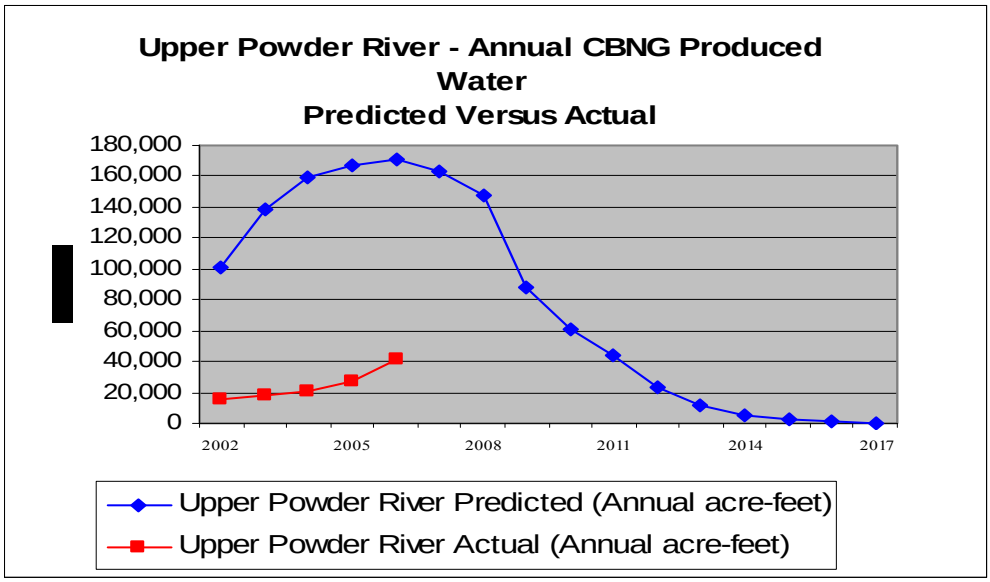
As of March 2007, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 123,984 acre-ft of water compared to the predicted 900,040 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 16.8% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

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

Year	Upper Powder River Predicted	Upper Powder River Predicted	Upper Powder River Actual (Annual acre-feet)	Upper Powder River Actual (Cumulative acre-feet from 2002)

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

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



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

The PRB FEIS states, "Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ's (Departments of Environmental Quality) have signed. This MOC was developed to ensure that

designated uses downstream in Montana would be protected while CBM development in both states continued. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met." (PRB FEIS page 4-117)

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

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

No additional mitigation measures are required.

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

4.5. Cultural Resources

Although eligible sites were identified within the block inventory, there are no eligible sites within the APE of the proposed project. Following the Wyoming State Protocol Section VI (A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 6/12/07 that no historic properties exist within the APE.

When a project is constructed in area with a high potential for buried cultural material, archaeological monitoring is often included as a condition of approval. Construction monitoring is performed by a qualified archeologist working in unison with construction crews. If buried cultural resources are located by the archeologist, construction is halted and the BLM consults with the State Historic Preservation Office (SHPO) as far as mitigation or avoidance. Due to the presence of alluvial deposits in the project area, the operator will be required to have an archeologist monitor all earth moving activities associated with construction in two areas, as described in the COA's.

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

4.6. Visual Resource Management

The visual resources would be impacted by the impoundments, access roads, utility corridors, and the new wells introduced to the area. The access roads and utility corridors would create linear contrasts with the natural lines and colors and the well pads and boxes will contrast with the natural forms. Some of the new access routes north of the Interstate inside the Class II area are hidden by ridges above the second observation point and will be visible for shorter periods along the highway. The impoundments in the valley east of the Powder River will be visible in the background because of their size and glare from the water, distracting the observer from the natural environment and attracting the observer's attention to the proposed development.

Mitigation

General mitigation measures for well pads, roads, and impoundments recommended to the operator include:

- Constructing pads to appear as natural clearings by rounding corners of pads and feathering the vegetation edge.
- Removal of construction debris immediately within the Class II area.
- Shaping cuts and fills to appear as natural forms.
- Establishing and maintaining shrubs and trees at the base of fills.
- Using rocks of various sizes scattered on cuts and fill slopes to add variety to texture and enhance revegetation.
- Seeding areas where there is high contrast of texture and color.
- Well boxes should be painted covert green, using non-reflective paint.

Specific mitigation recommended for facilities:

1. The location of RU Fed 41-29-4977 well was changed during the on-site to reduce visual impact from the well pad and the access road. The new site is approximately 1700 feet west of the original location and will require a much shorter access. It is screened from east-bound traffic on Interstate 90 and will minimize visibility of the well to east-bound traffic.
2. The location of RU Fed 12-29-4977 well was moved approximately 400 feet west to reduce visual impact. The new site is on the west side of the ridge, rather than on top of the ridge, and will minimize visibility of the well from Interstate 90.
3. Water impoundment 12-14 is approximately 500 feet north of Interstate 90 and will have a significant impact on visual resources. Because of its size and proximity to the highway, BLM recommended the pit be withdrawn from the project.
4. The location of RU Fed 21-15-4977 well was changed to reduce visual impact. The new site is approximately 1000 feet southeast of the original location. It will minimize visibility of the well to east-bound traffic on Interstate 90 and will be screened from west-bound traffic.
5. Water impoundments 13-27 and 43-28 are within the Class II area along Interstate 90 and are not screened from the highway by vegetation. Because of their large size, their position in the landscape below east-bound traffic, and the glare from the water's surface, they will impact visuals within the corridor. BLM recommend these pits be listed as secondary in the water management plan or withdrawn from the project.

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Mary Hopkins	Interim SHPO	Wyoming SHPO	No
Rod Litzel	District Coordinator	Johnson County Weed & Pest District	No

6. OTHER PERMITS REQUIRED

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

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