FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Lance Oil & Gas Company, Inc.
Tincom Butte North
ENVIRONMENTAL ASSESSMENT – WY-070-07-202

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Lance Oil & Gas Company, Inc.'s Tincom Butte North Coal Bed Natural Gas (CBNG) POD comprised of the following 31 Applications for Permit to Drill (APDs):

Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
TINCOM BUTTE N SURANYI RNCH	14-1	SWSW	1	54N	77W	WYW146325
TINCOM BUTTE N HANSEN	12-2	SWNW	2	54N	77W	WYW146325
TINCOM BUTTE N HANSEN	14-2	SWSW	2	54N	77W	WYW146325
TINCOM BUTTE N HANSEN	21-2	NENW	2	54N	77W	WYW146327
TINCOM BUTTE N HANSEN	32-2	SWNE	2	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	34-2	SWSE	2	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	42-2	SENE	2	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	43-2	NESE	2	54N	77W	WYW146325
TINCOM BUTTE N HAYES	41-10	NENE	10	54N	77W	WYW146325
TINCOM BUTTE N HAYES	43-10	NESE	10	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	12-11	SWNW	11	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	14-11	SWSW	11	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	21-11	NENW	11	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	23-11	NESW	11	54N	77W	WYW146325
TINCOM BUTTE N TIETJEN	12-27	SWNW	27	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	12-28	SWNW	28	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	21-28	NENW	28	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	32-28	SWNE	28	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	41-28	NENE	28	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	14-29	SWSW	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	21-29	NENW	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	23-29	NESW	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	32-29	SWNE	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	41-29	NENE	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	12-29	SWNW	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	14-30	SWSW	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	23-30	NESW	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	34-30	SWSE	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	41-30	NENE	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	43-30	NESE	30	54N	77W	WYW146327
TINCOM BUTTE N WALSH	32-25	SWNE	25	54N	77W	WYW146327

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

IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
P21-2-5477	NENW	2	54	77	7.4	1.95	WYW146325

IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
P42-10-5477	SENE	10	54	77	5.8	1.5	WYW146325
P14-11-5477	SWSW	11	54	77	11.1	3.5	WYW146325
P41-11-5477	NENE	11	54	77	19.9	5.6	WDEQ
OK 6 Reservoir	SENW	29	54	77	7.14	1.89	WYW146327
OK 7 Reservoir	NWSW	29	54	77	6.12	1.64	WYW146327
Moore No. 8 Reservoir	SESE	30	54	77	1.8	0.54	WYW146327
OK Pit 1	NWSE	29	54	77	40.01	3.98	WOGCC
OK Pit 2	SWSW	28	54	77	52.9	6.48	WOGCC
P22-29-5477	SENW	29	54	77	30	6.4	WYW146327

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.
Tincom Butte North
PLAN OF DEVELOPMENT
WY-070-07-202

INTRODUCTION

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

1. PURPOSE AND NEED

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

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Lance Oil & Gas Company, Inc.'s Tincom Butte North Plan of Development (POD) for 35 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 35 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, the Wall Coal. All production facilities for a well in this POD will be enclosed in a 42 cubic inch 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/Qtr	Section	TWP	RNG	Lease #
TINCOM BUTTE N SURANYI RNCH	14-1	SWSW	1	54N	77W	WYW146325
TINCOM BUTTE N HANSEN	12-2	SWNW	2	54N	77W	WYW146325
TINCOM BUTTE N HANSEN	14-2	SWSW	2	54N	77W	WYW146325
TINCOM BUTTE N HANSEN	21-2	NENW	2	54N	77W	WYW146327
TINCOM BUTTE N HANSEN	23-2	NESW	2	54N	77W	WYW146325
TINCOM BUTTE N HANSEN	32-2	SWNE	2	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	34-2	SWSE	2	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	42-2	SENE	2	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	43-2	NESE	2	54N	77W	WYW146325
TINCOM BUTTE N HAYES	41-10	NENE	10	54N	77W	WYW146325
TINCOM BUTTE N HAYES	43-10	NESE	10	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	12-11	SWNW	11	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	14-11	SWSW	11	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	21-11	NENW	11	54N	77W	WYW146325
TINCOM BUTTE N SURANYI RNCH	23-11	NESW	11	54N	77W	WYW146325
TINCOM BUTTE N TIETJEN	12-27	SWNW	27	54N	77W	WYW146327
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TINCOM BUTTE N TIETJEN	21-28	NENW	28	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	32-28	SWNE	28	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	41-28	NENE	28	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	14-29	SWSW	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	21-29	NENW	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	23-29	NESW	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	32-29	SWNE	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	41-29	NENE	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	12-29	SWNW	29	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	12-30	SWNW	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	14-30	SWSW	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	21-30	NESW	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	23-30	NESW	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	32-30	SWNE	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	34-30	SWSE	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	41-30	NENE	30	54N	77W	WYW146327
TINCOM BUTTE N TIETJEN	43-30	NESE	30	54N	77W	WYW146327
TINCOM BUTTE N WALSH	32-25	SWNE	25	54N	77W	WYW146327

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

IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
P21-2-5477	NENW	2	54	77	7.4	1.95	WYW146325
P42-10-5477	SENE	10	54	77	5.8	1.5	WYW146325
P14-11-5477	SWSW	11	54	77	11.1	3.5	WYW146325
P41-11-5477	NENE	11	54	77	19.9	5.6	WDEQ
OK 6 Reservoir	SENW	29	54	77	7.14	1.89	WYW146327

IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
OK 7 Reservoir	NWSW	29	54	77	6.12	1.64	WYW146327
Moore No. 8 Reservoir	SESE	30	54	77	1.8	0.54	WYW146327
OK Pit 1	NWSE	29	54	77	40.01	3.98	WOGCC
OK Pit 2	SWSW	28	54	77	52.9	6.48	WOGCC
P22-29-5477	SENW	29	54	77	30	6.4	WYW146327

County: Sheridan

Applicant: Lance Oil & Gas Company, Inc.

Surface Owners: Sheri Tietjen, Janet Hansen, Jack Hayes Living Trust, John Walsh, William Suranyi, BLM

Project Description:

The proposed action involves the following:

- Drilling of 35 total federal CBM wells Wall Coal zone to depths ranging from 1730 to 2475 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.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 10 discharge points and 10 stock water reservoirs within the Upper Powder River watershed.

- An unimproved and improved road network.

- An above ground power line network to be constructed by Powder River Energy Corporation. The proposed route has 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 5 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 three times per week. Generator volume is expected to be 100.5 decibels at 1 meter distance.

- A buried gas, water and power line network. There are no central gathering/metering facilities proposed for this POD. Gas will be measured at the wellhead using an orifice plate in combination with an Electronic Flow Measurement (EFM) device.

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

Implementation of committed mitigation measures contained in the MSUP, Drilling Program, and WMP, in addition to the Standard 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 insure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator's proposal. The specific changes identified for the Tincom Butte North POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

1. The following table provides a summary of the changes made at the pre-approval onsite:

Well ID	Aliquot	Section	T/R	Notes
HAYES FED 43-10	NESE	10	54/77	Well location moved approx. 40ft upslope (south) away from the adjacent drainage. The well site layout will not exceed an area of 150' x 150'. The reserve pits will require an impermeable liner. Silt fences will be required around the location's perimeter to minimize surface run-off.
SURANYI FED 23-11	NESW	11	54/77	This is a non-constructed location. The well site layout will not exceed an area of 150' x 150'.

Well ID	Aliquot	Section	T/R	Notes
SURANYI FED 12-11	SWNW	11	54/77	Spot upgrade required along access road due to erosion feature (N/NE). The reserve pits will require an impermeable liner.
HAYES FED 41-10	NENE	10	54/77	Silt fences will be required around the location's perimeter to minimize surface run-off. Expedient soil stabilization measures will be required along the engineered access road, from PCULV 12-11 to station 8+87.6 (Road E Sheet 13).
SURANYI FED 21-11	NENW	11	54/77	A wider turning radius required at the start/intersection with Road 14-2.
HANSEN FED 14-2	SWSW	2	54/77	Well location moved approx. 215ft SE from the original well site. Constructed pad design dropped. The well location layout will not exceed an area of 150' x 75'. The well location was moved due to 1) sizeable surface disturbance associated with the proposed [engineered] access road and pad location; 2) highly erosive soils vulnerable to degradation; and, 3) slopes in excess of 25% in some areas. A new slot design is proposed for this well site (30'x120').
SURANYI FED 43-2	NESE	2	54/77	The well site layout will not exceed an area of 150' x 150'. Segment of Road-F dropped, from PCULV 43-2B to end of template C well 14-1 intersection (line diagram sheet 2).
SURANYI FED 14-1	SWSW	1	54/77	The well site layout will not exceed an area of 150' x 150'. Silt fences will be required around the location's topsoil/spoil piles to minimize surface run-off. The reserve pits will require an impermeable liner. Access road moved to follow existing 2-track from the NW @ intersection with Road C. Access road will continue beyond the well location to the county road and a metal gate/cattle guard will be installed, per landowner request.
HANSEN FED 21-2	NENW	2	54/77	Underground wellhead/infrastructure will be installed to mitigate visual impacts for US Hwy 14/16. The start of Road 21-2 was moved to come off hwy 14/16. Upgrade metal gate with lock. Access road alignment to protect headcuts along Road 21-2. Access Road 21-2 will be limited to a working area of 35' with a blading/clearing width of 20' from station 5+00 to the end of template C at the intersection of well location 21-2. Expedient stabilization measures will be required along the road segment specified above. Stock tank requested by landowner.
HANSEN FED 12-2	SWNW	2	54/77	Original pad design dropped. The new design will better incorporate access Road C coming from the NE.

Well ID	Aliquot	Section	T/R	Notes
HANSEN FED 23-2	NESW	2	54/77	Well location dropped due to 1) sizeable surface disturbance associated with the proposed [engineered] access road and pad location; 2) highly erosive soils vulnerable to degradation along the engineered access road; and, 3) slopes in excess of 25% in areas surrounding the well location.
SURANYI FED 42-2	SENE	2	54/77	Well location moved approx. 611ft NW due to newly-identified raptor nest. Underground wellhead/infrastructure will be installed to mitigate visual impacts for US Hwy 14/16. Access Road 42-2 will be limited to a working area of 35' with a blading/clearing width of 20'. Additional interim reclamation efforts will be required to ensure site stabilization and revegetation to mitigate visual impacts.
SURANYI FED 34-2	SWSE	2	54/77	Low Water Crossing required along access Road 34-2 (drainage between stations 0+00 and 5+00). The reserve pits will require an impermeable liner. Silt fences will be required around the location's S/SW perimeter to minimize surface run-off.
WALSH FED 32-25	SWNE	25	54/77	The engineered drainage crossing will require additional interim reclamation efforts to ensure site stabilization and revegetation, as well as to reduce topsoil loss, and minimize the growth of noxious weeds.
TIETJEN FED 12-30	SWNW	30	54/77	Well location dropped due to 1) sizeable surface disturbance associated with the proposed [engineered] access road and pad location; 2) highly erosive soils vulnerable to degradation along the engineered access road; and, 3) slopes in excess of 25%.
TIETJEN FED 21-30	NENW	30	54/77	Well location dropped due to 1) sizeable surface disturbance associated with the proposed [engineered] access road and pad location; 2) highly erosive soils vulnerable to degradation along the engineered access road; and, 3) slopes in excess of 25%.
TIETJEN FED 32-30	SWNE	30	54/77	Well location dropped due to 1) sizeable surface disturbance associated with the proposed [engineered] access road and pad location; 2) highly erosive soils vulnerable to degradation along the engineered access road; and, 3) slopes in excess of 25%.

Well ID	Aliquot	Section	T/R	Notes
TIETJEN FED 14-30	SWSW	30	54/77	Silt fences will be required around the location's perimeter to minimize surface run-off. Expedient soil stabilization measures will be required along the engineered access Road A-2, Road 14-30, and the constructed well pad. To minimize surface disturbance, the operator will incorporate the utility corridor within the roadway disturbance for some segments of engineered access Road A-2.
TIETJEN FED 23-30	NESW	30	54/77	Silt fences will be required around the location's perimeter to minimize surface run-off. Expedient soil stabilization measures will be required along the engineered access Road A-2, and the constructed well pad. To minimize surface disturbance, the operator will incorporate the utility corridor within the roadway disturbance for some segments of engineered access Road A-2. End Road A-2 at well 23-30. See engineering notes below concerning additional engineering requirements and/or observations. Stock tank requested by landowner.
TIETJEN FED 34-30	SWSE	30	54/77	Silt fences will be required around the location's perimeter to minimize surface run-off. Expedient soil stabilization measures will be required for the entire length of Road 34-30. Stock tank requested by landowner.
TIETJEN 43-30	NESE	30	54/77	Engineered Road A-1 was changed to a utility corridor with a road by template "D" (crowned 2-track; gravel as needed). Daily traffic on Road/Utility Corridor A-1 will be limited to rancher access and maintenance light truck use only. Signs will be posted at each end of the corridor. Additional interim reclamation efforts will be required on Road/Utility corridor A-1 to ensure site stabilization and revegetation, as well as to reduce topsoil loss, and minimize the growth of noxious weeds.
TIETJEN 14-29	SWSW	29	54/77	Stock tank requested by landowner.
TIETJEN 41-30	NENE	30	54/77	Silt fences will be required around the location's perimeter to minimize surface run-off. The reserve pits will require an impermeable liner.
TIETJEN 21-29	NENW	29	54/77	Constructed pad design will not exceed an area of 150' x 150'.
TIETJEN 12-28	SWNW	28	54/77	Well location moved approx. 288ft NE from the original well site. The well location is situated on a flat grassy area and out of the 1/4 mile buffer for the newly located raptor nest. Constructed pad design will not exceed an area of 150' x 150'.

Well ID	Aliquot	Section	T/R	Notes
TIETJEN 41-29	NENE	29	54/77	Constructed pad design will not exceed an area of 150' x 150'.
TIETJEN 21-28	NENW	28	54/77	Constructed pad design will not exceed an area of 150' x 150'.
TIETJEN 32-28	SWNE	28	54/77	Constructed pad design will not exceed an area of 150' x 150'.
TIETJEN 41-28	NENE	28	54/77	Constructed pad design. Silt fences will be required around the location's perimeter to minimize surface run-off.
TIETJEN 12-27	SWNW	27	54/77	Constructed pad design will not exceed an area of 150' x 150'. Proposed cattle guard was moved to allow a wider turning radius on location.
TIETJEN 32-29	SWNE	29	54/77	Well location moved approx. 796ft SW due to a newly-identified raptor nest. The new location is situated upslope from the original well site, within a small basin; adjacent to the proposed impoundment #005. Road A segment 77+53 - 98+20 dropped. The new access road will follow an existing 2-track SW from the original location. The access road will require spot upgrades and a small section of engineering. Access road continues to well location 23-29.

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 siting 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.

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

2.3.2.3. Soils

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

2.3.2.4. Wildlife

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

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

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

4. 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.

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

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

2.3.2.5. Threatened, Endangered, or Sensitive Species

2.3.2.5.1. Bald Eagle

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

2.3.2.5.2. Black-footed Ferret

1. Prairie dog colonies will be avoided wherever possible.

2.3.2.5.3. Mountain Plover

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

2. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ½ mile of occupied mountain plover nesting habitat.

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

4. 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.

5. 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.

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

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

2.3.2.5.4. Ute Ladies'-tresses Orchid

1. Suitable habitat will be avoided wherever possible.

2. If suitable habitat for Ute ladies'-tresses cannot be avoided, surveys will be conducted in compliance with USFWS standards (USFWS 1995) by a BLM approved biologist or botanist. Surveys can only be conducted between July 20 and August 31.

3. 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.

4. Companies operating in areas identified with weed infestations or suitable Ute ladies'- tresses orchid habitat will be required to submit an integrated pest management plan prior to APD approval. Mitigation will be determined on a site-specific basis and may include such measures as spraying herbicides prior to entering areas and washing vehicles before leaving infested areas. Infestation areas of noxious weeds have been identified through the county Weed and Pest Districts and are available at the Buffalo BLM office.

2.3.2.6. 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.

2.3.2.7. 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.

2.3.2.8. Air Quality

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

2.3.3. Site specific mitigation measures

General

1. All changes made at the onsite will be followed. They have all been incorporated into the operator's POD. Please refer to Table 2.3.1 "Changes as a result of the onsite" on pages 7-11 of EA# WY-070-07-202, and/or the Post-Onsite Deficiency Letter dated 08/03/2007.

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

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. Medallion's access road for Cottonwood POD, which crosses BLM in Sec. 32, requires a BLM ROW grant.

4. All Lance Oil & Gas / Anadarko Petroleum representatives and contractors will have a copy of the approved POD map and conditions of approval with them at all times while conducting activities within the Tincom Butte North POD project area.

5. Onshore Order #1, as revised effective 05-07-07, requires that all operators certify to the Field Office in writing that they have supplied a copy of the Surface Use Plan to each of the private surface owners affected by the project. This self-certification must be received by the Buffalo Field Office before construction on the project begins.

6. Please contact Julian Serafin – Natural Resource Specialist, @ (307) 684-1043, Bureau of Land Management, Buffalo, if there are any questions concerning surface use COAs.

Surface Use

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

2. Interim Reclamation of disturbed areas will adhere to the following guidance (as per the Wyoming Policy on Reclamation (IM WY-90-231):

A. The reclaimed area shall be stable and exhibit none of the following characteristics:
   i. Large rills or gullies.
   ii. Perceptible soil movement or head cutting in drainages.
   iii. 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:
   i. Successful onsite establishment of species included in the planting mixture or other desirable species.
   ii. 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.

3. All topsoil removed during construction activities will be respread for interim reclamation success.

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 year's 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:

Ecological Site	**Wells and infrastructure (including access roads)**
Shallow Loamy	12-2, 34-2, 21-11, 41-10, 12-11, 12-27, 41-28, 32-29, 34-30, 23-30, 14-30
Loamy	14-1, 14-2, 21-2, 32-2, 42-2, 43-2, 43-10, 14-11, 23-11, 32-25, 12-28, 21-28, 32-28, 12-29, 14-29, 21-29, 23-29, 41-29, 41-30, 43-30

Loamy Ecological Sites:

Species	**% in Mix**	**Lbs PLS***
Western Wheatgrass (Pascopyrum smithii)/or ***Thickspike Wheatgrass*** (Elymus lanceolatus ssp. lanceolatus)	35	4.2
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	15	2.1
Green needlegrass (Nassella viridula)	25	3.0
Rocky Mountain beeplant (Cleome serrulata) /or ***American vetch*** (Vicia americana)	10	1.4
White or purple prairie clover (Dalea candidum, purpureum)	5	0.3
Scarlet Globemallow (Sphaeralcea coccinea) / or ***Blue flax*** (Linum lewisii)	5	0.4

Species	% in Mix	Lbs PLS*
Prairie coneflower (Ratibida columnifera)	5	0.8
Totals	**100%**	**12.2 lbs/acre**

Shallow Loamy Ecological Sites:

Species	% in Mix	Lbs PLS*
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	50	6.0
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	35	4.2
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata) /or ***American vetch***(Vicia americana)	5	0.6
Totals	**100%**	**12 lbs/acre**

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

5. The disturbance areas identified below have limited reclamation potential that shall be stabilized in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be completed within 30 days of the initiation of construction activities. Stabilization efforts may include mulching, matting, soil amendments, etc.
   - Wells: 12-2, 14-2, P21-2, 21-2, 42-2, 41-10, 14-30, 23-30, and 34-30
   - Road/Pipeline section(s):
     - Road "E" – engineered segment from PCULV 12-11 to the intersection with well 41-10
     - Access Road 21-2
     - Access Road 42-2
     - Access Road 32-25 – engineered drainage crossing
     - Engineered Access Road A-2 (servicing wells 14-30 and 23-30)
     - Access road 34-30
     - Road "G"– from the intersection with Road 43-30 to the intersection with Road "A"

6. "Roughed-in" or "Pioneer" roads shall be constructed according to the line and grade shown in the approved engineering design. Non-engineered roads shall be constructed to a line and grade established to meet the BLM Gold Book and 9113 guidelines as approved in the MSUP, and shaped according to an approved design template for that road. Loop roads and all primary corridors servicing more than four wells shall be surfaced prior to placing these roads into service.

7. Adequate drainage control must be in place at all stages of construction and culverts installed as soon as feasible.

8. Pipeline corridor disturbance shall not exceed the approved disturbance width for road construction.

9. Final grading and surfacing shall occur immediately after utility installation is complete. All rills, gullies, and other surface defects shall be ripped to the full depth of erosion across the entire width of the roadway prior to final grading and surfacing.

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

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

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

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

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

14. Proposed access roads by Template "C" (crowned all weather) with utility corridor in level ground will be allowed a maximum working width of 45ft with a blading/clearing width not to exceed 35ft.

15. Proposed access roads by Template "C" (crowned all weather) with utility corridor in areas with "side slopes" (please refer to page 6, Figure 2 of the Master Surface Use Plan) will be allowed an average working width of 50ft with a blading/clearing width not to exceed 35ft.

16. Proposed access roads by Template "D" (crowned two-track) with utility corridor in sloped areas will be allowed an average working width of 50ft with a blading/clearing width not to exceed 35ft.

17. To minimize the impacts on visual resources Access Road 21-2 will be allowed a maximum working width of 45ft with a blading/clearing width not to exceed 25ft, from station 5+00 to the end of template C at the intersection of well location 21-2.

18. To minimize the impacts on visual resources Access Road 42-2 will be allowed a maximum working width of 45ft with a blading/clearing width not to exceed 25ft.

19. Pipeline installation and/or corridors without road access will not exceed a disturbance width of 35ft.

20. "Light Trucks Only" signs will be posted on Road "G" at the intersections with Road 43-30 and Road "A".

21. The operator will maintain well drilling, completion and associated construction operations within a 150 foot by 150 foot work area at the following well locations: 43-10, 23-11, 14-2, 43-2, 14-1, 21-29, 12-28, 41-29, 21-28, 32-28, and 12-27.

22. To mitigate the impacts on visual resources partial burial of the well head is required at well locations 42-2 and 21-2.

23. Reserve pits will be lined at the following locations: 43-10, 12-11, 14-1, 34-2, and 41-30.

24. All stock water tanks installed on BLM surface will be installed with a rock apron of 4 inch aggregate surrounding the tank and extending a minimum of 8 feet out from the tank.

Cultural

1. All earth moving activity in the following areas will be monitored by an archeologist who meets or exceeds the qualification standards recommended by the Secretary of the Interior. The Bureau has identified these areas as containing the potential for buried cultural deposits (areas containing deep alluvial deposits).
    a. All earth moving activities along Road "C" between stations 90+00 and 95+00 within the vicinity of the eligible site 48SH1573 in T54R77 Section 2 that pertain to the utility corridor. All utility corridor construction will be constructed on the **east side** of the existing two-track in this vicinity. The determination of the exact monitoring areas is based on the discretion of the archeological monitor. The archeologist shall notify the BLM, Buffalo Field Office of date they intend to inspect the aforementioned areas no less than three days in advance. The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of work.

2. In the event previously unidentified archaeological materials are identified within the project area the standard COAs apply for documentation of archaeological deposits.

Wildlife

1. The following conditions will minimize impacts to bald eagles:
    a. No surface disturbing activity shall occur within one mile of bald eagle habitat (Wild Horse Creek and the Powder River) 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
54/77	2	**Wells: Hansen Fed 12-2-5477, 14-2-5477, 21-2-5477 and 32-2-5477; Suranyi Fed 34-25477, 42-2-5477, and 43-2-5477** **Impoundments: P21-2-5477 and P41-11-5477** **ALL** project related activities within this **ENTIRE** section.
54/77	10	**Wells: Hayes Fed 42-10-5477 and 43-10-5477** **Impoundments: P42-10-5477** **ALL** project related activities within this **ENTIRE** section.
54/77	11	**Wells: Suranyi Ranch Fed 12-11-5477, 14-11-5477, 21-11-5477, and 23-11-5477** **Impoundments: P14-11-5477 and P41-11-5477** **ALL** project related activities within this **ENTIRE** section.
54/77	25	**Well: Walsh Fed 32-25-5477** **ALL** project related activities within this **ENTIRE** section.
54/77	27	**Well: Tietjen Fed 12-27-5477** **ALL** project related activities within this **ENTIRE** section.
54/77	28	**Wells: Tietjen Fed 21-28-5477, 32-28-5477, and 41-28-5477** **ALL** project related activities within this **ENTIRE** section, except the SWNW ¼ ¼ and the SW ¼ of this 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.

2. The following conditions will minimize 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 wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
54/77	**2**	**Wells: Hansen Fed 12-2-5477 and 14-2-5477; Suranyi Ranch Fed 42-2-5477 and 43-2-5477** **ALL** project related activities within the **SWNW, NENE, SENE, and NESE ¼ 1/4s** of this section.
54/77	**12**	**ALL** project related activities within this **ENTIRE** section.
54/77	**25**	**Well: Walsh Fed 32-25-5477** **ALL** project related activities within this **ENTIRE** section.
54/77	**28**	**Well: Tietjen Fed 12-28-5477** **ALL** project related activities within the **NWNW, SWNW, and NWSW ¼ ¼s** of this section.
54/77	**29**	**Wells: Tietjen Fed 12-29-5477, 21-29-5477, 23-29-5477, and 32-29-5477** **Impoundments: OK 6 Reservoir, Pit 22-29-5477, and OK Pit1-5477** **ALL** project related activities within this **ENTIRE** section, except the **NWSW ¼ ¼** of this section.
54/77	**30**	**Well: Tietjen Fed 41-30-5477 and its directly associated access/pipeline corridor.**
54/77	**31**	**ALL** project related activities within the N**E ¼** of this section.
54/77	**32**	**ALL** project related activities within this **ENTIRE** section.
54/77	**33**	**ALL** project related activities within the **west ½** of this 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 Tincom Butte North 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#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	CONDITION (2007)
2342	Unknown	413829E 4944996N	NWSE Sec. 14 T54N,R77W	Good
2343	American kestrel	414878E 4943040N	SESW Sec. 24 T54N, R77W	Unknown
2777	Long-eared owl	407563E 4941519N	SESE Sec. 30 T54N, R77W	Gone
2779	Long-eared owl	407712E 4940751N	SENE Sec. 30 T54N, R77W	Poor
2780	Great-horned owl	408825E 4941198N	NWNE Sec. 32 T54N, R77W	Poor
2786	Great-horned owl	414016E 4940940N	NENE Sec. 35 T54N, R77W	Poor
2343	Great-horned owl	414855E 4943046N	SESW Sec. 24 T54N, R77W	Good
4251	Great-horned owl	414290E 4941699N	SWSW Sec. 25 T54N, R77W	Good
4252	Unknown	415043E 4946992N	SENW Sec. 12 T54N, R77W	Good
4253	Red-tailed hawk	410803E 4945924N	NENE Sec. 16 T54N, R77W	Excellent
4254	Great-horned owl	408217E 4943653N	NESW Sec. 20 T54N, R77W	Good
4255	Great-horned owl	409451E 4940739N	SWNW Sec. 33 T54N, R77W	Good
4256	Red-tailed hawk	408167E 4942989N	SWSW Sec. 20 T54N, R77W	Good
4257	Unknown	407667E 4943730N	NESE Sec. 19 T54N, R77W	Fair
None	Great-horned owl	408747E 4940986N	NESE Sec. 32 T54N, R77W	Good
4259	Great-horned owl	408203E 4943745N	SENW Sec. 20 T54N, R77W	Unknown
4260	Unknown	415022E 4945880N	NENW Sec. 13 T54N, R77W	Good
4261	Red-tailed hawk	414175E 4942397N	SENE Sec. 26 T54N, R77W	Unknown
4262	Red-tailed hawk	412555E 4948317N	NESE Sec. 3 T54N, R77W	Good
None	Red-tailed hawk	411932E 4949619N	SWSE Sec. 34 T54N, R77W	Unknown
None	Unknown	411882E 4949281N	NWNE Sec. 3 T54N, R77W	Unknown
4265	Unknown	412113E 4948980N	SWNE Sec. 3 T54N, R77W	Good
4266	Great-horned owl	412337E 4949132N	NENE Sec. 3 T54N, R77W	Gone
4267	Red-tailed hawk	412190E 4942821N	NWNE Sec. 27 T54N, R77W	Unknown
4268	Unknown	410243E 4946390N	SESW Sec. 9 T54N, R77W	Unknown

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	CONDITION (2007)
1308	Unknown	408189E 4942993N	SWSW Sec. 20 T54N, R77W	Fair
1330	Unknown	411895E 4942706N	NWNE Sec. 27 T54N, R77W	Unknown
556	Red-tailed hawk	410297E 4946789N	NWSE Sec. 9 T54N, R77W	Good
579	Unknown	411932E 4949619N	SWSE Sec. 34 T54N, R77W	Good
581	Golden eagle	412113E 4945475N	SWNE Sec. 15 T54N, R77W	Good
597	Red-tailed hawk	414028E 4940898N	SENE Sec. 35 T54N, R77W	Good
599	Unknown	414479E 4948784N	SWNW Sec. 1 T54N, R77W	Unknown
600	Unknown	414534E 4948799N	SWNW Sec. 15 T54N, R77W	Unknown
None	Unknown	412303E 4947307N	NENE Sec. 10 T54N, R77W	Unknown
None	Unknown	409785E 4941230N	SWSW Sec. 28 T54N, R77W	Unknown
None	Unknown	409732E 4941095N	NWNW Sec. 32 T54N, R77W	Good
None	Red-tailed hawk	408879E 4941184N	NWNE Sec. 32 T54N, R77W	Good
None	Red-tailed hawk	407674E 4943703N	NESE Sec. 9 T54N, R77W	Fair
None	Red-tailed hawk	408987E 4942467N	SWNE Sec. 29 T54N, R77W	Good
None	Prairie falcon	407929E 4940817N	SWNW Sec. 32 T54N, R77W	Good

3. No surface disturbing activities are permitted in suitable prairie dog colonies, from March 15-July 31, until a mountain plover nesting survey has been conducted for the current breeding season. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
54/77	**28**	Well: Tietjen Fed 12-28-5477 and its associated access / pipeline corridor to Pit 22—29-5477
54/77	**29**	Well: Tietjen Fed 41-29-5477 and its associated access / pipeline corridor.

   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.

4. The following conditions will minimize the 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 surface disturbing activities and results shall be submitted to a BLM biologist. The required sage-grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
   b. If an active 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.

5. The following conditions will minimize impacts to sharp-tail-grouse:
   a. A survey is required for sharp-tailed grouse between April 1 and May 7, annually, within the project area for the duration of surface-disturbing activities and results shall be submitted to a BLM biologist.
   b. If an active lek is identified during the survey, the 0.64 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. The required sharp-tailed grouse survey will be conducted by a biologist following WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
   c. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 0.5 mile buffer until the following breeding season (April 1).
   d. Creation of raptor hunting perches will be avoided within 0.64 miles of documented sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on grouse.

2.4. Alternatives considered but not analyzed in detail

Direct Discharge

Direct discharge to tributaries is not feasible as the sole 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.

Total Containment

Total containment within existing and proposed reservoirs was assessed and quickly discounted due to potential high water volumes. Landowner concerns coupled with the large number of new reservoirs required under this alternative resulted in poor economics and high surface disturbance that led to the analysis of other alternatives.

Re-injection

Re-injection of produced water within the Tincom Butte North 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 Tincom Butte North 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 Tincom Butte North POD.

Land Application
Land application of produced water within the Tincom Butte North 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. Due to the high construction and operating costs and lack of landowner interest, land application was ruled out.

Treatment of Produced Water
Treatment of produced water from the Tincom Butte North POD with subsequent discharge into the OK Creek has been extensively researched to examine the full range of possibilities. The following potential treatment technologies were considered: 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. Given the short growing season in the OK Creek, substantial reservoir storage would still be needed. 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 01/16/2007. Field inspections of the proposed Tincom Butte North CBNG project were conducted on 07/02/2007, 07/03/2007, and 07/11/2007. The following individuals participated:

NAME	TITLE	AGENCY
Diane Adams	GIS Specialist/VRM Coordinator	Bureau of Land Management
Brandon Austen	GIS/GPS Technician	Knight Technologies, Inc.
Randy Clabaugh	Surface Owner Representative	Jack Hayes Living Trust
Nick Dyke	Engineer	WWC Engineering
Guymen Easdale	Wildlife Biologist	Bureau of Land Management
Shane Gasvoda	Water Management Specialist	Lance Oil & Gas / Anadarko Petroleum
Darrel Gentry	Construction Supervisor	Lance Oil & Gas / Anadarko Petroleum
Leigh Grench	Archeologist	Bureau of Land Management
Gary Hansen	Surface Owner	Surface Owner
Jack Hayes	Surface Owner	Jack Hayes Living Trust
Tammi Hitt	Regulatory Analyst	Lance Oil & Gas / Anadarko Petroleum
Arnie Irwin	Soil Scientist	Bureau of Land Management
Ethan Jahnke	Federal Permitting Coordinator	Lance Oil & Gas / Anadarko Petroleum
Joy Kennedy	Permitting Coordinator	Lance Oil & Gas / Anadarko Petroleum
Sara King	Geologist / Engineer	Knight Technologies, Inc.
Craig Klaahsen	Pipeline Foreman	Lance Oil & Gas / Anadarko Petroleum

NAME	TITLE	AGENCY
Riley Malli	Surface Owner Representative	John Walsh Ranch
Mike McKinley	Hydrologist	Bureau of Land Management
Ray Moores	Engineer	WWC Engineering
Chris Perry	Civil Engineer	Bureau of Land Management
Colt Rodeman	Drilling Supervisor	Lance Oil & Gas / Anadarko Petroleum
Brad Rogers	Wildlife Biologist	US Fish & Wildlife Service
Monte Sandvick	Landman	Independent Landman
Julian Serafin	Natural Resource Specialist	Bureau of Land Management
William Suranyi	Surface Owner	Suranyi Ranch, Inc.
Sheri Tietjen	Surface Owner	Sheri D. Tietjen Revocable Trust

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

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

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

3.1. Topographic Characteristics of Project Area

The Tincom Butte North POD is located in southeastern Sheridan County within T54N R77W in sections 1, 2, 10, 11, 25, 27, 28, 29, and 30. This project is divided into three development areas, all within three miles of Arvada, Wyoming. Two sections of the POD are located on the east side of the Powder River and one is located on the west side of the river, within the OK Creek drainage. The northern project area (sections 1, 2, 10, and 11) consists of broken terraces and uplands with deep down cut ephemeral drainages that lead to the Powder River. Highway 14-16 borders this area of development on the north, while the Powder River flows along the western portion of the POD. The southern portion of the project area on the east side of the Powder River consists of one well, which ties onto LOG's existing approved Tincom Butte POD. This small project area (sections 24 and 25) also consists of uplands and broken terraces with numerous rough draws sloping down to flatter terrain along the Powder River. The southwestern development area (sections 27, 28, 29, and 30) consists of steep ridges and draws with a gradual, relatively flat terrace along OK Creek. The entire area drains into OK Creek and the North Prong

of Cottonwood Creek, both of which are ephemeral tributaries to Powder River (approx. 1.5 miles to the east). Elevations within the POD range from 3,894 to 4,394 feet above sea level. The climate is semi-arid, averaging 12-14 inches of precipitation annually, with more than half occurring between April and June. Both Federal and Fee CBNG development exists within the proposed Tincom Butte North POD. This, in conjunction with livestock grazing, are the major land uses within the general area.

3.2. Vegetation & Soils

General vegetation communities within the project area consist of short-grass prairie grassland, fragmented sagebrush steppe, and ephemeral stream bottomlands. Wyoming Big Sagebrush (*Artemisia tridentata wyomingensis*) intermixed with various native bunch grasses dominates the vegetative composition of the POD. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grasses, and miscellaneous forbs. Common grasses noted during the onsite inspection included western wheatgrass, prairie junegrass, Sandberg's bluegrass, thickspike wheatgrass, bluebunch wheatgrass, and needleandthread. Great Plains yucca, broom snakeweed, prickly pear, and rubber rabbitbrush are found interspersed throughout the general area. Cheatgrass is dense and tall in most areas, particularly along slopes and flat terrain. Differences in dominant species within the project area vary with soil type, aspect and topography.

Soils within the project area were identified from the *Sheridan County Survey Area, Wyoming (WY633).* The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

Map units representing 2.5% or greater for soils within this project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

Table 3.2 – Soil Map Unit Types

Map Unit	Map Unit Name	Acres	Percent
268	SHINGLE-THEEDLE-KISHONA ASSOCIATION, 6 TO 25 PERCENT SLOPES	1210	21.0%
260	SHINGLE-ROCK OUTCROP COMPLEX, 30 TO 50 PERCENT SLOPES	1162	20.1%
114	BIDMAN-ULM, DRY, COMPLEX 0 TO 6 PERCENT SLOPES	754	13.1%
255	SHINGLE-HAVERDAD ASSOCIATION, 0 TO 80 PERCENT SLOPES	475	8.2%
317	ZIGWEID-KISHONA-CAMBRIA COMPLEX, 6 TO 15 PERCENT SLOPES	259	4.5%
166	HILAND-DECOLNEY COMPLEX, 3 TO 15 PERCENT SLOPES	202	3.5%
127	CUSHMAN-FORKWOOD ASSOCIATION, 3 TO 15 PERCENT SLOPES	152	2.6%
144	FORKWOOD LOAM, 6 TO 9 PERCENT SLOPES	146	2.5%

For more detailed soil information, see the NRCS Soil Survey 633 – Sheridan County. Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 3.2.1.

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

The soils and landforms in the Tincom Butte North POD present distinct challenges for reclamation. Approximately 35 percent of the area within the boundary of the proposed action has soil map units identified as having a low reclamation potential. The main soil limitations in the project area include:

depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high erosion potential especially in areas of steep slopes. Areas with limited reclamation capability and/or highly erosive soils have been identified by BLM specialists and the operator during the pre-approval onsite inspection.

3.2.1. Dominant Ecological Sites and Plant Communities by dominant soil series

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

Table 3.2.1 – Map Units and Ecological Sites

Map Unit	Ecological Site
268	Loamy 10-14" Northern Plains
260	SHALLOW LOAMY (10-14 NP)
114	Loamy 10-14" Northern Plains
255	SHALLOW LOAMY (10-14 NP)
317	Loamy 10-14" Northern Plains
166	SANDY (10-14 NP)
127	Loamy 10-14" Northern Plains
144	Loamy 10-14" Northern Plains

Dominant Ecological Sites and Plant Communities identified in this POD:

Loamy Sites: This site occurs on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10-14 inch precipitation zone. The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability.

The Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this site would be a Rhizomatous Wheatgrasses, Needleandthread, Blue Grama Plant Community. This plant community evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants.

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

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

Shallow Loamy: This site occurs on steep slopes and ridge tops, but may occur on all slopes, on landforms which include hill sides, ridges and escarpments in the 10-14 inch precipitation zone. The soils

of this site are shallow (less than 20”to bedrock) well-drained soils formed in alluvium over residuum or residuum derived from sandstone and shale. These soils have moderate permeability and may occur on all slopes. The bedrock may be any kind which is virtually impenetrable to plant roots, except igneous. The main soil limitations include the depth to bedrock.

The HCPC for this site would be a Rhizomatous Wheatgrasses, Needleandthread, Blue Grama plant Community. The present plant community is *Mixed Sagebrush/Grass*. Compared to the HCPC, big sagebrush and blue grama have increased. Bluebunch wheatgrass has decreased, often occurring only where protected from grazing by sagebrush canopy. Production of cool-season grasses has also been reduced. Cheatgrass has invaded with western wheatgrass, and thickspike wheatgrass maintaining a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. Plant diversity is low.

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

Summary of Ecological Sites

Ecological site	Acres	Percent
Loamy 10-14" Northern Plains	3090	54%
SHALLOW LOAMY (10-14 NP)	1818	32%
Clayey 10-14" Northern Plains	415	7%
SANDY (10-14 NP)	361	6%
LOWLAND (10-14 NP)	70	1%
WATER	17	0%

3.2.2. Invasive Species

The Sheridan County Weed and Pest Control District has identified several state-listed noxious weeds that are known to occur within the general area of the Tincom Butte North POD. Specific species of concern include leafy spurge (*Euphorbia esula*), salt cedar (*Tamarix ramosissima*), Canada thistle (*Cirsium arvens*), cocklebur (*Xanthium strumarium*), and buffalo bur (*Solanum rostratum*). The operator has also identified Russian knapweed (*Centaurea repens L.*), Scotch thistle (*Onopordum acanthium L.*), and whitetop (*Cardaria draba*) infestations throughout the project area.

The state-listed noxious weeds are listed in PRB FEIS Table 3-21 (p. 3-104) and the Weed Species of Concern are listed in Table 3-22 (p. 3-105.

3.3. 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 (BHEC) (2006 and 2007). BHEC performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006 and 2007. Surveys were conducted for Ute ladies’-tresses orchid were neither conducted nor required.

A BLM biologist conducted field visits on July 2 and 3, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the Tincom Butte North project area include pronghorn antelope, mule deer, and white-tailed deer. The WGFD has determined that the project area contains Yearlong range for pronghorn antelope, Yearlong and Winter–Yearlong range for mule deer and Yearlong range white-tailed deer.

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

Pronghorn antelope within the project area belong to the Ucross herd unit west of the Powder River and the Gillette herd unit east of the Powder River. The 2006 estimated Ucross herd population was 8654 with a population objective of 2500. The 2006 estimated Gillette herd unit population was 18,600 with a population objective of 11,000. Mule deer within the project area belong to the Powder River herd unit. The 2006 estimated herd population was 52,716 with a population objective of 52,000. White-tailed deer within the project area belong to the Powder River herd unit. The 2006 estimated herd population was 10,655 with a population objective of 8000. Populations of pronghorn antelope, mule deer, and white-tailed deer within their respective hunt areas are above WGFD objectives. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of the Powder River and Wild Horse Creek. No springs were observed within the project area. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

3.3.3. Migratory Birds

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

3.3.4. Raptors

Forty raptor nest sites were identified by BHEC (2006 and 2007) and BLM within 0.5 mile of the project area, of these seventeen nests were active in 2006 and sixteen were active in 2007 (Table 4).

Table 4. Documented raptor nests within the Tincom Butte North project area in 2006 and 2007.

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION (2007)	STATUS IN 2006	STATUS IN 2007
2342	Unknown	413829E 4944996N	NWSE Sec. 14 T54N,R77W	Cottonwood, live	Good	Inactive	Not located
2343	American kestrel	414878E 4943040N	SESW Sec. 24 T54N, R77W	Cottonwood, live	Unknown	Active	Active
2777	Long-eared owl	407563E 4941519N	SESE Sec. 30 T54N, R77W	Juniper, live	Gone	Gone	Gone
2779	Long-eared owl	407712E 4940751N	SENE Sec. 30 T54N, R77W	Juniper, live	Poor	Active	Inactive
2780	Great-horned owl	408825E 4941198N	NWNE Sec. 32 T54N, R77W	Rock cavity	Poor	Active	Inactive
2786	Great-horned owl	414016E 4940940N	NENE Sec. 35 T54N, R77W	Cottonwood, live	Poor	Active – Red-tailed hawk	Active
2343	Great-horned owl	414855E 4943046N	SESW Sec. 24 T54N, R77W	Cottonwood, live	Good	Active	Active
4251	Great-horned owl	414290E 4941699N	SWSW Sec. 25 T54N, R77W	Cottonwood, live	Good	Active	Inactive
4252	Unknown	415043E 4946992N	SENW Sec. 12 T54N, R77W	Cottonwood, live	Good	Active	Active
4253	Red-tailed hawk	410803E 4945924N	NENE Sec. 16 T54N, R77W	Cottonwood, live	Excellent	Inactive	Active
4254	Great-horned owl	408217E 4943653N	NESW Sec. 20 T54N, R77W	Cottonwood, live	Good	Active – Red-tailed hawk	Active
4255	Great-horned owl	409451E 4940739N	SWNW Sec. 33 T54N, R77W	Cliff	Good	Active	Active
4256	Red-tailed hawk	408167E 4942989N	SWSW Sec. 20 T54N, R77W	Cottonwood, live	Good	Active	Not located
4257	Unknown	407667E 4943730N	NESE Sec. 19 T54N, R77W	Cottonwood, live	Fair	Inactive	Inactive
None	Great-horned owl	408747E 4940986N	NESE Sec. 32 T54N, R77W	Cottonwood, live	Good	Active	Active
4259	Great-horned owl	408203E 4943745N	SENW Sec. 20 T54N, R77W	Cottonwood, live	Unknown	Active	Not located
4260	Unknown	415022E 4945880N	NENW Sec. 13 T54N, R77W	Cottonwood, live	Good	Inactive	Inactive

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION (2007)	STATUS IN 2006	STATUS IN 2007
4261	Red-tailed hawk	414175E 4942397N	SENE Sec. 26 T54N, R77W	Cottonwood, live	Unknown	Active	Not located
4262	Red-tailed hawk	412555E 4948317N	NESE Sec. 3 T54N, R77W	Cottonwood, live	Good	Active	Active
None	Red-tailed hawk	411932E 4949619N	SWSE Sec. 34 T54N, R77W	Cottonwood, live	Unknown	Active	Not located
None	Unknown	411882E 4949281N	NWNE Sec. 3 T54N, R77W	Cottonwood, live	Unknown	Inactive	Not located
4265	Unknown	412113E 4948980N	SWNE Sec. 3 T54N, R77W	Cottonwood, live	Good	Inactive	Inactive
4266	Great-horned owl	412337E 4949132N	NENE Sec. 3 T54N, R77W	Cliff	Gone	Active	Gone
4267	Red-tailed hawk	412190E 4942821N	NWNE Sec. 27 T54N, R77W	Cottonwood, live	Unknown	Active	Not located
4268	Unknown	410243E 4946390N	SESW Sec. 9 T54N, R77W	Cottonwood, live	Unknown	Unknown – no access	Unknown – no access
1308	Unknown	408189E 4942993N	SWSW Sec. 20 T54N, R77W	Cottonwood, live	Fair	Unknown	Inactive
1330	Unknown	411895E 4942706N	NWNE Sec. 27 T54N, R77W	Cottonwood, live	Unknown	Unknown – no access	Unknown – no access
556	Red-tailed hawk	410297E 4946789N	NWSE Sec. 9 T54N, R77W	Cottonwood, live	Good	Unknown	Active
579	Unknown	411932E 4949619N	SWSE Sec. 34 T54N, R77W	Cottonwood, live	Good	Unknown	Inactive
581	Golden eagle	412113E 4945475N	SWNE Sec. 15 T54N, R77W	Cottonwood, live	Good	Unknown	Active
597	Red-tailed hawk	414028E 4940898N	SENE Sec. 35 T54N, R77W	Cottonwood, live	Good	Unknown	Active
599	Unknown	414479E 4948784N	SWNW Sec. 1 T54N, R77W	Cottonwood, live	Unknown	Unknown	Inactive
600	Unknown	414534E 4948799N	SWNW Sec. 15 T54N, R77W	Cottonwood, live	Unknown	Unknown	Inactive
None	Unknown	412303E 4947307N	NENE Sec. 10 T54N, R77W	Cliff	Unknown	New in 2007	Inactive
None	Unknown	409785E 4941230N	SWSW Sec. 28 T54N, R77W	Cliff	Unknown	New in 2007	Inactive
None	Unknown	409732E	NWNW Sec. 32	Juniper, live	Good	New in 2007	Inactive

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION (2007)	STATUS IN 2006	STATUS IN 2007
		4941095N	T54N, R77W				
None	Red-tailed hawk	408879E 4941184N	NWNE Sec. 32 T54N, R77W	Cottonwood, live	Good	New in 2007	Active
None	Red-tailed hawk	407674E 4943703N	NESE Sec. 9 T54N, R77W	Cottonwood, live	Fair	New in 2007	Active
None	Red-tailed hawk	408987E 4942467N	SWNE Sec. 29 T54N, R77W	Man made structure	Good	New in 2007	Active
None	Prairie falcon	407929E 4940817N	SWNW Sec. 32 T54N, R77W	Cliff	Good	New in 2007	Active

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

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

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

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

Three black-tailed prairie dog colonies, totaling 213 acres in size were identified during site visits by BHEC within the project area. These towns are located in sections 28, 29 and 33, T54N, R77W. Several other towns are located outside of the project area, but within 1.5km of these three towns and/ or each other (See table below). The project area is located within the Arvada potential reintroduction area complex. Black-footed ferret habitat is present within and adjacent to the Tincom Butte North project area.

Prairie Dog Colonies Outside (within 1.5 km) of Tincom Butte N POD.

Location	Approximate size (acres)	Status
S S34, T54N, R77W	22	Active
SW S35, T54N, R77W	25	Active
E S3, T53N, R77W	172	Active
SW S4, S S5, SE S6, S7, S8, S9, N S10, SW S15, N and E S16, NE S17, NW S18, and NW S22, T53N, R77W	2661	Active
NENW S18, T53N, R77W	6	Active
NESW S18, T53N, R77W	6.5	Active

3.3.5.1.2. Ute's Ladies Tresses Orchid

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

northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

Ephemeral drainages of the Powder River and Wild Horse Creek are located throughout the project area. No springs were identified within the project area. No populations of Ute ladies'-tresses orchid are known within this area. The ephemeral drainages have heavy clay soils and immediately rise to upland vegetation, reducing potential for this species (Maechtle 2007). Suitable orchid habitat is not present within the Tincom Butte North project area.

3.3.5.2. Sensitive Species

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

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. Bald eagle

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

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 may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

Suitable bald eagle nesting and roosting habitat exists within the project area along the Powder River and Wild Horse Creek. Bald eagle observation were recorded in several locations within and surrounding the project area (see table below). In addition to the observations listed below, extensive bald eagle use has been documented along the Powder River and Cottonwood Creek in Sections 9, 10, 11, and 14, T53N, R77W. Reliable prey sources available within the project area include prairie dogs, lagomorphs, and fish and waterfowl associated with the Powder River.

Observation	UTMs	Legal Location	Date
1 bald eagle	410920E 4952118N	NENE Sec. 28 T55N, R77W	12/22/2005
1 bald eagle	411377E 4950350N	SWNW Sec. 34 T55N, R77W	12/22/2005
1 adult	413800E 4948700N	SWNE Sec. 2 T54N, R77W	01/13/2007
1 adult	410005E 4945881N	NENW Sec. 16 T54N, R77W	01/13/2007
1 adult	413460E 4945130N	NESW Sec. 14 T54N, R77W	01/08/2004
1 adult	413238E 4942028N	NESW Sec. 26 T54N, R77W	12/12/2006
1 adult, 1 immature	414281E 4940783N	SWNW Sec. 36 T54N, R77W	02/17/2006
1 adult	415890E 4940174N	NWSW Sec. 31 T54N, R76W	12/16/2006

3.3.5.2.2. 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.

Three black-tailed prairie dog colonies, totaling 213 acres in size were identified during site visits by BHEC within the project area. These towns are located in sections 28, 29 and 33, T54N, R77W.

3.3.5.2.3. Greater sage-grouse

Sage-grouse are listed as a sensitive species by BLM (Wyoming). In recent years, seven petitions have been submitted to the U.S. Fish and Wildlife Service (FWS) to list greater sage-grouse as Threatened or Endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was "not warranted" following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse.

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

Suitable sage-grouse habitat is present throughout the project area. Wyoming big sagebrush was observed in many areas of the project area, averaging 10 to 20 inches tall with 3-5% canopy cover. BHEC observed two male sage-grouse displaying on the edge of a prairie dog colony in Section 29, T54N, R77W on May 12, 2007. Birds were seen at this location on only one occasion and a search of the

immediate vicinity yielded no evidence that this is anything more than an incidental observation (BHEC 2007). BLM records identified one sage grouse lek within 3 miles of the Tincom Butte North POD. This lek site is identified below (Table 6).

Table 6. Sage-grouse leks surrounding the Tincom Butte North project area.

Lek Name	Legal Location	Status In (Peak Males)	Distance From Project Area
North Prong	NENE Sec. 27 T54N, R78W	2005 – 12 males 2006 – 23 males	2.0 miles

3.3.5.2.4. Mountain plover

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

Suitable mountain plover habitat is limited within the project area. Topography in the western portions of Section 6 and 7, T53N, R76W are relatively flat, but the presence of dense mixed grasses, lack of bare ground and rising slope to the east act as negative influences for nesting and foraging for mountain plover. Small areas of suitable habitat are located within the prairie dog towns in Sections 28, 29, and 33, T54N, R77W. These were also characterized by tall vegetation and relatively little flat, bare ground. BHEC surveyed these areas in 2006 and 2007. No 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
2007	155	22	Unknown	1

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 the OK Creek and North Prong Wild Horse Creek drainages of the Upper Powder River watershed. The upper reaches and main portion of the OK Creek and North Prong Wild Horse Creek drainages consist of steep, dissected terrain with slopes at times exceeding 45%. The mainstem and most tributaries possess a sinuous, well-vegetated channel bottom with a defined low flow channel.

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 52 registered stock and domestic water wells within one mile of a federal CBNG producing well in the POD with depths ranging from 110 to 4,000 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the OK Creek and North Prong Wild Horse Creek drainages which are tributaries 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 (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 Tincom Butte North project prior to on-the-ground project work (BFO project no. 70070089). North Platte Archaeological Services conducted a block and linear Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project.

Leigh Grench, 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 3.6 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48SH1572	Open Camp	Not Eligible
48SH1573	Open Camp	Eligible
48SH1574	Open Camp	Not Eligible
48SH1575	Open Camp	Not Eligible
48SH1576	Open Camp	Eligible
48SH1244	Historic Road	Not Eligible
48SH1258	Historic debris	Not Eligible
48SH1225	Open Camp	Not Eligible
48SH1259	Lithic Scatter	Unevaluated

3.7. Visual Resource Management

Approximately 419 acres of the Tincom Butte North POD are included in the Class II Visual Resource Management corridor along US Highway 14/16 (comprising only about nine percent of the total POD area of 4602 acres). The POD is divided into three areas, with about one-third of the northern area within the Class II corridor and the remainder of the POD designated as Class IV. 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". Visual Resource Management Class IV allows major modification of the existing landscape character. Although two-thirds of the northern part of the POD is designated as Class IV, it begins about one mile

from the highway and is visible as travelers approach the Powder River.

Key observation points for this project are the intersection of US Highway 14/16 and WY Highway 341 and the top of a divide along the US Highway 14/16 approximately 1.25 miles east of the Powder River. Two well sites within the Class II area, and eight well sites and an impoundment within the Class IV area, are visible from the first observation point. One well location and an access road/utility corridor are visible from the second observation point. A fourth well within the Class II corridor is visible to travelers approaching the area from the east, but is screened by topography from the selected observation points.

The project area is comprised of rolling grassland along the Powder River floodplain and includes large areas of invasive cheat grass. The landscape included in the project area above the river includes patches of sagebrush and a few ponderosa pines. Several barren spots of highly erosive soils on slopes are visible above the river. Ranching facilities are evident along the river, but little CBNG development has occurred in the Class II corridor in the immediate area to date. The North Wildhorse I POD, approved in 2004, is approximately three miles east of the project area, and the Tincom Butte, OK Creek, and Cottonwood Creek POD's are located near the southern part of the project.

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

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 31 proposed well locations, 1 can be drilled without a well pad being constructed, 12 can be drilled using a 30 x 120 foot rig slot, and 18 will require a designed/constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the well without a rig slot or designed/constructed pad would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (2 pits/per location, estimated approximate size of 35 x 20 x 20 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance is approximately 0.91 acre/well (200 x 200 feet) for the non-constructed well location. The 12 wells where a rig slot is proposed would involve leveling a 30 x 120 foot space with a maximum of 4 foot excavation depth. The work area will be approximately the same as the non-constructed pads, 0.91 acre/well for a total 10.92 acres. The other 18 wells requiring cut & fill pad construction would disturb an average of 0.685 acre/pad for an approximate total of 12.33 acres. The total estimated disturbance for all 31 wells would be 24.16 acres.

Approximately 16.05 miles of improved roads would be constructed to provide access to various well locations. Approximately 4.43 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common

trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 0.78 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 Rig Slots Constructed Pad	1 12 18	0.91/acre 0.91/acre Site Specific	0.91 10.92 12.33	Long Term
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0.0	Long Term
Impoundments On-channel Off-channel Water Discharge Points	 7 3 10	 Site Specific Site Specific Site Specific or 0.01 ac/WDP	 23.02 10.46 0.1	Long Term
Channel Disturbance Headcut Mitigation* Channel Modification	 0 0	 Site Specific Site Specific	 0.0 0.0	
Improved Roads • No Corridor Engineered Template • With Corridor Engineered Template	 0.0 0.0 1.38 14.67	35' Width for Template Roads w/o Utility Corridor 45' Width for Template Roads with a Utility Corridor An average 60' Width for all Engineered roads	 0.0 0.0 10.06 80.06	Long Term
2-Track Roads		35' Width for Template Roads w/o Utility		Long Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
No Corridor With Corridor	0.30 0.80	Corridor 50' Width for Template Road "D" with a Utility Corridor	1.29 4.82	
Pipelines No Corridor	0.78	35' Width	3.29	Short Term
Buried Power Cable No Corridor	0.0	12' Width or Site Specific	0.0	Short Term
Overhead Powerlines	3.03	30' Width	11.02	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".

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

a. Mixing of soil horizons occurs where construction on roads, pipelines or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.

b. Loss of soil vegetation cover, biologic crusts, organic matter and productivity.

c. Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependant on soil, climate, topography and cover.

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

e. Modification of hill slope hydrology.

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

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to or better than that which existed before it was disturbed. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.
There are many areas which will be reclaimed by traditional methods. However, some areas will be challenging for reclamation due to soil properties and other site characteristics. The Bureau of Land

Management has an obligation to protect these lands from disturbance which could lead to irretrievable and irreversible impacts. Disturbances within these areas require the programmatic/standard COA's be complimented with a site specific performance based reclamation related COA. In the Tincom Butte North POD, specific areas with low reclamation potential have been identified during the onsite inspection. The operator has agreed to design and implement site specific reclamation strategies to address these areas of concern. In addition, the operator will adhere to COAs which limit the surface disturbance allowable for construction and improvements.

The issue of parallel roads was discussed at the onsite both with the operator and the landowner. The NRS pointed out that the BLM does not support the construction and/or use of different roads for different operators within the same project area. The landowner, however, wants to keep the operators' project infrastructure separate within ranch property. As a result of the landowner's requirement no changes were made to the road plan to better utilize the existing roads in the project area. Therefore, Access Road A and Road 41-29 will parallel an existing road servicing Medallion's Cottonwood POD.

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

4.1.1. Invasive Species

Based on the investigations performed during the POD planning process, the operator has committed to the control of noxious weeds and species of concern using the following measures in an Integrated Pest Management Plan (IPMP) included in the proposal:

1. Control Methods such as mowing, tillage, herbicide applications, as well as grazing and/or the application of biological agents.
2. Preventive practices including sanitary procedures for equipment, identification and delineation of new weed infestations, and the use of certified weed-free seed for revegetation projects.
3. Education and awareness programs for field employees and contractors through county weed districts, state and federal agencies and educational institutions.

Cheatgrass or downy brome (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) are known to exist in the affected environment. These two species are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible.

During onsite inspections, BLM specialists identify areas within open cheatgrass pockets to minimize disturbance of desirable sagebrush stands. However, in some cases moves are not possible due to a landowner's desire to keep disturbance outside of potential grazing areas. In the Tincom Butte North POD onsite inspection, BLM specialists attempted to move well locations 12-29, 21-29, and 41-30 to open cheatgrass pockets but the landowner declined BLM's proposal. The well locations were moved back to the original sites within desirable sagebrush stands.

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

4.1.2. 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 OK Creek 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 Tincom Butte North proposes that produced water will not contribute significantly to flows downstream as a result of full-containment.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

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

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

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

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter

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

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be discharged into two existing and five proposed on-channel reservoirs and three off-channel pits. If a reservoir were to discharge, it is likely that produced water would reach the Powder River, a fish-bearing stream. It is likely downstream species would be affected.

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

Altering water temperatures, flow timing and magnitude, turbidity and chemical composition of the Powder River could harm native fish species which inhabit the Powder River. Alterations could also allow for non native species to become established. Any water development that alters discharge patterns, reduces turbidity, changes water quality, modifies sediment transport, or blocks migratory routes for fish is likely to result in changes in the fish community. Additionally, altering of tributaries may have adverse effects to aquatic species. Tributaries provide spawning and nursery habitat for riverine fishes and support unique fish assemblages. Seasonal movements of riverine fishes into tributaries may be essential to the continued maintenance of several species found in the Powder River (Hubert, 1993).

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 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. 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 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.

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

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

Table 5. Infrastructure within close proximity to documented raptor nests within the Tincom Butte North project area (Timing limitations will apply to this infrastructure).

BLM ID#	SPECIES	UTM (NAD 83)	STATUS	PROPOSED INFRASTRUCTURE	DISTANCE (MILES)
599	Unknown	414479E 4948784N	Inactive	Overhead powerline Suranyi Ranch Fed well 42-2-5477 Suranyi Ranch Fed well 43-2-5477	0.33 0.36 0.42
600	Unknown	414534E 4948799N	Inactive	Overhead powerline Suranyi Ranch Fed well 42-2-5477 Suranyi Ranch Fed well 43-2-5477	0.37 0.40 0.45
4266	Great-horned owl	412337E 4949132N	Gone	Hansen Fed well 12-2-5477	0.48
4262	Red-tailed hawk	412555E 4948317N	Active	Hansen Fed well 12-2-5477 Hansen Fed well 14-2-5477	0.37 0.41
2343	Great-horned owl	414855E 4943046N	Active	Walsh Fed well 32-25-5477	0.35
None	Red-tailed hawk	408987E 4942467N	Active	Tietjen Fed well 41-29-5477 Tietjen Fed well 12-28-5477 Tietjen Fed well 32-29-5477 Tietjen Fed well 23-29-5477 Overhead powerline OK Pit 1-5477 Pit 22-29-5477 OK 6 Reservoir	0.24 0.39 0.30 0.45 0.12 0.33 0.29 0.43
4256	Red-tailed hawk	408167E 4942989N	Unknown	Tietjen Fed well 21-29-5477 Tietjen Fed well 41-30-5477 Tietjen Fed well 12-29-5477	0.27 0.44 0.43
2779	Unknown	407712E 4940751N	Inactive	Overhead powerlines	0.14
None	Prairie falcon	407929E 4940817N	Active	Overhead powerlines	0.13

BLM ID#	SPECIES	UTM (NAD 83)	STATUS	PROPOSED INFRASTRUCTURE	DISTANCE (MILES)
2775	Red-tailed hawk	408424E 4940509N	Unknown	Overhead powerlines	0.43

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.

The Suranyi Ranch Federal 43-2 well was moved approximately 611 feet northwest to remove it from line-of-sight of an active red-tailed hawk nest. The Tietjen 32-29 well was relocated approximately 796 feet southwest and the 12-28 well was relocated 288 feet northeast to remove them from line-of-sight of a red-tailed hawk nest.

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 two species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered 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	NLAA	Suitable habitat of sufficient size will be disturbed.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

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

Project Effects
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

Suitable habitat is of sufficient size to support a black-footed ferret population and the project area is in the Arvada complex. No surveys for ferrets were required or conducted. It is extremely unlikely that any black-footed ferret is present in the project area. However, if any become present, the proposed action will most likely make portions of the project area unsuitable for inhabitance. Implementation of the proposed development ***"may affect, but is not likely to adversely affect"*** the black-footed ferret.

4.2.5.1.2. Ute's Ladies Tresses Orchid

Many of the reservoirs are located within ephemeral drainages of Wild Horse Creek and the Powder River. The remaining proposed reservoirs are located in upland habitats. No springs have been identified within the project area. Suitable habitat is not present within the Tincom Butte North project area.

Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. Implementation of the proposed coal bed natural gas project will 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

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

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

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

Bald eagles are likely to forage, nest, and roost within the project area.

There are 8.3 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Lance is proposing an additional 3 miles of overhead three-phase distribution lines. There are currently 3 miles of improved roads within the project area, with 16.1 miles proposed.

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

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

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

Human activities within bald eagle nesting and roosting habitat may disturb bald eagles, leading them to abandon the areas for the duration of the activity. Disturbance impacts would be reduced by limiting construction activities to outside of the bald eagle nesting and roosting seasons.

4.2.5.2.2. Black-tailed prairie dog

Two wells, one proposed road, and one existing road are within the prairie dog town in Sections 28 and 29, T54N, R77W. A reservoir is also proposed along the southern edge of this colony. The BLM did not attempt to move these facilities at the demand of the landowner.

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

4.2.5.2.3. Greater sage-grouse

One sage-grouse lek is documented within 3 miles of the Tincom Butte North project area. To alleviate direct impacts to sage-grouse habitat two access routes were limited to a 35 feet disturbance width.

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

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

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

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

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

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

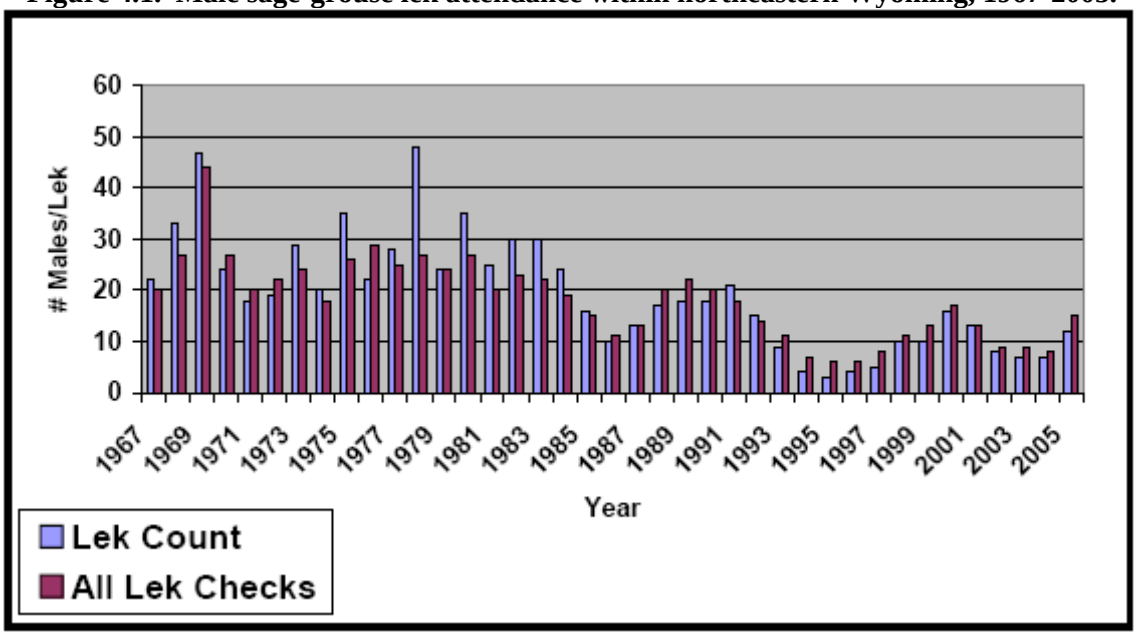
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km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

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

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

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

Figure 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).

4.2.5.2.4. Mountain plover

Suitable mountain plover habitat is present within the project area. Habitat may increase within the project area depending upon the grazing practices, precipitation, and construction activities. The project may impact mountain plovers. Mineral development has mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors and roads may be attractive to plovers while human activities

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

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

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

Stopping all development activities (i.e. road/pipeline, overhead powerline, reservoir construction, well drilling and all activities associated with bringing the wells into production) within one quarter mile of occupied mountain plover nesting habitat will reduce direct impacts such as vehicle/equipment related mortalities. The mountain plover is protected under the Migratory Bird Treaty Act. Road related mortalities are considered take under the under the Migratory Bird Treaty Act. 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), would reduce project area and downstream impacts from proposed water management strategies.

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

The maximum water production is predicted to be 7.5 gpm per well or 232.5 gpm (0.52 cfs or 375 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 which is the maximum production. As such, the volume of water resulting from the production of these wells is 0.22% 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 93 gpm will infiltrate at or near the discharge points and impoundments (150 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 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 110 to 4,000 feet compared to 450-1,200 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 gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in the WDEQ's WYPDES permit, and the levels found in the POD's representative water sample.

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

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** µmhos/cm
Most Restrictive Proposed Limit –		2	1,000
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 # WYW005636 At discharge point	5,000		7,500
Predicted Produced Water Quality Big George Coal Zone	1,450	28.2	2,260

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 1450.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

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 7.5 gallons per minute (gpm) is projected is to be produced from these 31 wells, for a total of 232.5 gpm for the POD. See Table 4.5 .

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

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

To manage the produced water, 10 impoundments (182.17 acre-ft.) would potentially be constructed within the project area. These impoundments will disturb approximately 33.48 acres including the dam structures. Of these water impoundments, 7 would be on-channel reservoirs disturbing 23.02 acres, and 3 would be off-channel ponds disturbing 10.46 acres. 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. Monitoring may be required based upon WYDEQ findings relative to "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004). 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 0.078 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 31 wells is anticipated to be a total of 232.5 gpm or 0.52 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in OK Creek and North Prong Wild Horse Creek from this action (0.078 cfs) may add a maximum 0.062 cfs to the Upper Powder River flows, or 0.09% 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 Watershed (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 a Wyoming Pollutant Discharge Elimination System (WYPDES) permit No. WYW0050636 for the discharge of water produced from this project from the WDEQ.

Permit effluent limits were set at (WYPDES, Attachment A):

pH	6.5 to 9.0
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Dissolved iron	1,000 µg/l max
Dissolved manganese	630 µg/l max
Total Barium	1800 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 (SESE, Sec. 16, T54N, R77W), TRIB2 (NWNE, Sec. 36, T54N, R77W), UPR (SWSE, Sec. 16, T54N, R77W), and DPR (NWSE, Sec. 34, T55N, 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 24) for the Tincom Butte North POD prepared by Western Water Consultants for Lance Oil & Gas Company, Inc.

4.4.2.1. Surface Water Cumulative Effects

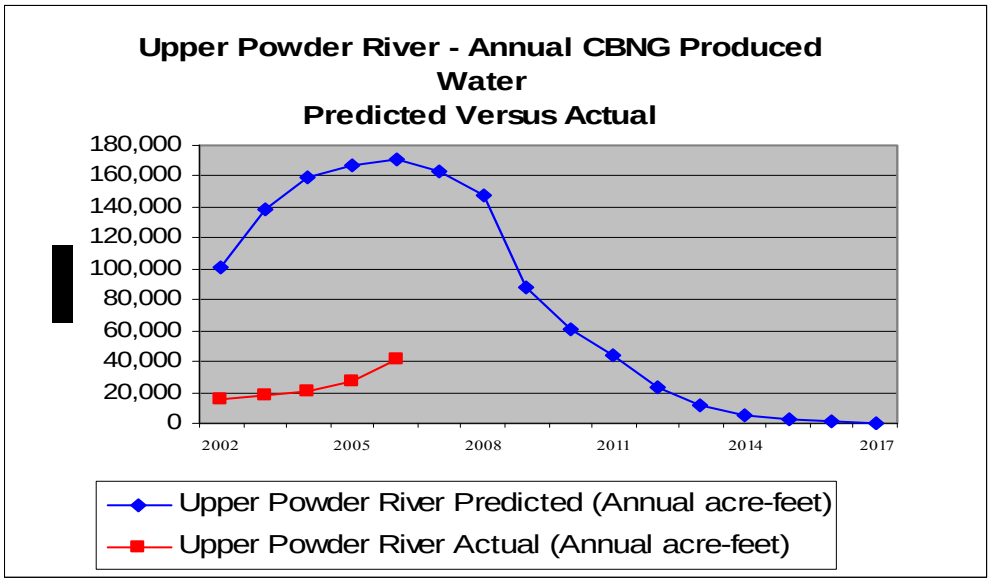
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of March 2007, all producing CBNG wells in the watershed have discharged a cumulative volume of 123,984 acre-ft of water compared to the predicted 736,519 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 16.8 % of the total predicted produced water analyzed in the PRB FEIS for the watershed.

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

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

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



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. 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

Non- eligible site 48SH1574 may be impacted by this project. This project will not affect the non-eligible sites 48SH1572, 48SH1244, 48SH1225, 48SH1258, and 48SH1575, or the unevaluated site 48SH1259. This project should not affect the eligible sites 48SH1573 and 48SH1576, however due to the close proximity of a proposed utility corridor and road upgrade near site 48SH1573 a monitoring stipulation has been placed on this area as specified in the site specific COA section.

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 wells and pads, access roads, utility corridors, and impoundments 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. In particular, Suranyi Federal 42-2-5477WA well and its access road will be visible for over a minute as travelers approach from the east. The access road to Hansen Federal 21-2-5477WA is right next to the highway right-of-way, on the south side of the highway, and will create a strong visual contrast for approximately one full minute as travelers move toward the divide from the west. The facilities within the Class IV area near the highway will be in the background, but will attract the observer's attention because the area is currently undeveloped.
Movement of the Suranyi Fed 42-2-5477WA well was proposed, to a site approximately 650 feet west-southwest next to an existing two-track road. This would have avoided construction of an access road, allowed use of a slot well location, and kept disturbance to a minimum. However, a raptor nest was discovered about 850 feet from the original well site during the on-site visit. Movement of the well to the new location would have placed it about 400 feet closer to the raptor nest.

Movement of the Hansen Fed 21-2-5477WA well was also proposed, to a location approximately 550 feet south-southwest and behind a ridge. This would have allowed use of a portion the proposed access road to Hansen Fed 32-2-5477WA for this well and significantly reduced the visual contrast caused by the originally proposed access road. An existing gas pipeline corridor along the ridge prevented relocation of the well site. Alternative locations considered that were farther from the highway would have required engineered roads and caused even more disturbance.

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Gary Hansen	Surface Owner	Surface Owner	Yes
Jack Hayes	Surface Owner	Jack Hayes Living Trust	Yes
Tammi Hitt	Regulatory Analyst	Lance Oil & Gas / Anadarko Petroleum	Yes
Mary Hopkins	Interim Wyoming SHPO	Wyoming SHPO	No
Ethan Jahnke	Federal Permit Coordinator	Lance Oil & Gas / Anadarko Petroleum	Yes
Joy Kennedy	Permitting Specialist	Lance Oil & Gas / Anadarko Petroleum	Yes
Riley Malli	Ranch Manager	Representing John Walsh Ranch	Yes
Mary Mondragon	Permitting Manager	Lance Oil & Gas / Anadarko Petroleum	No
Brad Rogers	Wildlife Biologist	US Fish & Wildlife Service	Yes
Williams Suranyi	Surface Owner	Suranyi Ranch, Inc.	Yes
John Walsh	Surface Owner	John Walsh Ranch	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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