FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Pinnacle Gas Resources, Inc.
Cabin Creek Phase III
ENVIRONMENTAL ASSESSMENT –WY-070-EA**07-089**

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Pinnacle Gas Resources, Inc.'s Cabin Creek Phase III Coal Bed Natural Gas (CBNG) POD comprised of the following 70 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	CABIN CREEK III CB	15CC-04	SWSE	4	57N	76W	WYW149628
2	CABIN CREEK III CB	15WP-04	SWSE	4	57N	76W	WYW149628
3	CABIN CREEK III CB	13CC-05	SWSW	5	57N	76W	WYW149628
4	CABIN CREEK III CB	13WP-05	SWSW	5	57N	76W	WYW149628
5	CABIN CREEK III CB	01CC-08	NENE	8	57N	76W	WYW151710
6	CABIN CREEK III CB	01WP-08	NENE	8	57N	76W	WYW151710
7	CABIN CREEK III CB	03CC-08	NENW	8	57N	76W	WYW144211
8	CABIN CREEK III CB	03WP-08	NENW	8	57N	76W	WYW144211
9	CABIN CREEK III CB	05CC-08	SWNW	8	57N	76W	WYW151710
10	CABIN CREEK III CB	05WP-08	SWNW	8	57N	76W	WYW151710
11	CABIN CREEK III CB	07WP-08	SWNE	8	57N	76W	WYW151710
12	CABIN CREEK III CB	11CC-08	NESW	8	57N	76W	WYW151710
13	CABIN CREEK III CB	11WP-08	NESW	8	57N	76W	WYW151710
14	CABIN CREEK III CB	13CC-08	SWSW	8	57N	76W	WYW151710
15	CABIN CREEK III CB	13WP-08	SWSW	8	57N	76W	WYW151710
16	CABIN CREEK III CB	15CC-08	SWSE	8	57N	76W	WYW151710
17	CABIN CREEK III CB	15WP-08	SWSE	8	57N	76W	WYW151710
18	CABIN CREEK III CB	09CC-08	NESE	8	57N	76W	WYW151710
19	CABIN CREEK III CB	09WP-08	NESE	8	57N	76W	WYW151710
20	CABIN CREEK III CB	07CC-08	SWNE	8	57N	76W	WYW151710
21	CABIN CREEK III CB	01CC-09	NENE	9	57N	76W	WYW151711
22	CABIN CREEK III CB	01WP-09	NENE	9	57N	76W	WYW151711
23	CABIN CREEK III CB	03CC-09	NENW	9	57N	76W	WYW151711
24	CABIN CREEK III CB	03WP-09	NENW	9	57N	76W	WYW151711
25	CABIN CREEK III CB	01CC-10	NENE	10	57N	76W	WYW144212
26	CABIN CREEK III CB	01WP-10	NENE	10	57N	76W	WYW144212
27	CABIN CREEK III CB	03CC-10	NENW	10	57N	76W	WYW132268
28	CABIN CREEK III CB	03WP-10	NENW	10	57N	76W	WYW132268
29	CABIN CREEK III CB	05CC-10	SWNW	10	57N	76W	WYW132268
30	CABIN CREEK III CB	05WP-10	SWNW	10	57N	76W	WYW132268
31	CABIN CREEK III CB	07CC-10	SWNE	10	57N	76W	WYW132268

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
32	CABIN CREEK III CB	07WP-10	SWNE	10	57N	76W	WYW132268
33	CABIN CREEK III CB	04CC-17	NWNW	17	57N	76W	WYW144212
34	CABIN CREEK III CB	04WP-17	NWNW	17	57N	76W	WYW144212
35	CABIN CREEK III CB	05CC-17	SWNW	17	57N	76W	WYW144212
36	CABIN CREEK III CB	05WP-17	SWNW	17	57N	76W	WYW144212
37	CABIN CREEK III CB	12CC-17	NWSW	17	57N	76W	WYW144212
38	CABIN CREEK III CB	12WP-17	NWSW	17	57N	76W	WYW144212
39	CABIN CREEK III CB	13CC-17	SWSW	17	57N	76W	WYW144212
40	CABIN CREEK III CB	13WP-17	SWSW	17	57N	76W	WYW144212
41	CABIN CREEK III CB	01CC-17	NENE	17	57N	76W	WYW144212
42	CABIN CREEK III CB	01WP-17	NENE	17	57N	76W	WYW144212
43	CABIN CREEK III CB	07CC-18	SWNE	18	57N	76W	WYW144212
44	CABIN CREEK III CB	07WP-18	SWNE	18	57N	76W	WYW144212
45	CABIN CREEK III CB	08CC-18	SENE	18	57N	76W	WYW144212
46	CABIN CREEK III CB	08WP-18	SENE	18	57N	76W	WYW144212
47	CABIN CREEK III CB	15CC-18	SWSE	18	57N	76W	WYW172627
48	CABIN CREEK III CB	15WP-18	SWSE	18	57N	76W	WYW172627
49	CABIN CREEK III CB	21CC-18	SWNW	18	57N	76W	WYW144212
50	CABIN CREEK III CB	21WP-18	SWNW	18	57N	76W	WYW144212
51	CABIN CREEK III CB	03WP-18	NWNE	18	57N	76W	WYW147339
52	CABIN CREEK III CB	03CC-18	NWNE	18	57N	76W	WYW147339
53	CABIN CREEK III CB	05CC-18	SENW	18	57N	76W	WYW147339
54	CABIN CREEK III CB	05WP-18	SENW	18	57N	76W	WYW147339
55	CABIN CREEK III CB	11CC-18	NESW	18	57N	76W	WYW147339
56	CABIN CREEK III CB	11WP-18	NESW	18	57N	76W	WYW147339
57	CABIN CREEK III CB	13CC-18	SESW	18	57N	76W	WYW147339
58	CABIN CREEK III CB	13WP-18	SESW	18	57N	76W	WYW147339
59	CABIN CREEK III CB	17CC-18	NENW	18	57N	76W	WYW147339
60	CABIN CREEK III CB	17WP-18	NENW	18	57N	76W	WYW147339
61	CABIN CREEK III CB	18CC-18	NWNW	18	57N	76W	WYW147339
62	CABIN CREEK III CB	18WP-18	NWNW	18	57N	76W	WYW147339
63	CABIN CREEK III CB	23CC-18	NESW	18	57N	76W	WYW147339
64	CABIN CREEK III CB	23WP-18	NESW	18	57N	76W	WYW147339
65	CABIN CREEK III CB	24CC-18	NWSW	18	57N	76W	WYW147339
66	CABIN CREEK III CB	24WP-18	NWSW	18	57N	76W	WYW147339
67	CABIN CREEK III CB	27CC-18	SWSW	18	57N	76W	WYW147339
68	CABIN CREEK III CB	27WP-18	SWSW	18	57N	76W	WYW147339
69	CABIN CREEK III CB	09CC-12	NESE	12	57N	77W	WYW144218
70	CABIN CREEK III CB	09WP-12	NESE	12	57N	77W	WYW144218

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

FINDING OF NO SIGNIFICANT IMPACT: Based on the analysis of the potential environmental impacts, 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
Pinnacle Gas Resources, Inc.
Cabin Creek Phase III
PLAN OF DEVELOPMENT
WY-070-EA07-089

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 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. It is the continuing policy of the Federal Government to foster and encourage private enterprise in the development of a stable domestic minerals industry and the orderly and economic development of domestic mineral resources; as set forth in the Mining and Minerals Policy Act of 1970. In addition the Energy Policy Act of 2005 encourages the development of the nation's domestic energy resources to reduce the United States dependence of foreign energy sources.

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Description of the Proposed Action

<u>Proposed Action Title/Type</u>: Pinnacle Gas Resources, Inc.'s Cabin Creek Phase III Plan of Development

(POD) for 70 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 78 CBNG wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 2 wells per location. Each well will produce from 2 coal seams (Cook/Canyon = CC and the Wall/Pawnee = WP) as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	CABIN CREEK III CB	09CC-04	NESE	4	57N	76W	WYW149628
2	CABIN CREEK III CB	09WP-04	NESE	4	57N	76W	WYW149628
3	CABIN CREEK III CB	15CC-04	SWSE	4	57N	76W	WYW149628
4	CABIN CREEK III CB	15WP-04	SWSE	4	57N	76W	WYW149628
5	CABIN CREEK III CB	13CC-05	SWSW	5	57N	76W	WYW149628
6	CABIN CREEK III CB	13WP-05	SWSW	5	57N	76W	WYW149628
7	CABIN CREEK III CB	01CC-08	NENE	8	57N	76W	WYW151710
8	CABIN CREEK III CB	01WP-08	NENE	8	57N	76W	WYW151710
9	CABIN CREEK III CB	03CC-08	NENW	8	57N	76W	WYW144211
10	CABIN CREEK III CB	03WP-08	NENW	8	57N	76W	WYW144211
11	CABIN CREEK III CB	05CC-08	SWNW	8	57N	76W	WYW151710
12	CABIN CREEK III CB	05WP-08	SWNW	8	57N	76W	WYW151710
13	CABIN CREEK III CB	07WP-08	SWNE	8	57N	76W	WYW151710
14	CABIN CREEK III CB	11CC-08	NESW	8	57N	76W	WYW151710
15	CABIN CREEK III CB	11WP-08	NESW	8	57N	76W	WYW151710
16	CABIN CREEK III CB	13CC-08	SWSW	8	57N	76W	WYW151710
17	CABIN CREEK III CB	13WP-08	SWSW	8	57N	76W	WYW151710
18	CABIN CREEK III CB	15CC-08	SWSE	8	57N	76W	WYW151710
19	CABIN CREEK III CB	15WP-08	SWSE	8	57N	76W	WYW151710
20	CABIN CREEK III CB	09CC-08	NESE	8	57N	76W	WYW151710
21	CABIN CREEK III CB	09WP-08	NESE	8	57N	76W	WYW151710
22	CABIN CREEK III CB	07CC-08	SWNE	8	57N	76W	WYW151710
23	CABIN CREEK III CB	01CC-09	NENE	9	57N	76W	WYW151711
24	CABIN CREEK III CB	01WP-09	NENE	9	57N	76W	WYW151711
25	CABIN CREEK III CB	03CC-09	NENW	9	57N	76W	WYW151711
26	CABIN CREEK III CB	03WP-09	NENW	9	57N	76W	WYW151711
27	CABIN CREEK III CB	01CC-10	NENE	10	57N	76W	WYW144212
28	CABIN CREEK III CB	01WP-10	NENE	10	57N	76W	WYW144212
29	CABIN CREEK III CB	03CC-10	NENW	10	57N	76W	WYW132268
30	CABIN CREEK III CB	03WP-10	NENW	10	57N	76W	WYW132268
31	CABIN CREEK III CB	05CC-10	SWNW	10	57N	76W	WYW132268
32	CABIN CREEK III CB	05WP-10	SWNW	10	57N	76W	WYW132268
33	CABIN CREEK III CB	07CC-10	SWNE	10	57N	76W	WYW132268
34	CABIN CREEK III CB	07WP-10	SWNE	10	57N	76W	WYW132268

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
35	CABIN CREEK III CB	04CC-17	NWNW	17	57N	76W	WYW144212
36	CABIN CREEK III CB	04WP-17	NWNW	17	57N	76W	WYW144212
37	CABIN CREEK III CB	05CC-17	SWNW	17	57N	76W	WYW144212
38	CABIN CREEK III CB	05WP-17	SWNW	17	57N	76W	WYW144212
39	CABIN CREEK III CB	12CC-17	NWSW	17	57N	76W	WYW144212
40	CABIN CREEK III CB	12WP-17	NWSW	17	57N	76W	WYW144212
41	CABIN CREEK III CB	13CC-17	SWSW	17	57N	76W	WYW144212
42	CABIN CREEK III CB	13WP-17	SWSW	17	57N	76W	WYW144212
43	CABIN CREEK III CB	01CC-17	NENE	17	57N	76W	WYW144212
44	CABIN CREEK III CB	01WP-17	NENE	17	57N	76W	WYW144212
45	CABIN CREEK III CB	07CC-18	SWNE	18	57N	76W	WYW144212
46	CABIN CREEK III CB	07WP-18	SWNE	18	57N	76W	WYW144212
47	CABIN CREEK III CB	08CC-18	SENE	18	57N	76W	WYW144212
48	CABIN CREEK III CB	08WP-18	SENE	18	57N	76W	WYW144212
49	CABIN CREEK III CB	09CC-18	NESE	18	57N	76W	WYW144212
50	CABIN CREEK III CB	09WP-18	NESE	18	57N	76W	WYW144212
51	CABIN CREEK III CB	15CC-18	SWSE	18	57N	76W	WYW172627
52	CABIN CREEK III CB	15WP-18	SWSE	18	57N	76W	WYW172627
53	CABIN CREEK III CB	21CC-18	SWNW	18	57N	76W	WYW144212
54	CABIN CREEK III CB	21WP-18	SWNW	18	57N	76W	WYW144212
55	CABIN CREEK III CB	03WP-18	NWNE	18	57N	76W	WYW147339
56	CABIN CREEK III CB	03CC-18	NWNE	18	57N	76W	WYW147339
57	CABIN CREEK III CB	05CC-18	SENW	18	57N	76W	WYW147339
58	CABIN CREEK III CB	05WP-18	SENW	18	57N	76W	WYW147339
59	CABIN CREEK III CB	11CC-18	NESW	18	57N	76W	WYW147339
60	CABIN CREEK III CB	11WP-18	NESW	18	57N	76W	WYW147339
61	CABIN CREEK III CB	13CC-18	SESW	18	57N	76W	WYW147339
62	CABIN CREEK III CB	13WP-18	SESW	18	57N	76W	WYW147339
63	CABIN CREEK III CB	17CC-18	NENW	18	57N	76W	WYW147339
64	CABIN CREEK III CB	17WP-18	NENW	18	57N	76W	WYW147339
65	CABIN CREEK III CB	18CC-18	NWNW	18	57N	76W	WYW147339
66	CABIN CREEK III CB	18WP-18	NWNW	18	57N	76W	WYW147339
67	CABIN CREEK III CB	23CC-18	NESW	18	57N	76W	WYW147339
68	CABIN CREEK III CB	23WP-18	NESW	18	57N	76W	WYW147339
69	CABIN CREEK III CB	24CC-18	NWSW	18	57N	76W	WYW147339
70	CABIN CREEK III CB	24WP-18	NWSW	18	57N	76W	WYW147339
71	CABIN CREEK III CB	27CC-18	SWSW	18	57N	76W	WYW147339
72	CABIN CREEK III CB	27WP-18	SWSW	18	57N	76W	WYW147339
73	CABIN CREEK III CB	09CC-12	NESE	12	57N	77W	WYW144218

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
74	CABIN CREEK III CB	09WP-12	NESE	12	57N	77W	WYW144218
75	CABIN CREEK III CB	11CC-12	NESW	12	57N	77W	WYW144218
76	CABIN CREEK III CB	11WP-12	NESW	12	57N	77W	WYW144218
77	CABIN CREEK III CB	13CC-12	SWSW	12	57N	77W	WYW144218
78	CABIN CREEK III CB	13WP-12	SWSW	12	57N	77W	WYW144218

County: Sheridan and Campbell

Applicant: Pinnacle Gas Resources, Inc.

Surface Owners: PEEGEE Ranch, Cliff Ritchie, Bill Ritchie, USA/BLM,

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

- Drilling of 78 total federal CBM wells in Cook-Canyon (CC= Cook/Canyon) and Wall-Pawnee (WP= Wall/Pawnee) coal zones ranging in depths from 600 to 1000 feet.

- An unimproved and improved road network.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: Treatment of water at a facility and subsequent discharge to the Middle Powder River. The treatment facility and river discharge were evaluated and described in the Cabin Creek Phase I POD and EA (EA# WY-070-07-057, approved 4/9/07).

- A buried gas and water network and an overhead power line network.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to ensure thatreduce potential impacts to natural resources would be minimized. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate or minimize environmental impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate or minimize environmental effects of the operator's proposal. The specific changes identified for the Cabin Creek Phase III POD are listed below under 2.3.1:

The following 8 wells were dropped from the project, rationale is provided below the table:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1.	Cabin Creek III CB	09CC-04	NESE	4	57N	76W	WYW149628
2.	Cabin Creek III CB	09WP-04	NESE	4	57N	76W	WYW149628
3.	Cabin Creek III CB	09CC-18	NESE	18	57N	76W	WYW144212
4.	Cabin Creek III CB	09WP-18	NESE	18	57N	76W	WYW144212
5.	Cabin Creek III CB	11CC-12	NESW	12	57N	77W	WYW144218
6.	Cabin Creek III CB	11WP-12	NESW	12	57N	77W	WYW144218
7.	Cabin Creek III CB	13CC-12	SWSW	12	57N	77W	WYW144218
8.	Cabin Creek III CB	13WP-12	SWSW	12	57N	77W	WYW144218

2.3.1. Changes as a result of the on-sites

1. 13-5 WP/CC – Moved CC well 50ft North; Expedient Reclamation due to erosive soils being potentially present. Last portion of road will be constructed as a template designed road

2. 13-8 WP/CC – Moved WP well 50ft West to reduce need for a constructed pad.

3. 12-17 WP/CC – Road will need spot upgrades and will be a template design; No Pad is needed. Expedient reclamation due to limited reclamation potential and potentially erosive soils.

4. 11-18 WP/CC – Moved both wells to avoid a drainage and need for a constructed pad; road to hug hillside to avoid splitting sagebrush habitat. No constructed pad is needed. Expedient reclamation due to limited reclamation potential and potentially erosive soils.

5. 9-18 WP/CC – Location dropped. Site is in drainage and there is no physical place to move it to.

6. 15-18 WP/CC – Moved both wells to top of hill to South, will be an exception location but will avoid building a road; Expedient reclamation due to potentially erosive soils.

7. 13-18 WP/CC – Access road will be straightened to go across drainage as corner is too sharp for large trucks to make turn. A low water crossing will be installed at start of road where it leaves the existing crown and ditch road.

8. 27-18 WP/CC –Will have a constructed pad for turn around space. Expedient reclamation due to potentially erosive soils.

9. 13-12 WP/CC – Dropped from Phase III project

10. 23-18 WP/CC –The road going to the SE will be a corridor also.

11. 24-18 WP/CC – Pad rotated to the North to reduce cut amount on Point B; Pit to be lined; Expedient Reclamation due to potentially erosive soils. Access road to be a template road design.

12. 21-18 WP/CC – Location moved to top of hill, will be an exception location but will avoid building a road; No Pad needed on new location. Expedient reclamation due to potentially erosive soils.

13. 5-18 WP/CC – Location will move East where less sagebrush is present as 2 flocks of sage grouse were observed. Road shown on map as orange will be changed to a corridor and resource road.

14. 17-18 WP/CC –The location will be 20' X 100' slot design. The proposed resource road/corridor going south to the 21-18 WP/CC location has been dropped from this project.

15. 11-12 WP/CC – Well dropped from the project; Reclamation potential for this site is poor therefore expedient reclamation will be needed and ½ mile of road will have to be built.

16. 9-12 WP/CC – Cattleguard to be installed; Access road crosses an old silted in lake where the dam failed; the drainage is actively eroding and road will cross as far as possible above the active headcut.

17. 18-18 WP/CC – 2nd stake moved 30ft to North with 1st stake moved 50ft Northeast of that. Constructed pad will be needed at an estimated 70ft X 100ft. 20ft undisturbed vegetative buffer between edge of disturbance and drainage to East.

18. 1-17 WP/CC – Location moved 300ft to the East across road as original location is too tight after Nance installed its pipeline. The location will be a 150' X 100' constructed pad. A pipeline corridor goes to the 15-8 well with a 30ft total disturbance width. Not enough room to put along access road; Expedient reclamation due to potentially erosive soils.

19. 9-8 WP/CC – Have the existing road that goes thru bottom moved to go past well then curve back and align with existing gate opening.

20. 7-8 WP/CC – The proposed 150' X 150' constructed pad was reduced to a 120' X 100' constructed pad. A 20ft undisturbed buffer between edge of disturbance and drainage to West will be maintained.

21. 1-8 WP/CC – Location moved to other side of fence to avoid putting in another gate or a cattleguard.

22. 1-9 WP/CC –proposed road/corridor going to the 15-4 will be just pipe no road. The access road going south was changed to go straight south at proposed power drop in section 9 to connect to intersection of main road and access road going to 5-10 well location. The proposed 150' X 150'

constructed pad was reduced to 120' X 100' pad that will function as a staging area for drilling and completion vehicles for the 15-4 WP/CC location.

23. 5-10 WP/CC – Moved location ~300 feet due West to more level ground; No constructed pad will be needed; moved pipeline route to NW, along the existing single phase line; pipeline will cross the drainage as far above an active headcut as possible.

24. 9-4 WP/CC – Dropped from consideration due to proximity to an active raptor nest.

25. 8-18 WP/CC – The location will be a slot design incorporating the slot into the access road as a drive in, drive out location.

26. 5-8 WP/CC -- The 150' X 150' proposed pad was reduced to a 120' X 100' pad. Expedient reclamation due to potentially erosive soils.

27. 15-4 WP/CC – The proposed pad location was reduced to a 20' X 100' rig slot design.

28. 3-8 WP/CC – Expedient reclamation due to limited reclamation potential and potentially erosive soils.

WATER MANAGEMENT

1. The waterline which will be placed under the Powder River to carry water from phase III and subsequent phases will be sized to carry the maximum possible production from full development of the operator's leases on the west side of the river. This will prevent the need for having to perform the boring operation more than once.

2. Low water crossing 008 is presently a culvert. In order to reduce the amount of new disturbance, this culvert crossing will be left in place. However, a contingency plan will be developed to replace this culvert crossing with an LWC in case a precipitation event washes it out.

3. Proposed LWC 09 will be two 24" culverts instead.

4. Proposed culvert crossing 03 will have two 24" culverts and the road will be built up as necessary.

5. LWC 10 and 11, if used, will be a combination culvert/LWC to accommodate low flows. Culvert will be sized to fit the low-flow channel at the crossing, not to pass the computed flood for the watershed.

6. LWC 05 is changed to two 24" culverts with appropriate road build-up as necessary.

7. GPS point 100 will be a constructed LWC across the emergency spillway for the dam. There will be no road buildup here as this could compromise the integrity of the structure.

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

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 CBM water on downstream irrigation use may require operators to increase the amount of storage of CBM water during the irrigation months and allow more surface discharge during the non-irrigation months.

2.3.2.3. Soils

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

2.3.2.4. Wetland/Riparian

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

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

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

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

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

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

2.3.2.5. Wildlife

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

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

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

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

2. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.6.2. Mountain Plover

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

2.3.2.7. Visual Resources

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

2.3.2.8. Noise

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

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

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

General

1. All changes made at the onsite will be followed. They have all been incorporated into the operator's POD.

Surface Use

1. The Cabin Creek III CB 07WP-08 and the 07CC-08 wells will maintain a 20 foot undisturbed buffer between edge of disturbance and drainage to West.

2. The Cabin Creek III CB 24WP-18 and the 24CC-18 wells will have the reserve pit lined.

3. For those proposed disturbance areas identified below, there are lands with limited reclamation potential that shall be stabilized in a manner which eliminates accelerated erosion until a self-perpetuating non-weed native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities.

   Well name(s):
   - Cabin Creek III CB 05WP-08 and 05CC-08
   - Cabin Creek III CB 13WP-05 and 13CC-05
   - Cabin Creek III CB 15WP-18 and 15CC-18
   - Cabin Creek III CB 27WP-18 and 27CC-18
   - Cabin Creek III CB 21WP-18 and 21CC-18
   - Cabin Creek III CB 24WP-18 and 24CC-18
   - Cabin Creek III CB 03WP-08 and 03CC-08
   - Cabin Creek III CB 11WP-08 and 11CC-08
   - Cabin Creek III CB 12WP-17 and 12CC-17
   - Cabin Creek III CB 11WP-12 and 11CC-12

   Road / Pipeline section (s):
   - Access Rd/Corridor from 5-8 to the 3-8 in section 8.
   - Access Rd/Corridor from the start of the cut/fill road section to the 11-8 location
   - Access Rd/Corridor from the 4-17 location to the tie in with the existing road to the West.
   - Access Rd/Corridor from the 7-18 location to the point of the existing 3 low water crossings on the road going to the 3-18 location
   - Access Rd/Corridor from the 27-18 location to the Y-intersection in the NESW (Lot 15) of Section 18. Then from the Y-intersection to the proposed power drop location at the intersection of the road/corridor going to the 21-18 location.
   - Access Rd/Corridor from the proposed cattleguard to the 9-12 location

4. The waterline which will be placed under the Powder River to carry water from phase III and subsequent phases will be sized to carry the maximum possible production from full development of the operator's leases on the west side of the river. This will prevent the need for having to perform the boring operation more than once.

5. Low water crossing 008 is presently a culvert. In order to reduce the amount of new disturbance, this culvert crossing will be left in place. However, a contingency plan will be developed to replace this culvert crossing with an LWC in case a precipitation event washes it out.

6. Proposed LWC 09 will be two 24" culverts instead.

7. Proposed culvert crossing 03 will have two 24" culverts and the road will be built up as necessary.

8. LWC 10 and 11, if used, will be a combination culvert/LWC to accommodate low flows. Culvert will be sized to fit the low-flow channel at the crossing, not to pass the computed flood for the watershed.

9. LWC 05 is changed to two 24" culverts with appropriate road build-up as necessary.

10. GPS point 100 will be a constructed LWC across the emergency spillway for the dam. There will be no road buildup here as this could compromise the integrity of the structure.

11. Primitive road and low-water crossings will be left as is. If problems develop remediation measures will be applied. Monitoring of these facilities will be done according to the normal schedule **AND AFTER ALL PRECIPITATION EVENTS**. Remediation measures will be applied **AS SOON AS PROBLEMS (such as development of ruts) BECOME APPARENT**.

12. **Archeological Monitoring**: 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). The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of work.

    a. All earth moving activities associated with the construction of the waterlines to the Emit facility and to the discharge point, on the Powder River floodplain (T57N R76W Sections 17 and 20).

13. 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 Cabin Creek Phase III POD is Beetle, 19-0312 TPX.

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

(10"-14" Precip Zone) Loamy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	15CC-04	SWSE	4	57N	76W	WYW149628
CABIN CREEK III CB	15WP-04	SWSE	4	57N	76W	WYW149628
CABIN CREEK III CB	15CC-08	SWSE	8	57N	76W	WYW151710
CABIN CREEK III CB	15WP-08	SWSE	8	57N	76W	WYW151710
CABIN CREEK III CB	01CC-09	NENE	9	57N	76W	WYW151711
CABIN CREEK III CB	01WP-09	NENE	9	57N	76W	WYW151711
CABIN CREEK III CB	03CC-09	NENW	9	57N	76W	WYW151711
CABIN CREEK III CB	03WP-09	NENW	9	57N	76W	WYW151711
CABIN CREEK III CB	05CC-10	SWNW	10	57N	76W	WYW132268
CABIN CREEK III CB	05WP-10	SWNW	10	57N	76W	WYW132268

Well Name	**Well #**	**QTR**	**Sec**	**TWP**	**RNG**	**Lease**
CABIN CREEK III CB	07CC-10	SWNE	10	57N	76W	WYW132268
CABIN CREEK III CB	07WP-10	SWNE	10	57N	76W	WYW132268
CABIN CREEK III CB	01CC-17	NENE	17	57N	76W	WYW144212
CABIN CREEK III CB	01WP-17	NENE	17	57N	76W	WYW144212

Species - *Cultivar*	**% in Mix**	**Lbs PLS**
Thickspike Wheatgrass – *Critana* **OR** Western Wheatgrass - *Rosana*	30	3.6
Bluebunch Wheatgrass – *Secar or P-7*	10	1.2
Green needlegrass - *Lodorm*	25	3.0
Slender Wheatgrass	20	2.4
White – *Antelope* **OR** Purple Prairie Clover – *Bismarck*	5	0.6
Prairie Coneflower	5	0.6
Rocky Mountain beeplant **OR** American Vetch	5	0.6
Totals	**100%**	**12 lbs/acre**

(10"14" Precip Zone) Shallow Loamy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	01CC-10	NENE	10	57N	76W	WYW144212
CABIN CREEK III CB	01WP-10	NENE	10	57N	76W	WYW144212

Species - *Cultivar*	**% in Mix**	**Lbs PLS**
Thickspike Wheatgrass – *Critana*	50	6.0
Bluebunch Wheatgrass – *Secar or P-7*	35	4.2
White – *Antelope* **OR** Purple Prairie Clover – *Bismarck*	5	0.6
Prairie Coneflower	5	0.6

Species - *Cultivar*	**% in Mix**	**Lbs PLS**
Rocky Mountain beeplant **OR** American Vetch	5	0.6
Totals	**100%**	**12 lbs/acre**

(10”-14” Precip Zone) Sandy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	03CC-10	NENW	10	57N	76W	WYW132268
CABIN CREEK III CB	03WP-10	NENW	10	57N	76W	WYW132268

Species - *Cultivar*	**% in Mix**	**Lbs PLS**
Thickspike Wheatgrass – *Critana*	20	2.4
Prairie Sandreed	30	3.6
Indian Ricegrass	20	2.4
Needleandthread	15	1.8
White – *Antelope* **OR** Purple Prairie Clover – *Bismarck*	5	0.6
Prairie Coneflower	5	0.6
Scarlet Globemallow **OR** Blue Flax	5	0.6
Totals	**100%**	**12 lbs/acre**

(15”-19”Precip Zone) Loamy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	01CC-08	NENE	8	57N	76W	WYW151710
CABIN CREEK III CB	01WP-08	NENE	8	57N	76W	WYW151710
CABIN CREEK III CB	07CC-08	SWNE	8	57N	76W	WYW151710
CABIN CREEK III CB	07WP-08	SWNE	8	57N	76W	WYW151710
CABIN CREEK III CB	09CC-08	NESE	8	57N	76W	WYW151710
CABIN CREEK III CB	09WP-08	NESE	8	57N	76W	WYW151710
CABIN CREEK III CB	04CC-17	NWNW	17	57N	76W	WYW144212
CABIN CREEK III CB	04WP-17	NWNW	17	57N	76W	WYW144212

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	13CC-17	SWSW	17	57N	76W	WYW144212
CABIN CREEK III CB	13WP-17	SWSW	17	57N	76W	WYW144212
CABIN CREEK III CB	05CC-18	SENW	18	57N	76W	WYW147339
CABIN CREEK III CB	05WP-18	SENW	18	57N	76W	WYW147339
CABIN CREEK III CB	08CC-18	SENE	18	57N	76W	WYW144212
CABIN CREEK III CB	08WP-18	SENE	18	57N	76W	WYW144212
CABIN CREEK III CB	13CC-18	SESW	18	57N	76W	WYW147339
CABIN CREEK III CB	13WP-18	SESW	18	57N	76W	WYW147339

Species - *Cultivar*	**% in Mix**	**Lbs PLS**
Western Wheatgrass – *Rosana*	20	1.2
Idaho fescue – *Joseph* **OR** Spike fescue	30	1.2
Green Needlegrass – *Lodorm*	30	1.8
American Vetch **OR** Cicer Milkvetch -- *Lutana*	10	0.70
White – *Antelope* **OR** Purple Prairie Clover – *Bismarck*	5	0.15
Lewis – *Appar*, Blue or Scarlet Flax	5	0.20
Totals	**100%**	**5.25 lbs/acre**

(15”-19” Precip Zone) Shallow Loamy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	13CC-05	SWSW	5	57N	76W	WYW149628
CABIN CREEK III CB	13WP-05	SWSW	5	57N	76W	WYW149628
CABIN CREEK III CB	03CC-08	NENW	8	57N	76W	WYW144211
CABIN CREEK III CB	03WP-08	NENW	8	57N	76W	WYW144211
CABIN CREEK III CB	05CC-08	SWNW	8	57N	76W	WYW151710
CABIN CREEK III CB	05WP-08	SWNW	8	57N	76W	WYW151710
CABIN CREEK III CB	11CC-08	NESW	8	57N	76W	WYW151710
CABIN CREEK III CB	11WP-08	NESW	8	57N	76W	WYW151710
CABIN CREEK III CB	13CC-08	SWSW	8	57N	76W	WYW151710
CABIN CREEK III CB	13WP-08	SWSW	8	57N	76W	WYW151710
CABIN CREEK III CB	09CC-12	NESE	12	57N	77W	WYW144218
CABIN CREEK III CB	09WP-12	NESE	12	57N	77W	WYW144218

CABIN CREEK III CB	03CC-18	NWNE	18	57N	76W	WYW147339
CABIN CREEK III CB	03WP-18	NWNE	18	57N	76W	WYW147339
CABIN CREEK III CB	11CC-18	NESW	18	57N	76W	WYW147339
CABIN CREEK III CB	11WP-18	NESW	18	57N	76W	WYW147339
CABIN CREEK III CB	17CC-18	NENW	18	57N	76W	WYW147339
CABIN CREEK III CB	17WP-18	NENW	18	57N	76W	WYW147339
CABIN CREEK III CB	18CC-18	NWNW	18	57N	76W	WYW147339
CABIN CREEK III CB	18WP-18	NWNW	18	57N	76W	WYW147339
CABIN CREEK III CB	21CC-18	SWNW	18	57N	76W	WYW144212
CABIN CREEK III CB	21WP-18	SWNW	18	57N	76W	WYW144212
CABIN CREEK III CB	23CC-18	NESW	18	57N	76W	WYW147339
CABIN CREEK III CB	23WP-18	NESW	18	57N	76W	WYW147339
CABIN CREEK III CB	24CC-18	NWSW	18	57N	76W	WYW147339
CABIN CREEK III CB	24WP-18	NWSW	18	57N	76W	WYW147339
CABIN CREEK III CB	27CC-18	SWSW	18	57N	76W	WYW147339
CABIN CREEK III CB	27WP-18	SWSW	18	57N	76W	WYW147339

Species - *Cultivar*	**% in Mix**	**Lbs PLS**
Western Wheatgrass – *Rosana*	20	1.2
Bluebunch Wheatgrass – *Secar or P-7*	30	2.1
Idaho Fescue -- *Joseph*	30	1.2
American Vetch **OR** Cicer Milkvetch -- *Lutana*	10	0.70
Winterfat – *Open Range*	5	0.40
Lewis – *Appar,* Blue or Scarlet Flax	5	0.20
Totals	**100%**	**5.8 lbs/acre**

(15”-19” Precip Zone) Very Shallow sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	05CC-17	SWNW	17	57N	76W	WYW144212
CABIN CREEK III CB	05WP-17	SWNW	17	57N	76W	WYW144212
CABIN CREEK III CB	12CC-17	NWSW	17	57N	76W	WYW144212
CABIN CREEK III CB	12WP-17	NWSW	17	57N	76W	WYW144212
CABIN CREEK III CB	07CC-18	SWNE	18	57N	76W	WYW144212
CABIN CREEK III CB	07WP-18	SWNE	18	57N	76W	WYW144212
CABIN CREEK III CB	15CC-18	SWSE	18	57N	76W	WYW172627
CABIN CREEK III CB	15WP-18	SWSE	18	57N	76W	WYW172627

Species - *Cultivar*	**% in Mix**	**Lbs PLS**
Western Wheatgrass – *Rosana* **OR** Thickspike Wheatgrass -- *Critana*	15	0.90
Bluebunch Wheatgrass – *Secar or P-7*	50	3.5
Idaho Fescue – *Joseph* **OR** Spike Fescue	20	0.80
American Vetch **OR** Cicer Milkvetch -- *Lutana*	10	0.70
Lewis – *Appar,* Blue or Scarlet Flax	5	0.20
Totals	**100%**	**6.1 lbs/acre**

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

Wildlife

1. The following conditions will minimize impacts to nesting and roosting bald eagles:
   a. No surface disturbing activity shall occur within one mile of the bald eagle roosts (NWSW Section 12, NWSW Section 16, and SENE Section 15, T57N, R76W) annually from November 1 through April 1. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
57/76	**8**	**Wells: 09-08-5776CC/WP and 15-08-5776CC/WP** **ALL** project related activities within the **SESE ¼ ¼** of this section.
57/76	**9**	**ALL** project related activities within the **SW ¼** of this section.
57/76	**10**	**Wells: 07-10-5776CC/WP** **ALL** project related activities within the **SWNE and SENE ¼ ¼s and the SW ¼** of this section.
57/76	**17**	**Wells: 01-17-5776CC/WP** ALL project related activities within the **NENW, SENW, NESW, and SESW ¼ ¼s and the eastern ½** of this section.

   b. No surface disturbing activity shall occur within one mile of bald eagle habitat (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
57/76	**8**	**Wells: 09-08-5776CC/WP, 11-08-5776CC/WP, and 15-08-5776CC/WP** **ALL** project related activities within the **NESW and SESW ¼ ¼s and the SE ¼** of this section.
57/76	**9**	**ALL** project related activities within the **southern 2/3** of this section.
57/76	**10**	**Wells: 07-10-5776CC/WP** **ALL** project related activities within the **NE and SW 1/4s** of this section.
57/76	**16**	**ALL** project related activities within this **ENTIRE** section.
57/76	**17**	**Wells: 01-17-5776CC/WP, 04-17-5776CC/WP, 05-17-5776CC/WP, 12-17-5776CC/WP, 13-17-5776CC/WP** **ALL** project related activities within this **ENTIRE** section.
57/76	**18**	**Wells: 15-18-5776CC/WP** **ALL** project related activities within the **SESE ¼ ¼** of this section.

c. 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.

d. 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).

e. 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;

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
57/76	**4**	**Well: 15-4-5776CC/WP** **ALL** project related activities within the **SE ¼** of this section.
57/76	**5**	**Well: 13-5-5776CC/WP** **ALL** project related activities within the **SW ¼** of this section.
57/76	**7**	**ALL** project related activities within the **NE ¼** of

Township/Range	Section	Wells and Infrastructure
		this section.
57/76	**8**	**ALL** project related activities within the **NWNW, NENW, and NWNE ¼ ¼s** of this section.
57/76	**9**	**Well: 01-09-5776CC/WP** **ALL** project related activities **north of the 01-09 well** within this section.
57/76	**16**	**ALL** project related activities within the **eastern** ½ of this section.
57/76	**17**	**Wells: 05-17-5776CC/WP and 12-17-5776CC/WP** **ALL** project related activities **west of the 05-17 and 12-17** wells within this section.
57/76	**18**	**Wells: 03-18-5776CC/WP, 07-18-5776CC/WP, 08-18-5776CC/WP and 11-18-5776CC/WP** **ALL** project related activities within the **eastern** ½ of this section.

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

b. Nest productivity checks shall be completed for all raptor nests within the Cabin Creek III 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	Legal Location	UTMs (NAD83)	Species
4036	NESE Sec. 4 T57N, R76W	417557E, 4977674N	RTHA
4037	SWSE Sec. 5 T57N, R76W	420794E, 4977995N	RTHA
623	SESE Sec. 6 T57N, R76W	418681E, 4977820N	GOEA
4040	SENE Sec. 18 T57N, R76W	417231E, 4975166N	RTHA

c. Routine maintenance should be scheduled outside the nesting season (Feb 1-July 31) for all active nests.

3. A mountain plover nesting survey is desired in suitable habitat prior to commencement of surface disturbing activities in the prairie dog towns. If the survey is not conducted prior to commencement of surface disturbing activities, it shall be conducted during the first breeding season following POD approval. No surface disturbing activities are permitted in the 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
57/76	8	**Wells: 01-08-5776CC/WP, 09-08-5776CC/WP** **ALL** project related activities within the **NENE, NESE and SESE ¼ ¼s** of this section.
57/76	9	**Wells: 03-09-5776CC/WP** **ALL** project related activities within the **NW, SW, and SE ¼s** of this section.

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

4. The following conditions will minimize impacts to sage-grouse:
   a. No surface disturbing activities are permitted within 2 miles of a sage grouse lek between March 1 and June 15, prior to completion of a greater sage grouse lek survey. This condition will be implemented on an annual basis for the duration of surface disturbing activities. This timing limitation will affect the following:

Township/Range	Section	Affected Wells and Infrastructure
57/76	**7**	**ALL** project related activities within the **SW ¼** of this section.
57/76	**17**	**Wells: 12-17-5776CC/WP and 13-17-5776CC/WP** **ALL** project related activities within the **NESW and SWSW ¼ ¼s** of this section.
57/76	**18**	**Wells: 03-18-5776CC/WP, 05-18-5776CC/WP, 07-18-5776CC/WP, 08-18-5776CC/WP, 11-18-5776CC/WP, 13-18-5776CC/WP, 15-18-5776CC/WP, 17-18-5776CC/WP, 18-18-5776CC/WP, 21-18-5776CC/WP, 23-18-5776CC/WP, 24-18-5776CC/WP, and 27-18-5776CC/WP** **ALL** project related activities within this **ENTIRE** section.
57/77	**12**	**Well: 09-12-5776CC/WP** **ALL** project related activities within this section.

   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). 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.

c. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
d. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15).

5. All other conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) shall be complied with.

2.4. Alternatives considered but not analyzed in detail

The operator did not address alternative water management strategies such as irrigation, impoundments, or direct discharge of untreated by-product water. This project proposed to transmit all produced water to a treatment facility and discharge point approved under the Cabin Creek Phase I plan of development (WY-070-EA07-057). However, additional "beneficial uses" were mentioned on page 13 of the water management plan under the heading "Beneficial Use".

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on August 2, 2006. Field inspections of the proposed Cabin Creek Phase III CBM project were conducted on 12/5/2006 - 12/7/2006 by the following:

NAME	ORGANIZATION	DATES PRESENT
Jim Aksamit	Western Land Services	12/5-12/7
Allen Aksamit	Western Land Services	12/5-12/7
Allen Jones	Western Land Services	12/5
Brian Johnston	Pinnacle Gas Resources Inc.	12/5-12/7
Megan Crow	MC^2 Engineering	12/5 & 12/7
Lee Harrelson	BLM	12/7
Ben Adams	BLM	12/5
Arlene Kosic	BLM	12/5-12/7
Clint Crago	BLM	12/6
Mary Maddux	BLM	12/5-12/7
Clif Ritchie	Landowner	12/5
Jacob Kendrick	Prestfeldt Surveying	12/5-12/7

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species		X		Arlene Kosic
Floodplains	X			Ben Adams
Wilderness Values			X	Mary Maddux
ACECs			X	Mary Maddux
Water Resources	X			Ben Adams

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

3.1. Topographic Characteristics of Project Area

The Cabin Creek Phase III POD area is located 14 miles north of Highway 14 and 2 miles west of Lower Powder River County Road.

The topography of the project area is dominated by numerous ridges and steep draws. As you head east toward the Powder River the topography levels out with more rolling hills and flat areas. Some of the steep draws have active headcuts and erosion due to snow runoff and storm events. Little Remington Creek runs through the project area and Hells Half Acre is also located in the project. Elevation of the project area ranges from 3600 to 3900 feet above sea level. The primary use of the project area is livestock grazing.

3.2. Vegetation

Ecological Site Descriptions are used to provide soils and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field investigations and Natural Resources Conservation Service (NRCS) published soil survey soils information. The associated ecological sites found within the Cabin Creek Phase III POD boundary are listed in Table 3.2 below.

Table 3.2-Ecological Sites with Acreage

Cabin Creek Phase III Ecological Sites	Acres
SHALLOW LOAMY (15-19 NP)	1213
LOAMY (10-14 NP)	733
LOAMY (15-19 NP)	646
VERY SHALLOW (15-19 NP)	288
SHALLOW LOAMY (10-14NP)	119
SANDY (15-19 NP)	103
LOWLAND (15-19 NP)	74
SHALLOW CLAYEY (10-14 NP)	64
SANDY (10-14NP)	62

Dominate Ecological Sites and Plant Communities identified in this POD and its infrastructure are:

(15”-19”Precip Zone) Loamy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	01CC-08	NENE	8	57N	76W	WYW151710
CABIN CREEK III CB	01WP-08	NENE	8	57N	76W	WYW151710
CABIN CREEK III CB	07CC-08	SWNE	8	57N	76W	WYW151710
CABIN CREEK III CB	07WP-08	SWNE	8	57N	76W	WYW151710
CABIN CREEK III CB	09CC-08	NESE	8	57N	76W	WYW151710
CABIN CREEK III CB	09WP-08	NESE	8	57N	76W	WYW151710
CABIN CREEK III CB	04CC-17	NWNW	17	57N	76W	WYW144212
CABIN CREEK III CB	04WP-17	NWNW	17	57N	76W	WYW144212
CABIN CREEK III CB	13CC-17	SWSW	17	57N	76W	WYW144212
CABIN CREEK III CB	13WP-17	SWSW	17	57N	76W	WYW144212
CABIN CREEK III CB	05CC-18	SENW	18	57N	76W	WYW147339
CABIN CREEK III CB	05WP-18	SENW	18	57N	76W	WYW147339
CABIN CREEK III CB	08CC-18	SENE	18	57N	76W	WYW144212
CABIN CREEK III CB	08WP-18	SENE	18	57N	76W	WYW144212
CABIN CREEK III CB	13CC-18	SESW	18	57N	76W	WYW147339
CABIN CREEK III CB	13WP-18	SESW	18	57N	76W	WYW147339

This site occurs on land nearly level up to 50% slopes on landforms which include hill slopes and the associated alluvial fans and stream terraces, in the 15-19 inch precipitation zone.

The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained and moderately permeable.

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 is dominated by tall and midgrasses. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC sagebrush and other unpalatable forbs have become more dominant.

Dominant grasses identified include: western wheatgrass, bluebunch wheatgrass, and threadleaf sedge. Forbs identified include: prairieclovers and fringed sagewort. Other vegetative species identified at onsite include: Wyoming big Sagebrush and plains pricklypear.

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

(10"-14" Precip Zone) Loamy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	15CC-04	SWSE	4	57N	76W	WYW149628
CABIN CREEK III CB	15WP-04	SWSE	4	57N	76W	WYW149628
CABIN CREEK III CB	15CC-08	SWSE	8	57N	76W	WYW151710
CABIN CREEK III CB	15WP-08	SWSE	8	57N	76W	WYW151710
CABIN CREEK III CB	01CC-09	NENE	9	57N	76W	WYW151711
CABIN CREEK III CB	01WP-09	NENE	9	57N	76W	WYW151711

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	03CC-09	NENW	9	57N	76W	WYW151711
CABIN CREEK III CB	03WP-09	NENW	9	57N	76W	WYW151711
CABIN CREEK III CB	05CC-10	SWNW	10	57N	76W	WYW132268
CABIN CREEK III CB	05WP-10	SWNW	10	57N	76W	WYW132268
CABIN CREEK III CB	07CC-10	SWNE	10	57N	76W	WYW132268
CABIN CREEK III CB	07WP-10	SWNE	10	57N	76W	WYW132268
CABIN CREEK III CB	01CC-17	NENE	17	57N	76W	WYW144212
CABIN CREEK III CB	01WP-17	NENE	17	57N	76W	WYW144212

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 HCPC for this site would be a Rhizomatous Wheatgrasses, Needleandthread, Blue Grama Plant Community. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants.

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

Dominant grasses identified include: western wheatgrass, bluebunch wheatgrass, and threadleaf sedge. Forbs identified include: prairieclovers and fringed sagewort. Other vegetative species identified at onsite include: Wyoming big sagebrush, some downy brome and plains pricklypear.

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.

(15”-19” Precip Zone) Shallow Loamy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	13CC-05	SWSW	5	57N	76W	WYW149628
CABIN CREEK III CB	13WP-05	SWSW	5	57N	76W	WYW149628
CABIN CREEK III CB	03CC-08	NENW	8	57N	76W	WYW144211
CABIN CREEK III CB	03WP-08	NENW	8	57N	76W	WYW144211
CABIN CREEK III CB	05CC-08	SWNW	8	57N	76W	WYW151710
CABIN CREEK III CB	05WP-08	SWNW	8	57N	76W	WYW151710
CABIN CREEK III CB	11CC-08	NESW	8	57N	76W	WYW151710
CABIN CREEK III CB	11WP-08	NESW	8	57N	76W	WYW151710
CABIN CREEK III CB	13CC-08	SWSW	8	57N	76W	WYW151710
CABIN CREEK III CB	13WP-08	SWSW	8	57N	76W	WYW151710
CABIN CREEK III CB	09CC-12	NESE	12	57N	77W	WYW144218
CABIN CREEK III CB	09WP-12	NESE	12	57N	77W	WYW144218

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	03CC-18	NWNE	18	57N	76W	WYW147339
CABIN CREEK III CB	03WP-18	NWNE	18	57N	76W	WYW147339
CABIN CREEK III CB	11CC-18	NESW	18	57N	76W	WYW147339
CABIN CREEK III CB	11WP-18	NESW	18	57N	76W	WYW147339
CABIN CREEK III CB	17CC-18	NENW	18	57N	76W	WYW147339
CABIN CREEK III CB	17WP-18	NENW	18	57N	76W	WYW147339
CABIN CREEK III CB	18CC-18	NWNW	18	57N	76W	WYW147339
CABIN CREEK III CB	18WP-18	NWNW	18	57N	76W	WYW147339
CABIN CREEK III CB	21CC-18	SWNW	18	57N	76W	WYW144212
CABIN CREEK III CB	21WP-18	SWNW	18	57N	76W	WYW144212
CABIN CREEK III CB	23CC-18	NESW	18	57N	76W	WYW147339
CABIN CREEK III CB	23WP-18	NESW	18	57N	76W	WYW147339
CABIN CREEK III CB	24CC-18	NWSW	18	57N	76W	WYW147339
CABIN CREEK III CB	24WP-18	NWSW	18	57N	76W	WYW147339
CABIN CREEK III CB	27CC-18	SWSW	18	57N	76W	WYW147339
CABIN CREEK III CB	27WP-18	SWSW	18	57N	76W	WYW147339

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 15-19 inch precipitation zone.

The soils of this site are shallow (less than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from shale and sandstone. These soils have moderate permeability and may occur on all slopes. The main soil limitations include depth to bedrock.

The HCPC for this site would be a Rhizomatous Wheatgrasses/Needleandthread Plant Community. The potential vegetation is about 80% grasses or grass-like plants, 10% forbs, and 10% woody plants. A mix of warm and cool season mid-grasses dominate the state.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, sagebrush and blue grama have increased. Production of the cool season grasses have decreased.

Dominant grasses identified include: western wheatgrass, bluebunch wheatgrass, and threadleaf sedge. Forbs identified include: prairieclovers, western yarrow and fringed sagewort. Other vegetative species identified at onsite include: Wyoming big sagebrush, some downy brome, rabbitbrush and plains pricklypear.

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.

(10”14” Precip Zone) Shallow Loamy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	01CC-10	NENE	10	57N	76W	WYW144212
CABIN CREEK III CB	01WP-10	NENE	10	57N	76W	WYW144212

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 that formed in alluvium over residuum. 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 depth to bedrock low organic matter content, and soil droughtiness. The low annual precipitation should be considered when planning a seeding.

The HCPC for this site would be a Rhizomatous Wheatgrasses/Needleandthread, Blue Grama Plant Community. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. A mix of warm and cool season mid-grasses dominate the state.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, sagebrush and blue grama have increased. Bluebunch wheatgrass has decreased, often occurring only where protected from grazing by the sagebrush canopy. Production of cool-season grasses has also been reduced.

Dominant grasses identified include: western wheatgrass, bluebunch wheatgrass, and threadleaf sedge. Forbs identified include: prairieclovers, western yarrow and fringed sagewort. Other vegetative species identified at onsite include: Wyoming big sagebrush, some downy brome, rabbitbrush and plains pricklypear.

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.

(10”-14” Precip Zone) Sandy Sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	03CC-10	NENW	10	57N	76W	WYW132268
CABIN CREEK III CB	03WP-10	NENW	10	57N	76W	WYW132268

This site occurs on land nearly level up to 50% slopes on landforms which includes hillsides, plateaus, ridges and the associated alluvial fans and stream terraces, in the 10-14 inch precipitation zone.

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

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

The HCPC for this site would be a Needleandthread, Prairie sandreed plant community. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. The state is a mix of warm and cool season midgrasses

The present plant community is a *Needleandthread/Prairie sandreed*. The state is stable and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought resistance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity).

Dominant grasses identified include: western wheatgrass, needleandthread, and needleleaf sedge. Forbs identified include: prairieclovers and fringed sagewort.

Cool-season grasses are a significant component of this Needleandthread/Prairie sandreed plant community. Warm-season grasses make up the majority of the understory with the remainder being made up annual cool-season grasses, and various forbs.

(15"-19" Precip Zone) Very Shallow sites:

Well Name	Well #	QTR	Sec	TWP	RNG	Lease
CABIN CREEK III CB	05CC-17	SWNW	17	57N	76W	WYW144212
CABIN CREEK III CB	05WP-17	SWNW	17	57N	76W	WYW144212
CABIN CREEK III CB	12CC-17	NWSW	17	57N	76W	WYW144212
CABIN CREEK III CB	12WP-17	NWSW	17	57N	76W	WYW144212
CABIN CREEK III CB	07CC-18	SWNE	18	57N	76W	WYW144212
CABIN CREEK III CB	07WP-18	SWNE	18	57N	76W	WYW144212
CABIN CREEK III CB	15CC-18	SWSE	18	57N	76W	WYW172627
CABIN CREEK III CB	15WP-18	SWSE	18	57N	76W	WYW172627

This site occurs on steep slopes and ridge tops, but may occur on all slopes on landforms which includes hill sides, ridges and escarpments, in the 15-19 inch precipitation zone.

The soils of this site are very shallow (less than 10"to bedrock) well-drained soils formed in residuum. These soils have rapid to slow permeability and can be of any texture. This site usually occurs on steep slopes, but may be on any slope. The bedrock will include all kinds except soft clay shales, igneous and some volcanic.

The main soil limitations include: depth to bedrock, low organic matter content, low water holding capacity, and high wind erosion potential. Landslides may occur on all slopes, but they are dominant on the steep and very steep slopes that have a south or east facing aspect.

The HCPC for this site is dominated by tall and midgrasses. The potential vegetation is about 75% grasses or grass-like plants, 10% forbs, and 15% woody plants.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC sagebrush and other unpalatable forbs have become more dominate.

Dominant grasses identified include: western wheatgrass, bluebunch wheatgrass, and threadleaf sedge. Forbs identified include: prairieclovers and fringed sagewort. Other vegetative species identified at onsite include: Wyoming big sagebrush, rabbitbrush and plains pricklypear.

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

Wetlands/Riparian

The project area is characteristic of the large ephemeral systems found throughout the Powder River Basin. Little Remington Creek has the largest channel passing through the Cabin Creek III POD. It has riparian and wetland areas typical of large ephemeral drainages with occasional small stands of mature

cottonwood trees and numerous occurrences of individual trees. Scattered individual cottonwood trees can be found in other draws within the project area as well. No natural open water areas were observed within the project area during the onsite, except for the Powder River itself, which is outside the project area.

Major wetland and riparian areas do occur along the Powder River, with mature stands of cottonwoods, willows and other riverine species.

3.2.1. Invasive Species

The following state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of inventory maps or databases on the CBM Clearinghouse (http://www.cbmclearinghouse.info/). This database was created cooperatively by the University of Wyoming, BLM and local Weed and Pest offices. Additionally, the operator or BLM may have documented infestations during subsequent field investigations.

- leafy spurge
- Russian knapweed
- salt cedar

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

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 Western Land Services (2006 and 2007). Western performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, prairie dog colonies, and Ute ladies'-tresses orchid according to protocol in 2006 and 2007.

A BLM Biologist conducted a field visit on December 5, 6, 7, and 8th of 2006 and March 7, 2007. During this time, she reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the project area include pronghorn antelope and mule deer. The WGFD has determined the project area to be Yearlong and Winter Yearlong range for pronghorn antelope and mule deer and yearlong range for white-tailed deer.

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

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

3.3.2. Aquatics

The Cabin Creek III project area is located within the Little and Big Remington Creek watersheds of the Powder River. The remaining portion of the project area falls within a number of smaller unnamed ephemeral tributaries of the Powder River. Little Remington Creek, drains the majority of the western portion of Cabin Creek III, while only a small portion of the southwest corner of the project area falls within Big Remington Creek. The eastern and south-central portions of the project area are drained by seven unnamed smaller watersheds. Each of these tributaries are ephemeral in nature, only receiving water flows during runoff periods associated with snowmelt runoff or with high intensity low frequency precipitation events. (Western 2006)

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

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

3.3.3. Migratory Birds

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

3.3.4. Raptors

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

The BLM database and Western identified four raptor nests within 0.5 mile of the Cabin Creek III project area. Table 4 lists the species and activity status of these nests in 2007.

Table 4. Raptor Nests identified within 0.5 miles of the Cabin Creek III POD.

BLM ID	Legal Location	UTMs (NAD83)	Species	2007 Activity
4036	NESE Sec. 4 T57N, R76W	417557E, 4977674N	RTHA	Inactive
4037	SWSE Sec. 5 T57N, R76W	420794E, 4977995N	RTHA	Inactive
623	SESE Sec. 6 T57N, R76W	418681E, 4977820N	GOEA	Active
4040	SENE Sec. 18 T57N, R76W	417231E, 4975166N	RTHA	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).

Active reintroduction efforts of black-footed ferrets have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 1988, the WGFD identified four prairie dog complexes (Arvada, Recluse, Thunder Basin National Grasslands, and Midwest) partially or wholly within the BLM BFO administrative area as potential black-footed ferret reintroduction sites (Oakleaf 1988). Today, the WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Western Mountains (Grenier 2003). The USFWS has also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

Six prairie dog towns are located within the project area. The towns total approximately 1, 170 acres. However, only 438 acres are currently active. The Cabin Creek III project area is located approximately six miles west of the Recluse potential reintroduction complex.

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 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

The Cabin Creek III project area is located within the Little and Big Remington Creek watersheds of the Powder River. The remaining portion of the project area falls within a number of smaller unnamed ephemeral tributaries of the Powder River. Little Remington Creek, drains the majority of the western portion of Cabin Creek III, while only a small portion of the southwest corner of the project area falls within Big Remington Creek. The eastern and south-central portions of the project area are drained by seven unnamed smaller watersheds. Each of these tributaries are ephemeral in nature, only receiving water flows during runoff periods associated with snowmelt runoff or with high intensity low frequency precipitation events. (Western 2006). The project area was evaluated for potential Ute Ladies'-tresses orchid habitat and none was identified (Cooper 2006).

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 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.

The Cabin Creek III project area is highly suited for bald eagle roosting and nesting. Roosting habitat is present along the Powder River and in upland areas containing mature ponderosa pine trees. Roosting habitat is found in the form of cottonwood trees and large ponderosa pines (both dead and live). Surveys conducted for roosting bald eagles identified eagles utilizing cottonwood habitat along the Powder River and Fence Creek. Western observed 35 eagles during surveys conducted during 2006-2007 surveys and 6 during 2005-2006 surveys. The locations for 2006-2007 surveys are listed below.

Date	***Easting***	***Northing***	***T:R:S***	***Number of Eagles***	
				Adults	Juvenile
12/6/2006	424500	4976504	57:76:12	8	7
12/14/2006	424500	4976504	57:76:12	2	2
12/14/2006	424908	4976562	57:76:12	2	0
1/10/2007	424500	4976504	57:76:12	8	1
1/10/2007	422137	4979088	58:76:34	1	0
1/10/2007	419733	4974747	57:76:16	1	0
1/10/2007	419303	4973939	57:76:20	1	0
1/10/2007	416813	4971628	57:76:30	2	0
Total				***25***	***10***

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.

Six prairie dog towns were identified within the Cabin Creek III project area. The size, activity status, and locations of the towns are listed below.

T:R:S	**Easting**	**Northing**	**Total Acres**	**Active Acres**
57:76:15	4975500	420150	842	100
57:76:8	4976100	419200	35	35
57:76:7	4976400	416500	53	53
57:76:18	4974817	416506	5	5
57:76:19	4973600	415400	226	226
57:76:10	4977015	422357	9	9

3.3.5.2.3. Greater sage-grouse

Sage-grouse 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).

The Cabin Creek III project area is suited for sage-grouse breeding, nesting, and wintering grounds. The Big Remington Creek lek is located 0.64 mile south southwest of the project area. A new lek was thought to be found in 2006 (2 males were observed displaying). No additional observations of grouse have been recorded for this location. Western conducted aerial and ground surveys for sage-grouse and sharp-tailed grouse in 2006 and 2007. The Big Remington lek was active during both years and no birds were identified at the new lek in 2007. Additionally, no sharp-tailed grouse were identified.

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 present within the Cabin Creek III project area. Six prairie dog towns exist within the project area. Surveys were conducted in 2006 and 2007. No mountain plovers were observed.

3.4. West Nile Virus

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

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

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

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007	37	2	None reported	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 Middle Powder River drainage system. This drainage begins at the Powder River's confluence with Clear Creek approximately 6 miles upstream of this POD's boundary.

3.5.1. Groundwater

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring and Siting Requirements for Unlined

Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

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

The PRB EIS Record of Decision includes a Monitoring, Mitigation and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation 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 related to groundwater, the plan identified the following (PRB EIS ROD page E-4):

- The effects of infiltrating 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 CBNG impoundments
- Shallow groundwater wells would be installed and monitored where necessary

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

The BLM 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 had a battery of nineteen wells which were installed and monitored jointly by the BLM and USGS starting in August of 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment site, which has since been reclaimed, 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 indicated 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.

The WDEQ implemented requirements for monitoring shallow groundwater of Class III or better quality under unlined CBNG water impoundments effective August 1, 2004. The intent is to identify locations where the impoundment of water could potentially degrade any existing shallow groundwater aquifers.

These investigations are conducted where discharged water will be detained in existing or proposed impoundments. If shallow groundwater is detected and the water quality is determined to fall within the Class III or better class of use (WDEQ Chapter 8 classifications for livestock use), operators are required to install batteries of 1 to 3 wells, develop a monitoring plan and monitor water levels and quality. The results of these investigations have yet to be analyzed and interpreted.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 29 registered stock and domestic water wells within 1 mile of the POD boundary. These wells have depths ranging from 147 to 620 feet below the ground surface. Two of these wells, Kendrick #152 and Kendrick #102 appear to be "flowing" wells (negative static water levels). 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 majority of the project area lies within the Little Remington and Big Remington drainages. The remainder of the project falls within a number of smaller unnamed drainages. All are tributaries to the Middle Powder River watershed. The project area is characteristic of the large ephemeral systems found throughout the Powder River Basin. Little Remington Creek has the largest channel passing through the Cabin Creek III POD. All of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt – PRB FEIS Chapter 9 Glossary). The channels range from steep-sided narrow gully systems to wide, broad-bottomed, well vegetated grassy swales without well defined beds and banks. They are characteristic of land forms created by a combination of high intensity short duration thunderstorms and slumping of large blocks of gully sides.

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 Middle Powder River, the EC ranges from 1421 at Maximum monthly flow to 2154 at Low monthly flow and the SAR ranges from 3.92 at Maximum monthly flow to 4.62 at Low monthly flow. These values were determined at the USGS gaging station located on the Powder River at Moorhead, Montana. For the Upper Powder River, these parameters range from 1797 to 3400 for EC and 4.76 to 7.86 for SAR, determined at the Powder River gage at Arvada, Wyoming. It is interesting to note that the 7Q10 flow (the lowest flow during 7 consecutive days with a 10-year recurrence interval -- PRB FEIS page 3-40) for the Arvada, Wyoming gage is 0, and for the Moorhead, Montana gage is 0.3 cfs (PRB FEIS page 3-49).

The operator has stated that no natural springs were identified within this POD's boundary.

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 inventories were conducted for the Cabin Creek III project prior to on-the-ground project work (BFO project #'s 70060265, 70060265a, 70060265b). Western Land Services, Inc., conducted the Class III inventories following the Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48FR190) for the proposed project. Clint Crago, BFO archaeologist, reviewed the reports for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined them to be adequate. The following resources are located within the

Area of Potential Effect (APE).

Table 3.6 Cultural Resource Sites Identified within the Cabin Creek III Project Area

Site Number	Site Type	NHRP Eligibility
48SH150	Prehistoric Lithic Scatter	Unevaluated
48SH151	Rockshelter, cave, overhang	Not Eligible
48SH152	Prehistoric Stone Circle	Not Eligible
48SH153	Prehistoric Lithic Scatter	Not Eligible
48SH155	Prehistoric Lithic Scatter	Unevaluated
48SH157	Prehistoric Lithic Scatter	Not Eligible
48SH471	Historic Homestead	Not Eligible
48SH1414	Prehistoric Artifact Scatter	Not Eligible
48SH1415	Prehistoric Lithic Scatter	Not Eligible
48SH1416	Prehistoric Artifact Scatter	Not Eligible
48SH1417	Historic Foundations and Artifact Scatter	Not Eligible
48SH1418	Prehistoric Lithic Scatter	Not Eligible
48SH1419	Prehistoric Artifact Scatter	Not Eligible
48SH1420	Prehistoric Lithic Scatter	Not Eligible
48SH1421	Historic Homestead	Not Eligible
48SH1422	Historic Graffiti/ Prehistoric Artifact Scatter	Not Eligible
48SH1423	Historic Graffiti/ Prehistoric Artifact Scatter	Not Eligible
48SH1424	Prehistoric Lithic Scatter	Not Eligible
48SH1425	Prehistoric Lithic Scatter	Not Eligible
48SH1426	Prehistoric Lithic Scatter	Not Eligible
48SH1427	Prehistoric Lithic Scatter	Eligible
48SH1428	Prehistoric Features and Artifact Scatter	Eligible
48SH1429	Prehistoric Feature	Not Eligible
48SH1430	Prehistoric Lithic Scatter	Not Eligible
48SH1544	Prehistoric Lithic Scatter	Not Eligible
48CA6317	Prehistoric Features and Artifact Scatter	Not Eligible

Site Number	Site Type	NHRP Eligibility
48CA6318	Prehistoric Lithic Scatter	Not Eligible
48CA6319	Prehistoric Lithic Scatter	Eligible
48CA6320	Prehistoric Lithic Scatter	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation

Impacts to vegetation and soils from surface disturbance will be reduced, based on the operator's plans and BLM applied mitigation. Of the 70 proposed well locations, 55 can be drilled without a well pad being constructed and 15 will definitely require a constructed (cut & fill) well pad. As such, surface disturbance would occur with the drilling of the 55 wells without pads. This disturbance would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 12 x 30 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 55 wells would involve approximately 0.2 acre/well for 11.0 total acres. The other 15 wells requiring cut & fill pad construction would disturb approximately 0.5 acre/well pads for a total of 7.5 acres. The total estimated disturbance for all 70 wells would be 18.5 acres. This long-term impact will be reduced through expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Approximately 9.0 miles of existing improved roads would be utilized to access various well locations. Approximately 5.46 miles of new and existing primitive roads 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 18.6 miles of disturbance corridor will be constructed along new and existing access routes. Approximately 1.7 miles of pipeline would be constructed outside of corridors. Approximately 6.3 miles of overhead electrical lines would be constructed. 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.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	55	0.2 acre/well	11	Long Term
Constructed Pad	15	0.5 acre/well	7.5	
Gather/Metering Facilities	0	Site Specific	0	Long Term
Screw Compressors	0	Site Specific	0	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments				
On-channel	0 0	Site Specific	0.0	
Off-channel	0	Site Specific	0.0	Long Term
Water Discharge Points	1**	0.01 ac/WDP	0.0	
Channel Disturbance				
Headcut Mitigation	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Proposed Improved Roads				
No Corridor	0	40’ Width	0	Long Term
With Corridor	0	40’ Width	0	
Existing Improved Roads				
No Corridor	6.04	28’ Width	20.5	Long Term
With Proposed Corridor	2.94	40’ Width	14.3	
Proposed Primitive Roads				
No Corridor	0.59	14’ Width	1.0	Long Term
With Corridor	4.92	40’ Width	23.9	
Existing Primitive Roads				
No Corridor	4.87	14’ Width	8.3	Long Term
With Proposed Corridor	9.4	40’ Width	45.6	
Pipelines				
No Corridor	1.68	40’ Width	8.2	Short Term
In Corridor w/o Road	1.33	40’ Width	2.3	
Buried Power Cable				
No Corridor	0	12’ Width	0	Short Term
Overhead Powerlines	6.25	30’ Width	22..7	Long Term
Additional Disturbance		Site Specific	0	

**One discharge point directly to the Powder River was identified and analyzed under the EA for the Cabin Creek Phase I POD (EA# WY-070-07-057, approved 4/9/07)

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

4.2. Soils

Under alternative C 70 federal wells would be drilled (see description of alternatives). The topographical, ecological and soils in this area are diverse. There are many areas which will be reclaimed by traditional methods, alleviating the overall impact of the project. However, some areas will be challenging for reclamation due to soil properties and/or site characteristics. The proponent with BLM's assistance planned their project to avoid those areas where possible, however the proposed action will affect some areas of soils with a limited potential for successful reclamation. Disturbances within these areas require the programmatic/standard COA's be complimented with a site specific performance based reclamation related COA.

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

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

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

Soil compaction by vehicle traffic results in the collapse of soil pores reducing the transmissivity of water and air. Compaction decreases infiltration thus increasing runoff and hazard of water erosion. The potential for compaction is greatest when soils are wet. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction in these areas may be reduced by remedial action such as plowing or ripping.

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

4.2.1. Wetland/Riparian

The water management strategy proposed for this development is treatment of all produced water and direct discharge to the Powder River. This project is expected to contribute 700 gpm or 1.6 cfs to the river.

4.2.2. Invasive Species

Utilization of existing facilities and surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. The activities related to the performance of the proposed project would create a favorable environment for the continuing spread of noxious weeds/invasive plants such as salt cedar, leafy spurge and Russian knapweed that are currently present in the project area. As these species are all ready established, eradication of the species would be virtually impossible. The proponent has committed to an integrated approach to control known noxious weeds or weeds of concern throughout the life of the project. The integrated approach uses a combination of methods such as education, cultural, physical, biological and chemical. Within this project the overall goal is to prevent the current populations from growing and expanding into newly disturbed areas as a result of CBNG development.

4.2.3. Cumulative Effects

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

On its own, the flow added as a result of this POD will be undetectable except during periods of low flow which generally occur from late summer through late winter/early spring. However, the total discharge which will occur at this location will be a summation of all Cabin Creek phases, including fee development, which the operator chooses to add to the treatment facility. Phases I, II and III, as proposed, will add 2540 gpm (5.7 cfs) to the treatment plant. The operator's WYPDES permit, WY0051934, allows a total discharge of 12.93 MGD (20 cfs) from treatment facilities along 80 miles of the Powder River upstream of the Montana line. This water, distributed along 80 miles of river, will be nearly undetectable except during periods of very low flow.

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

- They are proportional to the actual amount of cumulatively produced water in the Middle Powder River drainage and the total amount that was predicted in the PRB FEIS, which is approximately 41% of that total (see section 4.4.2.1).
- 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 the Powder River and to modify their water management strategy, if necessary, to prevent significant volumes of water from flowing into the Middle Powder River Watershed.

4.3. Wildlife

4.3.1. Big Game Direct and Indirect Effects

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

vegetation becomes established. Although, when these reclaimed areas are located along road sides, vehicular collisions may increase.

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

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

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

4.3.1.1. 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.

4.3.2. Aquatics Direct and Indirect Effects

All produced CBNG water will be piped to a water treatment facility approved in the Cabin Creek I POD. Treated water from this project will be discharged directly into the Powder River via a single outfall. (Western 2006)

This project is expected to contribute 700 gpm or 1.6 cfs to the River.

Change in Water Quality

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

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

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

Change In Water Quantity

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

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

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

4.3.2.1. Cumulative effects

On its own, the flow added as a result of this POD will be undetectable except during periods of low flow which generally occur from late summer through late winter/early spring. However, the total discharge which will occur at this location will be a summation of all Cabin Creek phases, including fee development, which the operator chooses to add to the treatment facility. Phases I, II and III, as proposed, will add 2540 gpm (5.7 cfs) to the treatment plant.

The operator's WYPDES permit, WY0051934, allows a total discharge of 12.93 MGD (20 cfs) from treatment facilities along 80 miles of the Powder River upstream of the Montana line. This water, distributed along 80 miles of river, will be nearly undetectable except during periods of very low flow.

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.

4.3.3. 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).

4.3.3.1. 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.

4.3.4. Raptors Direct and Indirect Effects

The 9-4 well location was originally proposed less than 0.25 miles and in direct line of sight of a raptor nest. Due to this and concerns with the road corridor, the well was removed from the project. The 8-18, 9-18, 7-18, and 3-8 well locations were proposed less than 0.25 miles from nest locations; however, none of the wells were in direct line of site of the wells and were not relocated.

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

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

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

4.3.4.1. 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.

4.3.5. 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 are summarized in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.3.5.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable active habitat of insufficient size.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	NE	Historically perennial water present, no orchids identified.

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

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

4.3.5.1.1. Black-footed ferret

The 9-8 and 15-4 wells and their associated infrastructure are proposed within prairie dog towns. Neither of the wells or their infrastructure were moved due to poisoning activities conducted by the landowner. It is highly unlikely that ferrets are present and the suitable habitat is insufficient in size to support ferrets. Implementation of the proposed development should have "***no effect***" on the black-footed ferret.

4.3.5.1.2. Ute's Ladies Tresses Orchid

All produced CBNG water will be piped to a water treatment facility approved in the Cabin Creek I POD. Treated water will be discharged directly into the Powder River via a single outfall. (Western 2006)

Well locations and their related infrastructure are proposed in dry upland vegetation with no source of perennial water. No populations of orchids or natural springs have been identified within the project area. Proposed discharge point location along the Powder River was surveyed in 2006 and no orchids or potential habitat was identified. Implementation of the proposed project should have "***no effect***" on the Ute ladies'-tresses orchid as suitable habitat is not present.

4.3.5.2. Sensitive Species Direct and Indirect Effects

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

Table 4.3 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	Overhead power lines proposed and increased human activity 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	Disturbance proposed in prairie dog towns.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Grassland and shrubland habitats will be affected.
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	S	WIPV	Sagebrush cover will be affected.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	S	MIIH	Grasslands will be affected.
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	S	MIIH	Prairie will be affected.
Northern goshawk (*Accipiter gentilis*)	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon (*Falco peregrinus*)	cliffs	NP	NI	No nesting habitat present.

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

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

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

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

4.3.5.2.1. Bald eagle

A year-round disturbance-free buffer has been placed within 0.5 mile of documented roost sites. A timing limitation restriction has also been placed on all CBNG activity proposed within 1.0 mile of these roosts sites. Three bald eagle roost sites, one communal and two consistent use, were identified within close proximity to the project area during 2006 and 2007 surveys. The communal roost is located in NWSW Section 12, T57N, R76W. Construction of wells, pits and their associated infrastructure proposed with the Cabin Creek III project will be affected by neither the disturbance-free buffer nor the timing restriction of this roost. The second roost is located in NWSW Section 16, T57N, R76W. The third roost is located in SENE Section 15, T57N, R76W. Construction of wells, pits and their associated infrastructure proposed with the Cabin Creek III project will not be affected by the disturbance-free buffers of either of these roosts, but proposed construction within Sections 8, 9, 10 and 17, T57N, R76W will be restricted from occurring between November 1 and April 1, annually.

The proposed project is likely to impact bald eagles due to the presence of proposed powerlines. Pinnacle proposes 6.25 miles of three phase overhead powerlines throughout the project area. Approximately 1.7 miles of overhead power exists within the project boundaries and over 15 miles of overhead power is located south of the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002).

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

4.3.5.2.2. Black-tailed prairie dog

The 9-8 and 15-4 wells and their associated infrastructure are proposed within prairie dog towns. Neither of the wells or their infrastructure were moved due to poisoning activities conducted by the landowner. Disturbance to black-tailed prairie dogs and their habitat will occur from the implementation of this project.

4.3.5.2.3. Greater sage-grouse

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

The presence of overhead power lines and roads within the project area may adversely affect sage grouse. Overhead power lines create hunting perches for raptors, thus increasing the potential for predation on sage-grouse. Increased predation from overhead power near leks may cause a decrease in lek attendance

and possibly lek abandonment. Overhead power lines are also a collision hazard for sage grouse flying through the area. Increased roads and mineral related traffic can affect grouse activity and reduce survival (Braun et al. 2002). Activity along roads may cause nearby leks to become inactive over time (WGFD 2003).

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

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

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

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

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

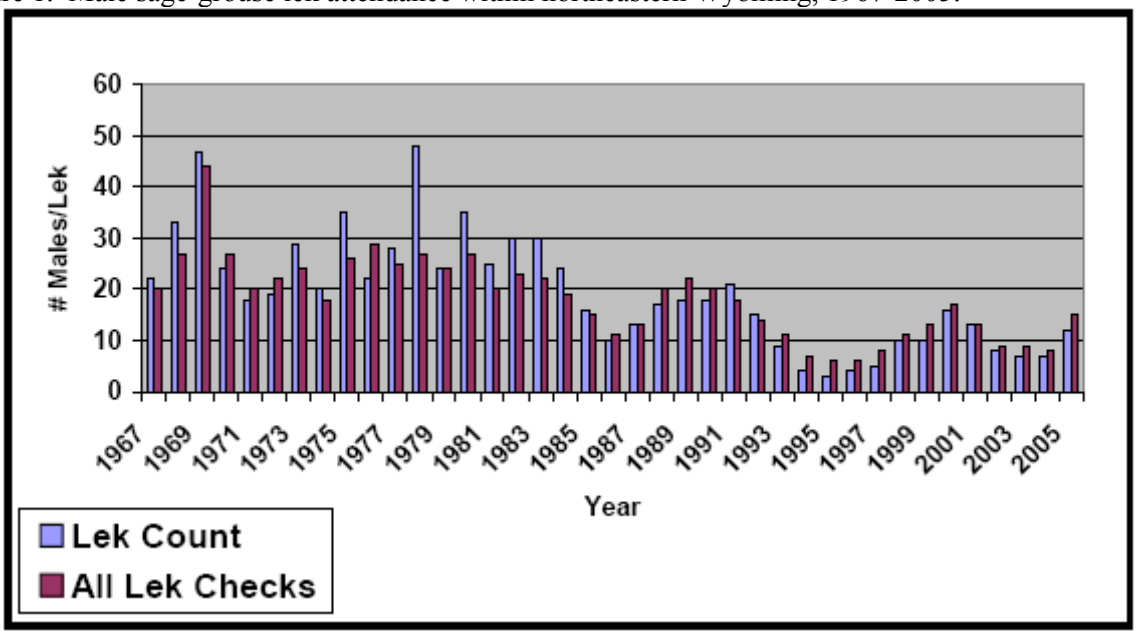
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently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

Vegetation communities within the Powder River Basin are naturally fragmented as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. Without contiguous habitat available to nesting grouse it is likely a smaller percentage of grouse nest within two-miles of a lek within the PRB than grouse within those areas studied in the development of the 1977 WAFWA recommendations and even the Holloran and Moynahan study areas. Holloran and Moynahan both studied grouse in areas of contiguous sagebrush habitats without large scale fragmentation and habitat conversion (Moynahan et al In press, Holloran and Anderson 2005). A recent

sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within Hollaran and Anderson's Upper Green River Basin study area to be 58% with an average patch size greater than 1200 acres; meanwhile Powder River Basin sagebrush coverage was estimated to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size decreased by more than 63% in forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). Recognizing that many populations live within fragmented habitats and nest much farther than two miles from the lek of breeding WAFWA revised their sage grouse management guidelines (Connelly et. al. 2000) and now recommends the protection of suitable habitats within 5 km (3.1 mi) of leks where habitats are not distributed uniformly such as the Powder River Basin.

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

Figure 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).

4.3.5.2.4. Mountain plover

The 9-8 and 15-4 wells and their associated infrastructure are proposed within prairie dog towns. Neither of the wells or their infrastructure were moved due to poisoning activities conducted by the landowner. Disturbance to mountain plover habitat will occur from the implementation of this project.

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.

4.4. West Nile Virus

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

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

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

BLM will keep monitoring this issue by continuing to consult with the State agencies and the researchers working in the area in order to stay abreast of the most current developments and any need to apply mitigation. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

4.5. 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 water management strategy for this plan is to treat all produced water and discharge it (treated water) into the Powder River at facilities which were evaluated and analyzed in the Cabin Creek Phase I EA (WY-070-EA07-057). The WMP incorporates sound water management practices, monitoring of downstream impacts within the Middle Powder River watershed and a commitment to comply with Wyoming State water laws/regulations. It also addresses potential

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

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

The maximum water production is predicted to be 20.0 gpm per well or 1400 gpm (3.1 cfs or 2,253 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 Middle Powder River drainage, the projected volume produced within the watershed area was 9,897 acre-feet in 2007 (maximum production was estimated to have occurred in 2005at 12,328 acre-feet). As such, the volume of water resulting from the production of these wells is 23% of the total volume projected for 2007. This volume of produced water is within the predicted parameters of the PRB FEIS.

4.5.1. Groundwater

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 147 to 620 feet compared to 255-294 feet to the Cook-Canyon and 400-500 to the Wall-Pawnee. 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.

4.5.1.1. Groundwater Cumulative Effects:

As stated in the PRB FEIS, "The aerial extent and magnitude of drawdown effects on coal zone aquifers and overlying and underlying sand units in the Wasatch Formation also would be limited by the

discontinuous nature of the different coal zones within the Fort Union Formation and sandstone layers within the Wasatch Formation." (PRB FEIS page 4-64).

Development of CBM through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water "…cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBM development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5)." (PRB FEIS page 4-65.

4.5.2. Surface Water

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

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

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** µmhos/cm
Most Restrictive Proposed Limit –		2	1000
Least Restrictive Proposed Limit		10	3200
Powder River at Moorhead, Montana Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		 3.92 4.62	 1421 2154
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 # WY0051934 At discharge point	5000	NS**	2500
Predicted Produced Water Quality Cook-Canyon Wall-Pawnee	 1140 1560	 40.5 46.4	 1900 2460

**Not Specified

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 has a TDS which ranges from 1140 to 1560 mg/l 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 disclosure by the BLM.

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

To manage the produced water, one treatment facility and one outfall to the Powder River will be used. These facilities were reviewed as part of the operator's Cabin Creek Phase I plan of development (EA

number WY-070-EA07-057).

This project is expected to contribute 700 gpm or 1.6 cfs to the river. On its own, the flow added as a result of this POD will be undetectable except during periods of low flow which generally occur from late summer through late winter/early spring. However, the total discharge which will occur at this location will be a summation of all Cabin Creek phases, including fee development, which the operator chooses to add to the treatment facility. Phases I, II and III, as proposed, will add 2540 gpm (5.7 cfs) to the treatment plant. The operator's WYPDES permit, WY0051934, allows a total discharge of 12.93 MGD (20 cfs) from treatment facilities along 80 miles of the Powder River upstream of the Montana line. This water, distributed along 80 miles of river, will be nearly undetectable except during periods of very low flow.

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 occurred in 2005 at a total contribution to the mainstem of the Middle Powder River of 56 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 70 wells is anticipated to be a total of 1400.0 gpm or 3.1 cfs to the river. This incremental volume is statistically within the measurement capabilities for the volume of flow of the Powder River, except during periods of flood (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 4-11 (PRB-FEIS pg 4-101).

The operator provided an analysis of the potential development in the watershed within the project area (WMP page 9). Based on the area of Little Remington Creek watershed, 9.3 sq mi, and an assumed density of 2 wells per location every 80 acres, the potential exists for the development of 149 wells which could produce a maximum flow rate of 3000 gpm (6.7 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 6.7 cfs, is less than the volume of runoff estimated from the 2-year storm event for Little Remington Creek, 120 cfs.

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

Permit effluent limits were set at WY0051934, Part I, page 2):

pH	6.5 to 9.0
TDS	5000 mg/l max
Sulfates	3000 mg/l max
Radium 226	1 pCi/l max
Dissolved iron	250 µg/l max
Dissolved manganese	630 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	150 mg/l
Specific Conductance (EC), year-round	2500 µS/cm
Dissolved Sodium, March through October	270 mg/l
Dissolved Sodium, November through February	350 mg/l

The effluent limits outlined in the permit are protective of all existing downstream uses such as irrigation and fishing. The designated point of compliance identified for this permit is the end of the pipe at the discharge point into the Powder River.

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. WDEQ requires water quality sampling and analysis of the treated water at the outfall.

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

In-channel downstream impacts are addressed in the WMP for the Cabin Creek phase III POD prepared by Western Land Services for Pinnacle Gas Resources, Inc.

4.5.2.1. Surface Water Cumulative Effects

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

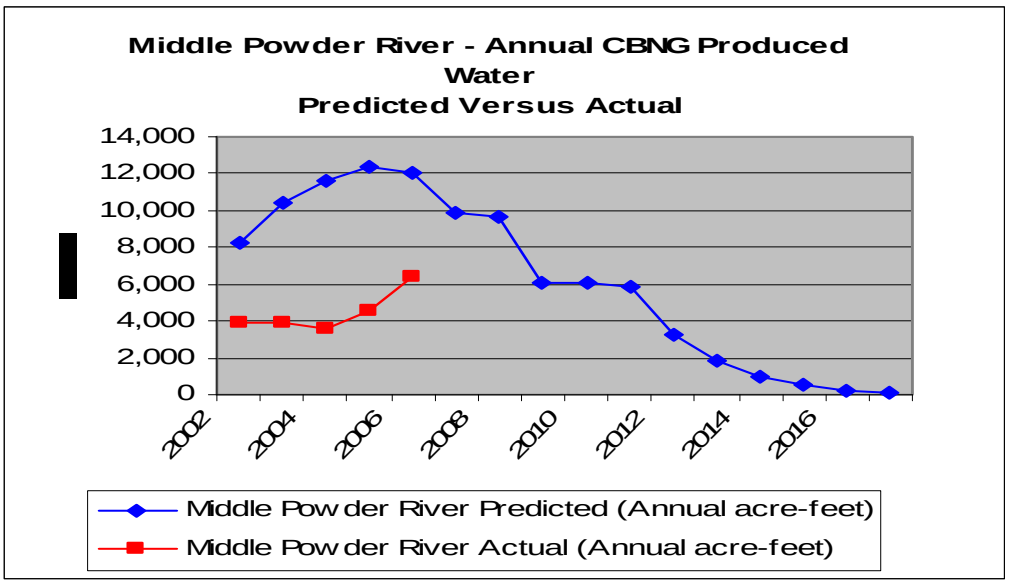
As of December 2006, all producing CBNG wells in the Middle Powder River watershed have discharged a cumulative volume of 22,292 acre-ft of water compared to the predicted 54,690 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 40.8 % of the total predicted produced water analyzed in the PRB FEIS for the Middle Powder River watershed.

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

Year	Middle Powder River Predicted (Annual acre-feet)	Middle Powder River Predicted (Cumulative acre-feet from 2002)	Middle Powder River Actual (Annual acre-feet)		Middle Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	8,257	8,257	3,929	47.6	3,929	47.6
2003	10,421	18,678	3,860	37.0	7,789	41.7
2004	11,640	30,318	3,547	30.5	11,336	37.4
2005	12,328	42,646	4,588	37.2	15,924	37.3
2006	12,044	54,690	6,368	52.9	22,292	40.8
2007	9,897	64,587				
2008	9,689	74,276				
2009	6,030	80,306				
2010	6,030	86,336				
2011	5,899	92,235				
2012	3,276	95,511				

2013	1,797	97,308				
2014	964	98,272				
2015	495	98,767				
2016	231	98,998				
2017	82	99,080				
Total	**99,080**		**22,292**			

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



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

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

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

1. They are proportional to the actual amount of cumulatively produced water in the Middle Powder River drainage and the total amount that was predicted in the PRB FEIS, which is approximately 41% of that total (see section 4.4.2.1).

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.

Through monitoring and adaptive management, additional mitigation measures may be required.

Refer to the PRB FEIS, Volume 2, page 4-99 – 108 and table 4-11 for cumulative effects relative to the Middle Powder River watershed and page 4-117 for cumulative effects common to all sub-watersheds.

4.6. Cultural Resources

Sites 48SH153, 48SH471, 48SH1419, 48SH1422, 48SH1544, 48CA6317 and 48CA6320 will be impacted by the project; however all are considered not eligible to the NRHP. No historic properties will be impacted by the project as proposed. The Bureau will require a monitoring stipulation for all construction activities across the Powder River floodplain due to a high potential for buried cultural deposits. On 4/17/07, the Bureau electronically notified the Wyoming State Historic Preservation Office (SHPO), following section V(A)(2) of the Wyoming State Protocol, that no historic properties were identified in the area of potential effect.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Mary Hopkins	Interim Wyoming SHPO	Wyoming SHPO	No
Brian Johnston	WY & MT Project Manager	Pinnacle Gas Resources	Yes
Brian Deurloo	Current WY & MT Project Manager	Pinnacle Gas Resources	No
Jim Aksamit	Senior Project Manager	Western Land Services	Yes
Allen Aksamit	Wildlife Biologist	Western Land Services	Yes
Allen Jones	Hydrologist	Western Land Services	Yes
Clif Ritchie		Surface Owner	Yes

6. OTHER PERMITS REQUIRED

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

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8. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS

Mary Maddux, Natural Resource Specialist
Casey Freise, Acting Supervisory Natural Resource Specialist
Ben Adams, Hydrologist
Dane Geyer, Petroleum Engineer
Becky Wilkerson, Legal Instruments Examiner
Clint Crago, Archaeologist
Arlene Kosic, Wildlife Biologist
Gerald Queen, Geologist
Lee Harrelson, Civil Engineer
Paul Beels, Associate Field Manager, Minerals & Lands
Buddy Green, Assistant Field Manager, Resources
Chris E. Hanson, Field Manager

Interdisciplinary Team Lead: Mary Maddux