

FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD

FOR

Lance Oil & Gas Company, Inc.

West Gas Draw Beta

ENVIRONMENTAL ASSESSMENT –WY-070-08-035

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Lance Oil & Gas Company, Inc.’s West Gas Draw Beta Coal Bed Natural Gas (CBNG) POD comprised of the following 61 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	W GAS DRAW BETA CARSON TRUST	43-2	NESE	2	54N	74W	WYW132246
2	W GAS DRAW BETA RULE TRUST	12-4	SWNW	4	54N	74W	WYW161252
3	W GAS DRAW BETA RULE TRUST	14-4	SWSW	4	54N	74W	WYW161252
4	W GAS DRAW BETA RULE TRUST	23-4	NESW	4	54N	74W	WYW161252
5	W GAS DRAW BETA RULE TRUST	32-4	SWNE	4	54N	74W	WYW161252
6	W GAS DRAW BETA RULE TRUST	41-4	NENE	4	54N	74W	WYW161252
7	W GAS DRAW BETA RULE TRUST	43-4	NESE	4	54N	74W	WYW161252
8	W GAS DRAW BETA RULE TRUST	31-4	NWNE	4	54N	74W	WYW161252
9	W GAS DRAW BETA D SPELLMAN	43-8	NESE	8	54N	74W	WYW161252
10	W GAS DRAW BETA SPELLMAN	41-8	NENE	8	54N	74W	WYW161252
11	W GAS DRAW BETA D SPELLMAN	23-9	NESW	9	54N	74W	WYW161252
12	W GAS DRAW BETA D SPELLMAN	34-9	SWSE	9	54N	74W	WYW161252
13	W GAS DRAW BETA RULE TRUST	21-9	NENW	9	54N	74W	WYW161252
14	W GAS DRAW BETA RULE TRUST	41-9	NENE	9	54N	74W	WYW161252
15	W GAS DRAW BETA D SPELLMAN	43-9	NESE	9	54N	74W	WYW161252
16	W GAS DRAW BETA D SPELLMAN	12-9	SWNW	9	54N	74W	WYW161252
17	W GAS DRAW BETA SPELLMAN	14-9	SWSW	9	54N	74W	WYW161252
18	W GAS DRAW BETA CARSON TRUST	21-10	NENW	10	54N	74W	WYW132246
20	W GAS DRAW BETA C&F RANCH	14-15W	SWSW	15	54N	74W	WYW143957
21	W GAS DRAW BETA C&F RANCH	21-15W	NENW	15	54N	74W	WYW143957
22	W GAS DRAW BETA C&F RANCH	12-15W	SWNW	15	54N	74W	WYW143957
23	W GAS DRAW BETA SPELLMAN	34-17	SWSE	17	54N	74W	WYW143958
24	W GAS DRAW BETA D SPELLMAN	12-17	SWNW	17	54N	74W	WYW143958
25	W GAS DRAW BETA D SPELLMAN	14-17	SWSW	17	54N	74W	WYW143958
26	W GAS DRAW BETA D SPELLMAN	23-17	NESW	17	54N	74W	WYW143958
27	W GAS DRAW BETA D SPELLMAN	21-18	NENW	18	54N	74W	WYW143958
28	W GAS DRAW BETA D SPELLMAN	23-18	NESW	18	54N	74W	WYW143958
29	W GAS DRAW BETA D SPELLMAN	32-18	SWNE	18	54N	74W	WYW144517
30	W GAS DRAW BETA D SPELLMAN	34-18	SWSE	18	54N	74W	WYW143958
31	W GAS DRAW BETA D SPELLMAN	43-18	NESE	18	54N	74W	WYW143958
19	W GAS DRAW BETA FEDERAL	13-19	NWSW	19	54N	74W	WYW137635
32	W GAS DRAW BETA FEDERAL	24-19	SESW	19	54N	74W	WYW137635
33	W GAS DRAW BETA FEDERAL	34-19	SWSE	19	54N	74W	WYW137635
34	W GAS DRAW BETA FEDERAL	43-19	NESE	19	54N	74W	WYW137635
37	W GAS DRAW BETA SORENSON RANCH	32-19	SWNE	19	54N	74W	WYW143958
38	W GAS DRAW BETA SORENSON RANCH	12-19	SWNW	19	54N	74W	WYW137635
39	W GAS DRAW BETA SORENSON RANCH	21-19	NENW	19	54N	74W	WYW137635
40	W GAS DRAW BETA SORENSON RANCH	31-19	NWNE	19	54N	74W	WYW143958
41	W GAS DRAW BETA SORENSON RANCH	32-20	SWNE	20	54N	74W	WYW143958
42	W GAS DRAW BETA SORENSON RANCH	34-20	SWSE	20	54N	74W	WYW143958
43	W GAS DRAW BETA SORENSON RANCH	43-20	NESE	20	54N	74W	WYW143958
44	W GAS DRAW BETA SORENSON RANCH	12-20	SWNW	20	54N	74W	WYW143958

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
45	W GAS DRAW BETA FEDERAL	14-21	SWSW	21	54N	74W	WYW143959
46	W GAS DRAW BETA FEDERAL	23-21	NESW	21	54N	74W	WYW143959
47	W GAS DRAW BETA FEDERAL	13-21	NWSW	21	54N	74W	WYW143959
48	W GAS DRAW BETA SORENSON	21-21	NENW	21	54N	74W	WYW143959
49	W GAS DRAW BETA SORENSON	41-21	NENE	21	54N	74W	WYW143959
50	W GAS DRAW BETA SORENSON RANCH	34-21	SWSE	21	54N	74W	WYW143959
51	W GAS DRAW BETA SORENSON RANCH	32-21	SWNE	21	54N	74W	WYW143959
52	W GAS DRAW BETA SORENSON RANCH	43-21	NESE	21	54N	74W	WYW143959
53	W GAS DRAW BETA SORENSON RANCH	12-22	SWNW	22	54N	74W	WYW143957
54	W GAS DRAW BETA SORENSON RANCH	14-22	SWSW	22	54N	74W	WYW143957
55	W GAS DRAW BETA SORENSON RANCH	21-22	NENW	22	54N	74W	WYW143957
56	W GAS DRAW BETA SORENSON RANCH	23-22	NESW	22	54N	74W	WYW143957
57	W GAS DRAW BETA TARVER	23-23	NESW	23	54N	74W	WYW132917
58	W GAS DRAW BETA TARVER	34-23	SWSE	23	54N	74W	WYW132917
59	W GAS DRAW BETA FEDERAL	43-24	NESE	24	54N	75W	WYW159215
35	W GAS DRAW BETA SORENSON	23-19	NESW	19	55N	74W	WYW129532
36	W GAS DRAW BETA SORENSON	43-19	NESE	19	55N	74W	WYW129532
60	W GAS DRAW BETA RULE TRUST	23-31	NESW	31	55N	74W	WYW143960
61	W GAS DRAW BETA RULE TRUST	23-32	NESW	32	55N	74W	WYW143960

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

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	Jalene	NENW	28	54	74	5.1	2.2	WYW130079
2	Carson	SESW	13	54	74	66.5	44.36	Fee
3	P 43-20-5474	NESW	20	54	74	10.9	3.8	WYW143958
4	Pit 13-22-5474	NWSW	22	54	74	45.0	7.05	WYW143957
5	Cox 23-12-5474 (Existing Pit)	SESW	12	54	74	45	4.5	Fee
6	TD Stock Reservoir	NWSE	15	54	74	1.7	0.8	Fee
7	Pit 21-13-5474	NENW	13	54	74	35	5.4	Fee
8	Jim #1	SWSW	21	54	74	0.7	0.44	WYW143959
9	Pit 31-4-5474	NWNE	4	54	74	35.0	5.55	WYW161252
10	Pit 21-23-5474	NENW	23	54	74	50	7.2	Fee
11	Pit 31-23-5474	NWNE	23	54	74	45	6.6	Fee
12	P 24-4-5474	SESW	4	54	74	17	6.0	WYW161252
13	P 41-29-5474	NENE	29	54	74	14.7	2.0	WYW130079
14	Pit 41-29-5474	NENE	29	54	74	50	7.95	WYW130079
15	P 42-22-5474	SENE	22	54	74	15	4.5	WYW143957
16	Jan Stock Reservoir	NWSE	21	54	74	6.3	3.2	WYW143959
17	P 44-20-5474	SESE	20	54	74	14.7	2.0	WYW143958
18	Pit 22-9-5474	SESW	9	54	74	50	8.1	WYW161252
19	Rick Stock Reservoir	NENE	15	54	74	1.0	0.4	Fee
20	RC Stock Reservoir	NWSE	10	54	74	6.5	2.6	WYW132246

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
21	BW Stock Reservoir	SWSE	10	54	74	2.7	2.0	WYW132246
22	BW#2 Stock Reservoir	NWNE	15	54	74	5.3	3.2	Fee
23	Pit 13-31-5474	NWSW	31	54	74	40.0	6.45	WYW143960
24	Pit 24-32-5474	NWNW SESW	5 32	55 54	74 74	35.0	5.55	WYW129033 WYW143960
25	Pit 11-19-5474	NWNW	19	54	74	50	8.4	WYW137635
26	Pit 44-35-5574	SESE	35	55	74	50	7.5	Fee
27	Sorenson 43-23-5474B	NESE	23	54	74	5.6	1.0	Fee
28	Sorenson 43-23-5474	NESE	23	54	74	3.6	1.42	Fee
29	Pit 43-23-5474	NESE	23	54	74	45	4.5	Fee
30	34-21-5474	SWSE	21	54	74	30	2.1	WYW143959
31	Power Line Reservoir	NESE	31	54	74	2.5	1.6	Fee
32	Pit 34-18-5474	SWSE	18	54	74	40	6.45	WYW143958
33	Enlg. Of Flat Stock Res	SWSE	21	54	74	19.8	6.45	WYW143959
34	Pit 33-9-5474	NWSE	9	54	74	40	7.2	WYW161252
35	Pit 24-10-5474	SESW	10	54	74	45	7.0	Fee
36	23-10-5474	NESW	10	54	74	19.9	7.0	Fee
37	24-17-5474	SESW	17	54	74	6.8	2.4	WYW143958
38	23-18-5474	NESW	18	54	74	15	3.0	WYW143958
39	Mickinna Stock Res	NESW	28	54	74	3.3	1.4	Fee
40	Enlg of Ford Stock Res	NESE	29	54	74	15.0	3.5	WYW130079
41	Tarver #1 (Previous POD)	SENE	23	54	74	1.7	1.76	WYW143958
42	Tarver #2 (Previous POD)	NWSE	23	54	74	8.1	4.42	WYW143958

The following impoundment locations were inspected and analyzed but require Right-of-Way approval prior to use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	P 24-21-5474	SESW	21	54	74	4.1	1.6	WYW143959
2	P 44-15-5474S	SESE	15	54	74	15	2.0	WYW132246

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

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

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

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

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

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

Field Manager: _____ Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Lance Oil & Gas Company, Inc.
West Gas Draw Beta
PLAN OF DEVELOPMENT
WY-070-08-035**

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 impacts that were 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 11 valid federal oil and gas mineral leases issued to the applicant by the BLM. Analysis has determined that federal CBNG is being drained from the federal leases by surrounding fee or state mineral well development. The need exists because without approval of the Applications for Permit to Drill (APDs), federal lease royalties will be lost and the lessee will be deprived of the federal gas they have the rights to develop.

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Lance Oil & Gas Company proposes to develop coalbed natural gas (CBNG) from wells located within the West Gas Draw Beta Unit.

Proposed Well Information: There are 67 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from Fort Union Coals (Wall Coal). Proposed well house dimensions will include a 42 inch cubical well head enclosure. Well house color is Covert Green (18-0617 TPX), selected to blend with the surrounding vegetation. Wells are located as follows:

	Well Name	Well #	Qtr/Ort	Sec	TWP	RNG	Lease #
1	W GAS DRAW BETA CARSON TRUST	43-2	NESE	2	54N	74W	WYW132246
2	W GAS DRAW BETA RULE TRUST	12-4	SWNW	4	54N	74W	WYW161252
3	W GAS DRAW BETA RULE TRUST	14-4	SWSW	4	54N	74W	WYW161252
4	W GAS DRAW BETA FEDERAL	21-4	NENW	4	54N	74W	WYW161252
5	W GAS DRAW BETA RULE TRUST	23-4	NESW	4	54N	74W	WYW161252
6	W GAS DRAW BETA RULE TRUST	32-4	SWNE	4	54N	74W	WYW161252
7	W GAS DRAW BETA RULE TRUST	41-4	NENE	4	54N	74W	WYW161252
8	W GAS DRAW BETA RULE TRUST	43-4	NESE	4	54N	74W	WYW161252
9	W GAS DRAW BETA D SPELLMAN	43-8	NESE	8	54N	74W	WYW161252
10	W GAS DRAW BETA SPELLMAN	41-8	NENE	8	54N	74W	WYW161252
11	W GAS DRAW BETA D SPELLMAN	23-9	NESW	9	54N	74W	WYW161252
12	W GAS DRAW BETA D SPELLMAN	34-9	SWSE	9	54N	74W	WYW161252
13	W GAS DRAW BETA RULE TRUST	21-9	NENW	9	54N	74W	WYW161252
14	W GAS DRAW BETA RULE TRUST	41-9	NENE	9	54N	74W	WYW161252
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19	W GAS DRAW BETA C&F RANCH	14-15W	SWSW	15	54N	74W	WYW143957
20	W GAS DRAW BETA C&F RANCH	21-15W	NENW	15	54N	74W	WYW143957
21	W GAS DRAW BETA C&F RANCH	12-15W	SWNW	15	54N	74W	WYW143957
22	W GAS DRAW BETA CARSON TRUST	23-15	NESW	15	54N	74W	WYW143957
23	W GAS DRAW BETA SPELLMAN	34-17	SWSE	17	54N	74W	WYW143958
24	W GAS DRAW BETA D SPELLMAN	12-17	SWNW	17	54N	74W	WYW143958
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58	W GAS DRAW BETA SORENSON RANCH	23-22	NESW	22	54N	74W	WYW143957
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60	W GAS DRAW BETA TARVER	23-23	NESW	23	54N	74W	WYW132917
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64	W GAS DRAW BETA SORENSON	43-19	NESE	19	55N	74W	WYW129532
65	W GAS DRAW BETA TARVER	14-30	SWSW	30	54N	74W	WYW128753
66	W GAS DRAW BETA RULE TRUST	23-31	NESW	31	55N	74W	WYW143960
67	W GAS DRAW BETA RULE TRUST	23-32	NESW	32	55N	74W	WYW143960

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

	IMPOUNDMENT Name / Number	Qtr/Qu	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	Jalene	NENW	28	54	74	5.1	2.2	WYW130079
2	P24-21-5474	SESW	21	54	74	4.1	1.6	WYW143959
3	Carson	SENW	13	54	74	66.5	44.36	Fee
4	P 43-20-5474	NESW	20	54	74	10.9	3.8	WYW143958
5	Pit 13-22-5474	NWSW	22	54	74	45.0	7.05	WYW143957
6	Cox 23-12-5474 (Existing)	SESW	12	54	74	45	4.5	Fee

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
7	TD Stock Reservoir	NWSE	15	54	74	1.7	0.8	Fee
8	Pit 21-13-5474	NENW	13	54	74	35	5.4	Fee
9	Jim #1	SWSW	21	54	74	0.7	0.44	WYW143959
10	Pit 31-4-5474	NWNE	4	54	74	35.0	5.55	WYW161252
11	Pit 21-23-5474	NENW	23	54	74	50	7.2	Fee
12	Pit 31-23-5474	NWNE	23	54	74	45	6.6	Fee
13	P 24-4-5474	SESW	4	54	74	17	6.0	WYW161252
14	P 41-29-5474	NENE	29	54	74	14.7	2.0	WYW130079
15	Pit 41-29-5474	NENE	29	54	74	50	7.95	WYW130079
16	P 42-22-5474	SENE	22	54	74	15	4.5	WYW143957
17	Jan Stock Reservoir	NWSE	21	54	74	6.3	3.2	WYW143959
18	P 44-20-5474	SESE	20	54	74	14.7	2.0	WYW143958
19	Pit 22-9-5474	SENE	9	54	74	50	8.1	WYW161252
20	Rick Stock Reservoir	NENE	15	54	74	1.0	0.4	Fee
21	RC Stock Reservoir	NWSE	10	54	74	6.5	2.6	WYW132246
22	BW Stock Reservoir	SWSE	10	54	74	2.7	2.0	WYW132246
23	BW#2 Stock Reservoir	NWNE	15	54	74	5.3	3.2	Fee
24	Pit 13-31-5474	NWSW	31	54	74	40.0	6.45	WYW143960
25	Pit 24-32-5474	NWNW SESW	5 32	55 54	74 74	35.0	5.55	WYW129033 WYW143960
26	Pit 11-19-5474	NWNW	19	54	74	50	8.4	WYW137635
27	Pit 44-35-5574	SESE	35	55	74	50	7.5	Fee
28	Sorenson 43-23-5474B	NESE	23	54	74	5.6	1.0	Fee
29	Sorenson 43-23-5474	NESE	23	54	74	3.6	1.42	Fee
30	Pit 43-23-5474	NESE	23	54	74	45	4.5	Fee
31	34-21-5474	SWSE	21	54	74	30	2.1	WYW143959
32	Power Line Reservoir	NESE	31	54	74	2.5	1.6	Fee
33	Pit 34-18-5474	SWSE	18	54	74	40	6.45	WYW143958
34	Enlg. Of Flat Stock Res	SWSE	21	54	74	19.8	6.45	WYW143959
35	Pit 33-9-5474	NWSE	9	54	74	40	7.2	WYW161252
36	Pit 24-10-5474	SESW	10	54	74	45	7.0	Fee
37	23-10-5474	NESW	10	54	74	19.9	7.0	Fee
38	24-17-5474	SESW	17	54	74	6.8	2.4	WYW143958
39	23-18-5474	NESW	18	54	74	15	3.0	WYW143958
40	Mickinna Stock Res	NESW	28	54	74	3.3	1.4	Fee
41	Enlg of Ford Stock Res	NESE	29	54	74	15.0	3.5	WYW130079
42	Tarver #1 (Previous POD)	SENE	23	54	74	1.7	1.76	WYW143958
43	Tarver #2 (Previous POD)	NWSE	23	54	74	8.1	4.42	WYW143958
44	P 34-17	NENE	18	54	74	6.2	Na	Fee

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
45	P 34-18	NWNE	18	54	74	5.5	Na	Fee
46	P 11-21	SESE	21	54	74	3.2	Na	Fee
47	Hill Top Reservoir	NWSE	19	55	74	19.9	Na	Fee
48	P 44-15-5474N	SESE	15	54	74	12.2	2.5	WYW132246
49	P 44-15-5474S	SESE	15	54	74	15	2.0	WYW132246

County: Campbell

Applicant: Lance Oil & Gas Company, Inc.

Surface Owners: BLM, William & Jacques Butcher, Rule Trust, Don Spellman, Spellman Trust, Carson Family Trust, Sorenson Ranch, Bonita K Sorenson Revocable Trust, Louis C Reed, Donna H. Tarver Trust, Kendall Cox, James A. & Joan Wolff, Fred & Mary Ann Oedekoven Family Trust, Jeff Sorenson

Project Description:

The proposed action involves the following:

Drilling of 67 total federal CBM wells in the Wall coal zone to depths of approximately 1,190–1,750 feet.

Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD. The operator plans to start drilling as soon as the POD is approved. Each well will take approximately 4 days to drill and 2 days to complete.

Well metering shall be accomplished by telemetry. Physical visitation to the wells will entail approximately 4 visits per month to ensure well integrity.

A Water Management Plan (WMP) that involves the following infrastructure and strategy: 49 discharge points (10 existing) into 1 existing off-channel, 17 existing on-channel, 15 proposed off-channel, and 16 proposed on-channel impoundments that fully contain CBNG discharge during dry conditions from this POD within the Upper Powder River and Little Powder River watersheds.

An unimproved and improved road network which includes utility corridors. The utility corridors consist of gas, water, and power. Some water pipelines and underground power lines will be constructed outside road/utility corridors.

An existing above ground power line network, constructed by PRE Corp, will be used. In addition, underground power will be constructed off of proposed/existing power drops to power the wells. Temporary diesel generators may be placed at the power drops if the underground power construction is delayed.

A storage tank of 500 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for less than 6 months. Fuel deliveries are anticipated to be 3 times per week. Noise level is expected to be 100.5 decibels at 3 feet distance.

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 in the POD and individual APDs. Also see the subject POD and/or APDs for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

Implementation of committed mitigation measures contained in the MSUP, Drilling Program and WMP, in addition to the Standard COAs 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:

- Comply with all applicable Federal, State and Local laws and regulations.
- Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
- Offer water well agreements to the owners of record for permitted water wells within ½ mile of any federal CBNG producing well in the POD
- Provide water analysis from a designated reference well in each coal zone.
- The Operator has certified that a Surface Use Agreement has been reached with the Landowners.

2.3. Alternative C – Environmentally Preferred

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

2.3.1. Changes as a result of the onsite

1. Moved the Fed 21-4 out of sagebrush habitat. The new location is now the 31-4.
2. The Fed 34-4 was dropped due to highly erosive soils and topography.
3. The Fed 34-9 was moved to a location with a lesser slope thereby minimizing disturbance.
4. Access to the Fed 43-9 was rerouted to meet landowner concerns.
5. The Fed 23-15 was dropped due to highly erosive soils, dense sagebrush, and proximity to a fee location.
6. The Fed 34-17 location was moved to avoid impacting the adjacent drainage.

7. The Fed 43-18 was moved off the hill and out of sage-grouse nesting habitat.
8. Moved the Fed 14-19 location to avoid difficult topography and lessen disturbance. The new location is the Fed 13-19.
9. Access to the Federal 24-19 was changed to minimize disturbance.
10. To allow for a safe drilling location, the Sorenson Ranch Fed 32-19 will need a constructed pad.
11. To allow for a safe drilling location, the Federal 34-19 will need a constructed pad.
12. The Federal 41-19 was moved to the 42-19 location to minimize disturbance.
13. The Federal 11-20 was moved to the 12-20 location to minimize disturbance.
14. The Federal 21-20 was dropped due to difficult topography and excessive disturbance.
15. The Federal 41-20 was dropped due to difficult topography and excessive disturbance.
16. The Sorenson Fed 12-21 was moved to the 13-21 location to minimize disturbance.
17. To minimize disturbance, moved access/utility corridor to an existing two-track for the Sorenson Fed 21-21.
18. To minimize disturbance, moved access to existing north road for the Sorenson Fed 14-22.
19. The Federal 32-22 was dropped due to difficult topography.
20. The Sorenson Fed 14-30 was dropped because the operator sold the lease.
21. To meet landowner and wildlife concerns, proposed overhead power was changed to underground power in Sec. 18 & 19 T54N R74W.
22. The access/utility corridor to the Sorenson Fed 32-19, Federal 43-19, Federal 34-19, and the Federal 24-19 was changed to come in from the north. The existing two-track coming in from the south will not be used to avoid a sage-grouse lek area.
23. Reservoir P 34-17 was dropped due to landowner concerns.
24. Reservoir P 34-18 dropped with nearby pit enlargement approved by landowner.
25. Reservoir P 11-21 was dropped due to leasee and BLM concerns for grazing.
26. Pit 34-21-5474 was moved to a better on-channel location.
27. P 44-15-5474N on BLM surface was dropped due to poor site conditions.
28. Hilltop Reservoir was dropped by operator.

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 and revised a guidance document, "Compliance Monitoring and siting Requirements for Unlined Impoundments Containing Coalbed Methane Produced Water" (September, 2006) which can be accessed on their website. For all WYPDES permits the BLM will require that operators comply with the latest DEQ standards and monitoring guidance.

2.3.2.2. Surface Water

Channel Crossings:

Channel crossings by roads and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads.

Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.

Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.

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.

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

The operator will supply copies of the WYPDES permits for this POD to the BLM as soon as they are available from WDEQ.

2.3.2.3. Soils

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

2.3.2.4. Wildlife

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

2.3.2.5. Noise

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

background. This may require the installation of electrical compressor motors at these locations.

2.3.2.6. Air Quality

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 from the BLM authorized officer.

2.3.3. Site specific mitigation measures

1. All changes made at the onsite will be followed. They have all been incorporated into the operator’s POD.
2. The approval of this project does not grant authority to use off lease Federal lands. No access or surface activity is allowed on or off the affected leases on Federal lands until right-of-way grants become authorized.
3. The following impoundments are located on BLM surface and are not allowed to be constructed until a ROW application and bond has been authorized by the Buffalo Field Office.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	P 24-21-5474	SESW	21	54	74	4.1	1.6	WYW143959
2	P 44-15-5474S	SESE	15	54	74	15	2.0	WYW132246

4. Per landowner request, the access road through the ballpark to the Carson Trust Fed 43-2 must be graveled.
5. The total width of disturbance must be kept to <35’ for the following access/utility corridors: Rule Trust Fed 14-4, Rule Trust Fed 43-4, C&F Ranch Fed 14-15, and Rule Trust Fed 23-32.
6. The following locations will need lined pits; Spellman Fed 43-8, Spellman Fed 32-18, and the Federal 24-19.
7. All slotted locations and constructed pads must follow approved designs.
8. Access to the Spellman Feds 32-18 and 34-18 will be a graveled two-track/utility corridor. Road maintenance will be performed per Don Spellman approval.
9. All culvert cross drains must have ditch blocks where applicable.
10. The engineered access to the 32-19 must be slope staked for field review at the preconstruction field onsite. Placement for the extra 822 cubic yards of material will determined during the preconstruction field onsite.

11. 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 West Gas Draw Beta POD is Covert Green
12. Provide 4” of aggregate where grades exceed 8% for stability and erosion prevention.
13. The operator is responsible for having a licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
14. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12” or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing:

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

15. “Roughed-in” or “Pioneer” sections of engineered roads shall be constructed according to the line and grade shown in the approved engineering designs. Non-engineered roads shall be constructed to a line and grade established to meet the BLM Gold Book and 9113 guidelines as approved in the SUP, and shaped according to an approved design template for that road.
16. Adequate drainage control must be in place at all stages of construction and culverts installed as soon as feasible.
17. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:
 Reclamation Standards:
 C. 3. The reclaimed area shall be stable and exhibit none of the following characteristics:
 - a. Large rills or gullies.
 - b. Perceptible soil movement or head cutting in drainages.
 - c. Slope instability on, or adjacent to, the reclaimed area in question.
 C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
 C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
 - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
 C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

18. The seed mix provided in the Surface Use Plan is to be used. The operator is responsible to determine whether to use the Loamy or Sandy mix on the disturbed sites.
19. Please contact Casey Freise Natural Resource Specialist, @ (307) 684-1189 Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

Wildlife

1. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, “The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time” (M32). The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, 2008, Lance will coordinate with the BLM to determine if additional resurvey will be required.
2. 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 condition will be implemented on an annual basis for the duration of surface disturbing activities. This timing limitation will affect the following proposed wells and their associated infrastructure:

Township/Range	Section	Affected Wells and Infrastructure
5574	20	43-19-5574 well road and utility corridor
5574	31	West ½ of road and utility corridor to the Rule Trust Fed 23-32 & off channel pit 13-31
5474	16	34-9 and 12-15 wells and access roads and util. corridor
5474	18	32-18 and 34-18 well, 34-18 pit, access road and util. corr.

- a. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to disturbance activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts disturbance activities within ½ mile of occupied raptor nests from February 1 to July 31.
 - b. Nest productivity checks shall be completed for the first five years following completion of affected infrastructure. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. Nests to be checked are within a ½ mile or less of the proposed development.
 - c. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
3. The following conditions will reduce impacts to sage grouse:
 - a. No surface disturbing activities are permitted within 2 miles of the following leks; Wildcat, Case I, Case II, Case III, Spotted Horse, Box Draw, Fitch Prong Road, Kretschman, Ridgetop 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 **The entire project area.**

- b. If an active sage grouse lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and disturbance activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, disturbance 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.

Cultural

1. Site 48 CA 6290, a stone circle site adjacent to the infrastructure corridor in the SW ¼ of Section 21, T54N R74W, shall have a protective fence barrier at the junction of the road from Dry Gulch with the north-south service road, to discourage vehicles from parking off road in this area. Infrastructure will be installed in or west of the north-south service road.

2.4. Alternatives considered but not analyzed in detail

The following water management strategies were analyzed by the operator for this POD.

Direct Discharge

Direct discharge to tributaries of Powder River is not an alternative due to water quality and limits imposed by the WDEQ discharge permit for this POD. The water produced in this area does not meet WDEQ standards for discharge.

Re-injection

Re-injection of produced water within this POD was not a reasonable solution. A review of the well logs on file with the Wyoming Oil and Gas Conservation Commission and available geologic information suggests that there are no aquifers within the immediate area that have sufficient storage capacity to accept the volume of CBNG water that would be produced from the POD. Re-injection into deep saltwater aquifers would also render the relatively high quality produced water unsuitable for future use.

Land Application

Land application of produced water within the POD has also been considered. Land application would involve applying the water to cropland at agronomic rates through an irrigation system. Land application is at best a seasonal approach and would require the construction of several reservoirs to store produced water during the non-irrigation season. Due to the high construction and operating costs and lack of landowner interest, land application is not a viable strategy, but several sites are available and the landowner may consider using water from reservoirs for this purpose in the future.

Treatment of Produced Water

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

2.5. Summary of Alternatives

A summary of the infrastructure currently existing within the POD area (Alternative A), the infrastructure originally proposed by the operator (Alternative B), and the infrastructure within the BLM/operator modified proposal (Alternative C) are presented in Table 2.5.

Table 2.5 Summary of the Alternatives

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Total Locations	220	67	61
Nonconstructed Pads		25	19
Slotted Pads		32	33
Constructed Pads		10	9
Conventional Wells	0	0	0
Gather/Metering Facilities	0	0	0
Compressors	0	0	0
Monitor Wells	0	0	0
Impoundments	18	49	44
On-channel	17	33	28
Off-channel	1	16	16
Water Discharge Points	10	49	44
Treatment Facilities	0	0	0
Improved Roads			
No Corridor	4	0	0
With Corridor	0	44	42.3
2-Track Roads			
No Corridor	0	0	0
With Corridor	0	.3	.8
Buried Utilities			
No Corridor		9	9
With Corridor		.8	.8
Overhead Powerlines	6.2	2.8	2.8
Communication Sites	0	0	0
Staging/Storage Areas	0	2	2
Other Disturbance			
Acres of Disturbance	221.2	540	528.2

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on September 8, 2006. Field inspections of the proposed West Gas Draw Beta CBNG project were conducted on 5/10/2007, 5/11/07 and 5/16/07 by the following:

NAME	TITLE	AGENCY
Jim Snyder	NRS	BLM
Larry Gerard	Wildlife Biologist	BLM
BJ Earle	Archeologist	BLM
Chris Williams	Hydrologist	BLM
Lee Harrelson	Engineer	BLM
Ethan Janke	Permit Agent	Lance Oil & Gas
Joy Kennedy	Permit Agent	Anadarko
Jamie Cragle	Permit Agent	Anadarko
Colt Roderman	Construction Supervisor	Anadarko
Monte Sandvick	Landman	Anadarko
Charles Sorenson	Surface Owner	--
Steve Sorenson	Surface Owner	--
Robert Sorenson	Surface Owner	--
Don Spellman	Surface Owner	--

An additional field visit was held on March 19, 2008 as part of the Native American consultation.

NAME	TITLE	AGENCY/TRIBE
Chris Hanson	Field Manager	BLM
Casey Freise	Sup. NRS	BLM
BJ Earle	Archeologist	BLM
JoAnn Wite		Arapaho
Conrad Fisher		Northern Cheyenne
Eugene Brave Hart	Elder	Northern Cheyenne
Tammi Hitt	Permit Agent	Anadarko
Colt Roderman	Construction Supervisor	Anadarko
Jeff Maddux	Landman	Anadarko
Charles Sorenson	Surface Owner	--
Steve Sorenson	Surface Owner	--
Robert Sorenson	Surface Owner	--
Don Spellman	Surface Owner	--

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		Larry Gerard
Floodplains		X		Chris Williams
Wilderness Values		X		Jim Snyder
ACECs			X	Jim Snyder
Water Resources	X			Chris Williams
Air Quality	X			Jim Snyder
Cultural or Historical Values	X			BJ Earle

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Prime or Unique Farmlands			X	Jim Snyder
Wild & Scenic Rivers			X	Jim Snyder
Wetland/Riparian		X		Chris Williams
Native American Religious Concerns		X		BJ Earle
Hazardous Wastes or Solids		X		Jim Snyder
Invasive, Nonnative Species	X			Jim Snyder
Environmental Justice		X		Jim Snyder

3.1. Topographic Characteristics of Project Area

The project area is located near Spotted Horse, WY which is 35 miles to the north and west of Gillette, WY; T. 54, 55 N., R.74, 75 W. Sec. 20, 21, & 28. For detailed directions on how to access the project area, see the MSUP in the POD. Elevations within the project area range from 4,000 to 4,650 feet above sea level. The topography throughout the area is rolling hills with moderately steep ridges and draws. Several ephemeral tributaries drain into Spotted Horse Creek, which flows into the Powder River located approximately 14 miles west of the POD area. Current land uses in the region include grazing of livestock, conventional oil production, and coalbed natural gas production.

3.2. Vegetation & Soils

General vegetation communities within the project area consist of mixed sagebrush/grassland mosaic. Wyoming big sagebrush intermixed with various native bunch grasses dominates the vegetative composition of the project area. 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. Common grasses noted during the onsite investigation include needle and thread, western wheatgrass, cheatgrass, threadleaf sedge, little bluestem, and buffalo grass. Broom snakeweed, rubber rabbitbrush, and prickly pear are found interspersed throughout the area.

3.2.1. Soils

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 4 inches on ridges to 8+ inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover, and slope. Reclamation potential of soils also varies throughout the project area. The main soil limitations in the project area include: depth to bedrock, low organic matter content, soil droughtiness, and low water holding capacity, and high erosion potential especially in areas of steep slopes.

Approximately 4,100 acres within the POD boundary have been identified by BLM as having low reclamation potential utilizing Soil Survey Geographical Data (SSURGO). The proponent planned their project and the BLM made further recommendations on the onsite to avoid those areas where possible. Disturbances within these areas require the programmatic/standard COA's be complimented with a site specific performance based reclamation related COA.

Soils within the project area were identified from the *North Campbell County Survey Area, Wyoming (WY705)*. The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

The map unit symbols within this project area were filtered and map units representing 3.0% or greater in extent within the pod boundary are displayed. Dominant soil map units are listed in the table below with their individual acreage and percentage of the area within the POD boundary.

Dominate soils affected by the proposed action include:

Map Unit	Map Unit Name	Acres	Percent
239	IRONBUTTE-FAIRBURN-MITTENBUTTE COMPLEX, 6 TO 40 PERCENT SLOPES	2627.8	14%
225	UCROSS-IWAIT-FAIRBURN LOAMS, 3 TO 30 PERCENT SLOPES	1776.9	10%
334	VONALF-XEMA-MITTENBUTTE FINE SANDY LOAMS, 3 TO 30 PERCENT SLOPES	1115.9	6%
278	FAIRBURN-SAMSIL-BADLAND COMPLEX, 10 TO 45 PERCENT SLOPES	1101.4	6%
107	ARWITE-VONALF FINE SANDY LOAMS, 0 TO 6 PERCENT SLOPES	844.7	5%
105	ARWITE-ELWOP FINE SANDY LOAMS, 0 TO 6 PERCENT SLOPES	803.2	4%
167	JAYWEST-MOORHEAD LOAMS, 0 TO 6 PERCENT SLOPES	752.7	4%
275	ECHETA-MOORHEAD CLAY LOAMS, 0 TO 6 PERCENT SLOPES	709.5	4%
106	ARWITE-ELWOP FINE SANDY LOAMS, 6 TO 15 PERCENT SLOPES	684.0	4%
181	MOORHEAD CLAY LOAM, 0 TO 6 PERCENT SLOPES	638.4	3%

For more detailed soil information, see the NRCS Soil Survey 705 – North Campbell County. Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 3.2.2.

3.2.2. Vegetation

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

The map unit symbols for the soils identified above and the associated dominant ecological site for the identified soil map unit symbols found within the POD boundary are listed in the table below.

Map Unit	Ecological Site
239	SHALLOW LOAMY (15-17NP)
225	LOAMY (15-17NP)
334	SANDY (15-17NP)
278	SHALLOW LOAMY (15-17NP)
107	SANDY (15-17NP)
105	SANDY (15-17NP)
167	LOAMY (15-17NP)
275	CLAYEY (15-17NP)
106	SANDY (15-17NP)
181	CLAYEY (15-17NP)

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure are predominately Shallow Loamy and Sandy sites.

Shallow Loamy Sites: 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 15-17 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 present plant community is a *Mixed Sagebrush/Grass*.

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.

Dominant grasses include: bluebunch wheatgrass, rhizomatous wheatgrass, blue grama, and little bluestem. Other grasses occurring on the state include Cusick’s and Sandberg bluegrass, and prairie junegrass. Cheatgrass has invaded the state. Other vegetative species identified at onsite include: pricklypear and fringed sagewort.

Sandy Sites: This site occurs on nearly level to 50 percent slopes on landforms which include alluvial fans, hillsides, plateaus, ridges and stream terraces in the 15-17” precipitation zone.

The soils of this site are moderately deep to very deep (greater than 20” to bedrock), well drained soils that formed in eolian deposits or residuum derived from unspecified sandstone. These soils have moderate, moderately rapid or rapid permeability. The main soil limitations include low available water holding capacity, and high wind erosion potential.

The present plant community is a *Needleandthread/threadleaf sedge/Fringed sagewort* plant community. The understory of grass includes needleandthread, threadleaf sedge, and prairie junegrass. Other vegetation includes fringe sagewort, blue grama, and prickly pear cactus.

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

Summary of Ecological Sites

Ecological Site	Acres	Percent
LOAMY (15-17NP)	6739.4	36%
SANDY (15-17NP)	4180.6	23%
SHALLOW LOAMY (15-17NP)	3807.7	21%
CLAYEY (15-17NP)	2695.1	15%

3.2.3. Wetlands/Riparian

Most of the POD area is located in the headwater areas of Horse Creek and Spotted Horse Creek where streams are ephemeral, and wetland or riparian vegetation is sparse. Cottonwood trees within the POD area are restricted to the perimeters of a few older existing reservoirs, and are largely absent from stream corridors.

3.2.4. Invasive Species

Infestations of the following state-listed noxious weeds and/or weed species of concern were discovered by a search of inventory databases on the Wyoming Energy Resource Information Clearinghouse (WERIC) web site (www.weric.info):

- Leafy Spurge (not found within the specific project area, but nearby)
- Cheatgrass

The WERIC database was created cooperatively by the University of Wyoming, BLM, and county Weed and Pest offices.

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

3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Big Horn Environmental Consulting (BHEC). BHEC performed aerial and ground surveys for raptors and sage grouse; ground surveys for mountain plover nesting activity; and prairie dog colonies on 1, 3, 10, 11, 17, 20, 28 April ; on 2, 3, 6, 17, and 31 May; and 2, 5, 6, and 14 June 2006. Follow up surveys were conducted in 2007 on 18, 21, and 29 April and 1 May.

Searches for potential Ute ladies'-tresses orchid habitat were conducted. Surveys for bald eagle winter roost sites were not conducted due to lack of adequate habitat.

A BLM biologist conducted field visits on 10, 11 May, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the project area include pronghorn and mule deer. The WGFD has determined the entire project area to be Yearlong range for pronghorn and Winter/Yearlong and Yearlong range for mule deer.

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

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of Spotted Horse Creek and Chicken creek and does not support aquatic species.

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

Twenty nine raptor nests were located in the West Gas Draw B POD. In 2007 there were 19 active nests. Four nests are within 0.5 miles potential development; all other active and inactive nests are further than 0.5 miles from any potential development.

Table 3.3.4.1. Documented raptor nests within the West Gas Draw B project area in 2006 (UTM Zone 13, NAD83).

BLM ID#	Species	UTM	Legal location	substrate	condition	status 2006	status 2007
2020	RTHA	444542 4941972	SWSW SEC 30 5473	CTL	GOOD	ACTI	ACTI
3062	GOEA	436153 4948285	SWSE SEC6 5474	CTL	GOOD		ACTI
3303	UNRA	441395 4947482	SENE SEC10, 5474	GHS	POOR	INAC	INAC
3304	UNRA	4441398 4947470	SENE SEC10, 5474	GHS	POOR	INAC	INAC
3305	UNRA	440919 4948039	NWNE SEC10, 5474	GHS	REMN	REMN	REMN
3306		440751 4948908	SWNE, 3 5474	GONE			
3307	RTHA	441766 4946557	SWSW, 11 5474	CTL	GOOD	ACTI	ACTI
4171	RTHA	439525 4945959	SENE, 16 5474	JUN	GOOD	ACTI	ACTI
4172	UNRA	439598 4946119	NENE, 16 5474	BOX	POOR	INAC	INAC
4173	RTHA/ GHOW	435256 4950841	NENW, 31 5574	CTL	GOOD	ACTI	ACTI
4174	RTHA	435361 4951396	NESW, 30 5574	CTL	GOOD	OCCU	ACTI
4175	AMKE	436304 4946532	SWSE, 7 5474	CTD	INK		ACTI
4176	UNRA	434854 4946767	SESE, 12 5475	CTL	GOOD	ACTI	INAC
4177	LEOW	435136 4942380	SWNW, 30 5474	JUN	GOOD		ACTI
4178	AMKE	435243 4945761	SWNW, 18 5474	CTL	UNK	INAC	OCCU

BLM ID#	Species	UTM	Legal location	substrate	condition	status 2006	status 2007
4179	UNRA	435265 4945846	SWNW, 18 5474	CKB	UNK	ACTI	INAC
4182	UNRA	436388 4953222	NENE 19, 5574	GHS	REMN	INAC	INAC
N16WG06	BUOW	442746 4941819	SESE, 26 5474	ACB	UNK	ACTI	ACTI
BH03807	AMKE	436004 4948556	SENE 6, 5474	CTD	UNK		OCCU
4183	FEHA	436595 4953276	NWSW, 20 5574	ROK	GOOD	INAC	ACTI
4184	FEHA	436864 4953331	SWNW, 20 5574	GHS	POOR	INAC	INAL
4185	GHOW	435967 4945495	NWNW SEC 18, 5474	JUN	UNK		OCCU
4186	SEOW	443300 4941622	SWSW, 25 5474	GHS	GONE	ACTI	INAC
BH04607	UNRA	435765 4945106	SESW18, 5474	BOX	POOR		INAC
BH04707	RTHA	435070 4946110	NENE 13, 5474	CTL	GOOD		ACTI
BH08807	GHOW	444840 4941979	NESE 30, 5473	BOX	FAIR		ACTI-F
BH08907	AMKE	444907 4941999	NESE 30, 5473	CTL	UNK		ACTI
BH36907	RTHA	434863 4942619	SENE 25, 5475	JUN	GOOD		ACTI
BH37907	LEOW	434751 4942976	NENE 25, 5475	JUN	GOOD		ACTI
N15WG06	AMKE	436907 4947821	NWNW 8, 5474	CTD	GOOD		OCCU
N16WG06	BUOW	442746 4941819	SESE 26, 5474	ACB	UNK		ACTI
N6WG06	UNRA	434339 4947736	NENW 12, 5475	CTL	POOR		INAL

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

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

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

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

Approximately 143 acres of black-tailed prairie dog colonies were identified during site visits by BHEC within the project area. Black-footed ferret habitat is not present within the West Gas Draw B project area.

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

Spotted Horse and Chicken Creek and tributaries are ephemeral. There are no springs. Suitable orchid habitat is not present within the W. Gas Draw B project area.

3.3.5.2. Sensitive Species

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

3.3.5.2.1. Bald eagle

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

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

The W. Gas Draw B project has few mature trees associated with it. No suitable nesting habitat or suitable winter roosting habitat were identified during the consultants or BLM biologist's site visits, within the immediate project area or extending one mile from proposed activities. The boundary of the project area is > 10 miles from the Powder River; the nearest water body capable of supporting bald eagles.

The project area has a limited year round prey base in the form of prairie dogs, and lagomorphs (hares and rabbits). Within the project area there are 143 acres of active prairie dog colonies. As the reservoirs are developed and begin taking water, waterfowl will likely be attracted to the project area and provide an additional prey source for bald eagles.

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.

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 Reading 1989) 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*).

One active black-tailed prairie dog town of approximately 143 acres was identified during site visits by BHEC within the project area.

3.3.5.2.3. Grouse

3.3.5.2.3.1. 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).

Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), the primary shrub, occurs throughout the project area in a patchy mosaic of sparse (0-5% cover), low (5-10% cover), moderate (10-15% cover), and dense (15-25% cover) stands. On average, the sagebrush ranged in size from 15 to 20 inches tall. Suitable sage-grouse habitat is present throughout the project area.

BHEC documented nine sage-grouse leks present within 2 miles of the project area (Table 5), however only one has been active in the last 2 years. Sage-grouse were observed by Gilbert, Blaylock and Maechtle.

Table 5. Documented sage-grouse leks within two miles of the project in 2007.

Lek ID	UTM NAD83	Legal Location	Status (Peak Males)	Distance From Project Area (Miles)
WILDCAT	443064, 4941420	NENW SEC 36 5474	INAC	.5
CASE I	437195 4947600	NENW SEC8, 5474	INAC	within
CASE II	435715 4948102	NWSE SEC6, 5474	INAC	within
CASE III	436858 4948102	SESW SEC31, 5574	INAC	within
SPOTTED HORSE	432655 4959984	NESW SEC35, 5575	INAC	1.2MI.
BOX DRAW	436621 4943053	NENE SEC 30, 5474	13	within
FITCH PRONG ROAD	436586 4938649	NESW SEC1, 5375	INAC	1.6 MI.
KRETSCHMAN	433700 4939600	NWNW SEC1, 5375	INAC	1.8MI.
RIDGETOP	437300 4939699	SESW SEC 5, 5374	INAC	1.4MI.

3.3.5.2.3.2. Sharp-tailed grouse

BHEC Consultants observed 2 sharp-tailed grouse located in section 3 T55 R75, but not in courtship display. No leks were found during surveys.

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.

In September 2003, the U.S. Fish and Wildlife Service withdrew their proposal to list the mountain plover. However, the mountain plover remains an agency-designated Sensitive Species within both the Bureau of Land Management and the Forest Service. According to the U.S. Geological Survey, prairie dogs currently exist on less than one percent of their former range, and their numbers have declined by 98 percent (Turbak 2004). Mountain plover numbers have declined, possibly from millions to only about 10,000 birds today (Turbak 2004).

Suitable mountain plover habitat is limited within the project area, because of the small amount of prairie dog colonies, and bare ground. One black-tailed prairie dog colony had residual vegetation in excess of 4 inches. No mountain plovers were observed during 2006, or 2007.

3.4. West Nile Virus

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

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

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

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007*	155	22	Unk	1

*Wyoming Department of Health Records September 12, 2007.

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 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

Most of the project area is within the Upper Spotted Horse Creek which is tributary to the Upper Powder River watershed. The eastern third of the POD area drains into Horse Creek which is a tributary to the Little Powder River.

3.5.1. Groundwater

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

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

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

- The effects of infiltrated waters on the water quality of existing shallow groundwater aquifers are not well documented at this time;
- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions;
- It may be necessary to conduct investigations at representative sites around the basin to quantify these impacts;
- Provide site specific guidance on the placement and design of CBM impoundments, and;
- Shallow groundwater wells would be installed and monitored where necessary.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 61 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 10 to 946 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

All drainages in the POD area are ephemeral (flowing only in response to a precipitation event or snow melt) or intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). Channel conditions range from well vegetated grassy swales to deeply incised channels with highly erodible banks with well-vegetated and wide channel beds. The POD area is located in the headwater areas of Upper Spotted Horse Creek and Horse Creek, therefore most drainage basins that will be affected by development are relatively small.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in $\mu\text{mhos/cm}$) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters “illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBNG produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Upper Powder River watershed, EC ranges from 1,797 at maximum monthly flow to 3,400 at Low monthly flow and SAR ranges from 4.76 at maximum monthly flow to 7.83 at low monthly flow. These values were determined at the USGS station located at Arvada, WY, Station ID 06317000 (PRB FEIS page 3-49). For the Little Powder River watershed, EC ranges from 1,785 at Maximum monthly flow to 3,300 at Low monthly flow and SAR ranges from 4.44 at Maximum monthly flow to 6.94 at low monthly flow. These values were determined at the USGS station located near Weston, WY, Station ID 06324970 (PRB FEIS page 3-49).

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

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the West Gas Draw Beta project prior to on-the-ground project work (BFO Inventory No. 70070013 and 70070013A, NPAS for Lance: West Gas Draw Beta POD). Prior POD Inventory information was incorporated into the POD boundary tract: #70020075, A-C, Centennial Archaeology for Williston Basin: Grasslands Pipeline; #70030085, ACR for Yates: Compass POD; and #70030108, Greens for Williams: Gas Draw CBM POD. A total of 19 sites and 9 isolated cultural resources (IRFs) were located in the course of inventory. An assemblage of prehistoric stone circle sites and prehistoric cairns, rock alignments, and other features were recorded, along with several historic homesteads, stock camps and water developments, and historic debris locales.

Generally speaking, the upland areas of the POD are covered by large tracts of block survey, while proposed developments on the east side of the project are covered by smaller tract blocks and linear surveys. Varying inventory strategies were selected by different landowners. At this time, proposed developments for this POD are covered by Class III inventory, but changes and revisions are likely to be sundried in over the course of field operations, and additional cultural inventory may be needed in the future.

Native American consultation was initiated with the following tribes: Arapahoe, Crow, Northern Cheyenne, Eastern Shoshone; Fort Peck, Oglala, Rosebud, Standing Rock and Cheyenne River Sioux. Additional information was requested by the Arapahoe, Eastern Shoshone, and Oglala, and responses were returned by the Standing Rock Sioux Tribe and the Eastern Shoshone. At this time, no resources of interest to Native American cultural groups or Traditional Cultural Properties will be affected by the proposed development. Tribal cultural specialists from the Arapaho and Northern Cheyenne visited eight sites. As a result of site visits, site eligibility recommendations were switched from criterion C to criterion D (as described below) for five sites, and three sites were recommended Not eligible.

No eligible sites will be affected by the proposed undertaking. A portion of one non-eligible site will be affected by project infrastructure. A protective stipulation is recommended for one eligible site to prevent inadvertent disturbance. The project will have no effect on the historic site recommended eligible under criterion A, or on the viewshed from the site.

Briefly, the National Register criteria for evaluation of properties from 36 CFR 60.4 are summarized:

- (a) That are associated with events that have made a contribution to the broad patterns of history;
- (b) That are associated with the lives of significant persons;
- (c) That embody distinct craftsmanship, have high artistic values, or are a member of a distinctive group whose components may lack individual distinction; and
- (d) That have yielded or may be likely to yield, important prehistoric or historic information.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48 CA 4004	Lithic	Eligible; D
48 CA 4009	Lithic	Not eligible
48 CA 4440	Lithic	O/APE Unevaluated
48 CA 4444	Historic homestead	Not eligible
48 CA 4544	Historic homestead	Not eligible
48 CA 6286	Historic rock alignment, cairn & feature	Not eligible
48 CA 6287	Stock camp	Not eligible
48 CA 6288	Lithic	Not eligible
48 CA 6289	Cairn, prehistoric	Eligible: D
48 CA 6290	Stone circle	Eligible: D
48 CA 6291	Cairn, prehistoric	Not eligible

Site Number	Site Type	National Register Eligibility
48 CA 6292	Stone circle, campsite	Eligible: D
48 CA 6293	Stone circle, rock alignment	Eligible: D
48 CA 6294	Stone circle	Not eligible
48 CA 6295	Cairns	Eligible: D
48 CA 6296	Historic debris	Not eligible
48 CA 6297	Campsite	Eligible: D
48 CA 6347	Historic stock water facilities	Not eligible
48 CA 6713	Historic homestead	Not eligible
48 CA 6854	Historic homestead	Eligible: A
NA	9 IRFs	Not eligible

The POD area is mapped as Tertiary Paleocene Wasatch, which is considered to have a Paleontological Fossil Yield Classification (PFYC) of 3a, indicating moderate to high potential for significant vertebrate fossils. Field investigation located no faunal material, but plant casts, petrified tree stumps, and carbonaceous lenses of various thicknesses were observed. PFYC categories of 3a are recommended for field examination, and may require paleontological inventory, if vertebrate remains are located.

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action (Alternative B) resulted in development of Alternative C as the preferred alternative. The changes have reduced impacts to the environment which will result from this action. The environmental consequences of Alternative C are described below.

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 61 proposed well locations, 19 can be drilled without a well pad being constructed and 9 will require a constructed (cut & fill) well pad. The remaining 33 will require a slot design. Surface disturbance associated with the drilling of the 19 wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 20 x 32 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 19 wells would involve approximately 0.2 acre/well for 3.8 total acres. The other 9 wells requiring cut & fill pad construction would disturb approximately 0.7 acres/well pad for a total of 6.3 acres. The 33 well requiring a slot design would involve approximately 0.2 acres/slot design for a total of 6.4 acres disturbance. The total estimated disturbance for all 61 wells would be 16.5 acres.

No improved or primitive roads will be constructed outside utility corridors for this project. 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 9 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed

mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions, etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Chapter 2 Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Non-constructed Pad	19	0.2 acre/well	3.8	Long Term
Constructed Pad	9	.7 acre/well	6.3	
Slot design	33	0.2 acre/well	6.4	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments	44	Site Specific Site Specific Site Specific or 0.01 ac/WDP	223.0	Long Term
On-channel	28		118.0	
Off-channel	16		105.5	
Water Discharge Points	45		0.7	
Channel Disturbance	0	Site Specific	0.0	
Headcut Mitigation*		Site Specific	0.0	
Channel Modification	0			
Improved Roads/pipeline	1.4	50' Width	8.5	Long Term
Corridor		45' Width	232	
Template design	42.6			
2-Track Roads	0	35' Width	1.3	Long Term
No Corridor				
With Corridor	0.3			
Pipelines	9	30' Width	32.8	Short Term
No Corridor			2.9	
With Corridor		.8		
Buried Power Cable	0	Site Specific	0	Short Term
No Corridor				
Overhead Powerlines	2.8	Site Specific	10.7	Long Term
Staging Area	2	4 acre	8	Short Term

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

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

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

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

Loss of soil vegetation cover, organic matter and productivity - with expedient reclamation, productivity and stability should be regained in the shortest time frame. Soil productivity would be eliminated along improved roads and severely restricted along two track trails until successful final reclamation is achieved.

Modification of hill slope hydrology - these impacts would increase the potential for valuable soil loss due to increased water and wind erosion, invasive plant spread establishment, and increased sedimentation and salt loads to the watershed system.

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). BLM reclamation goals emphasize ecosystem reconstruction, which means returning the land to a condition approximate to or better than that which existed before it was disturbed. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.

The operator has agreed to design and implement site specific reclamation strategies to address these areas of concern. 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, wing ditches, culverts, rip-rap, etc.) would ensure land productivity/stability is regained and maximized. Seed mixes for the West Gas Draw Beta POD were provided by the operator based on the dominant ecological sites found within the project area, and the mixing of soil horizons in disturbed areas. A shallow loamy and sandy seed mix was created for the entire POD (see site specific COAs). In addition, the operator will adhere to COAs which limit the surface disturbance allowable for construction and improvements.

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

4.1.1. Wetland/Riparian

No impacts to wetland and riparian areas are projected with the development of this POD.

4.1.2. Invasive Species

The company will use an integrated approach to control known noxious weeds or weeds of concern throughout construction, production and reclamation of the West Gas Draw Beta project. Weed species, location, landscape and soils will all be taken into consideration when determining the best method of

control as well as the surrounding vegetation and land use using a combination of the following methods:

Education:

The company will provide periodic weed education and awareness programs for its employees and contractors through the county weed districts, state and federal agencies and educational institutions.

Employees and contractors will be encouraged to report any new noxious weed infestations to the company representative responsible for weed management.

Field employees and contractors will be notified of known noxious weeds or weeds of concern in the project area. Measures will be taken to avoid these areas when possible and control methods used in areas of company activity.

Cultural:

Areas of disturbance will be promptly re-seeded with a certified weed free seed mixture approved by the Bureau of Land Management (BLM), or surface owner.

Certified weed-free mulch will be used in necessary locations.

Vehicles and equipment may require cleaning or washing down before leaving or entering areas of known noxious weed infestations.

Surface disturbance will be minimized to the extent consistent with the company's right to economically develop its mineral resources.

Physical:

In newly reseeded areas, mowing will be considered during the first season of establishment, prior to seed formation of weeds of concern.

Hand pulling of weeds will be considered for small or new infestations.

Biological:

Domestic animals or approved biological agents may be used in areas most suited for this type of control, taking into consideration species, desired results, and management needs.

On BLM surface a Biological Control Agent Release Proposal would be obtained before the release of any biological control agents.

Chemical:

The use of herbicides to control noxious weeds has been found to be very effective and feasible. Herbicides used will be specific for target species, location and follow label instructions in order to obtain desired control for identified species.

Application of herbicides will be done by a commercially licensed applicator.

On BLM administered public lands, an approved Pesticide Use Permit (PUP) will be obtained from the local BLM office. Only herbicides approved for application on BLM administered lands will be used.

Control/treatment of noxious weeds/weeds of concern on private surface will be done in accordance with the existing Surface Use Agreement.

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

The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and

storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle and perennial pepperweed. However, mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants.

4.1.3. Cumulative Effects

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

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and soils are within the analysis parameters and impacts described in the PRB FEIS for the following reasons: They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage and Little Powder River basins, which are respectively approximately 18.5% and 42.8% of the total predicted in the PRB FEIS.

The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.

The commitment by the operator to prevent water from flowing into Horse Creek and Upper Spotted Horse during dry condition.

The WMP for the West Gas Draw Beta proposes that produced water will not contribute significantly to flows downstream.

4.2. Wildlife

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

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

Big game animals are expected to return to the project area following construction; however, populations will likely be lower than prior to project implementation as the human activities associated with operation and maintenance continue to displace big game. Mule deer are more sensitive to operation and maintenance activities than pronghorn, and as the Pinedale Anticline study suggests mule deer do not readily habituate. A study in North Dakota stated “Although the population (mule deer) had over seven years to habituate to oil and gas activities, avoidance of roads and facilities was determined to be long

term and chronic” (Lustig 2003). Deer have even been documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

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

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be contained in reservoirs. If a reservoir were to discharge, it is highly unlikely that produced water would reach a fish-bearing stream; the Powder River is more than ten miles away. Therefore downstream species would not be affected.

4.2.2.1. Cumulative effects

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

4.2.3. Migratory Birds Direct and Indirect Effects

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

Existing and newly constructed reservoirs may have either a positive or negative effect on waterfowl. The reservoirs may provide winter forage and nesting habitat for migrating waterfowl and shore birds. Concentrations of salts and metals, particularly barium and selenium, may increase in the containment reservoirs receiving coalbed natural gas produced water discharges, as water evaporates overtime. Direct effects (toxicity) to waterfowl could occur, depending on the quality of the produced water.

With numerous existing and proposed reservoirs within the project area, the potential for mosquito breeding areas will increase. With the creation of more reservoirs within the sagebrush community more species are being exposed to the West Nile virus. Mortality rates are likely to increase and reproductive

success is likely to decrease in susceptible bird species. The West Gas Draw B POD was an area identified by Montana University sage grouse researchers as causing direct mortality to several sage grouse in 2005. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to over heating or chilling of eggs or chicks. The prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221). An active golden eagle nest is also within .25 miles from a well traveled main ranch access road. The eagle seems to be accustomed to existing ranch and gas development traffic, as it has been active for more than 2 years. The access route cannot change due to topography and existing ranch use.

Twenty nine raptor nest sites were identified by BHEC within the West Gas Draw B project area; of these, nineteen nests were active in 2007. The active ferruginous hawk nest within .25 miles of the 43-19 well in section 20 is out of line of sight from the well and road.

Proposed wells, and utility corridors, were proposed in close proximity to seven nests, which were active in 2007. Despite commitments such as telemetry metering to limit well visits, well visits during the nesting season would likely be necessary, which could lead to nest failure through nest abandonment or predation.

Table 2. Infrastructure within close proximity to documented raptor nests within the W. Gas Draw B project area (Timing limitations will apply to this infrastructure).

BLM ID#	Well / PIT NUMBER within .5 mile
4183	43-19-5574 well road and utility corr.
4173	West ½ of the road and utility corridor to the Rule Trust Fed 23-32 & off channel pit 13-31
4171	34-9 and 12-15 wells and access roads and util. corridor
4185	32-18, 34-18 well, 34-18 pit, access road and util. corr.

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

4.2.4.1. Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

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

4.2.5.1. Threatened and Endangered 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 (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	One small isolated prairie dog colony present.
Threatened				
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence

K Known, documented observation within project area.

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

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

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

Effect Determinations

LAA Likely to adversely affect

NE No Effect.

NLAA May Affect, not likely to adversely effect individuals or habitat.

4.2.5.1.1. Black-footed ferret

Because the black-tailed prairie dog colony within the W Gas Draw B project area is of insufficient size (143 acres) for supporting ferrets and is isolated from any prairie dog complexes, implementation of the proposed development should have no effect on the black-footed ferret.

4.2.5.1.2. Ute's Ladies Tresses Orchid

Produced water will be stored in proposed and existing on and off channel reservoirs. None are located within major drainages of Spotted Horse Creek. Remaining proposed reservoirs are located in upland habitats. No springs have been identified. Suitable habitat is not present within the project area.

Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. Implementation of the proposed coal bed natural gas project should not affect the Ute ladies'-tresses orchid as neither suitable habitat nor a seed source is present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.3 Summary of Sensitive Species Habitat and Project Effects.

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

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Plants				
Porter's sagebrush (<i>Artemisia porteri</i>)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (<i>Cymopterus williamsii</i>)	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.

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

WIPV Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

BI Beneficial Impact

4.2.5.2.1. Bald eagle

The W. Gas Draw B project area is surrounded by extensive natural gas development, existing 3-phase overhead power lines can be found surrounding and within the project area. There are 25.8 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Lance will be using existing 3 phase overhead power lines within the project area and additional proposed lines.

The presence of overhead power lines and roads may impact foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking, such as the W. Gas Draw B project area. From May 2003, through August 14, 2007, Service Law Enforcement salvage records for northeast Wyoming identified that 180 raptors, including 1 bald eagle, 106 golden eagles, 1 unidentified eagle, 28 hawks, 44 owls and 8 unidentified raptors and 1 great-blue heron were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2007). Of the 180 raptors electrocuted 58 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 power lines (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.

Private roads access the project area on the north, and south and are in close proximity to groups of cottonwood and willow trees. With the increase in gas development in the area, vehicle size and traffic volume will also increase.

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

Produced water will be stored in 44 reservoirs (18 existing and 26 proposed) which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.2.5.2.2. Black-tailed prairie dog

The presence of existing and proposed off channel pits (2) may limit colony expansion. Existing nearby power poles may provide perch sites for avian predators increasing prairie dog predation. Mineral related traffic on the adjacent road may result in prairie dog road mortalities. The access road, pipeline corridor and proposed water pits were the landowner and operator preference.

4.2.5.2.3. Greater sage-grouse

Suitable sage-grouse habitat is present throughout the W. Gas Draw B project area, sage-grouse scat was found during some site visits. Sage grouse were occasionally seen by consultants and landowners. The proposed access road through section 30 adjacent to the Box Draw lek was dropped and access to the

wells in section 19 will come from the north. The proposed overhead powerline to the 32-19 will be buried. The disturbance corridor will be kept to 30 feet with minimum brush hogging to minimize the loss of good sage grouse nesting habitat. Four wells were moved to prevent loss of sage grouse habitat at the request of BLM and the landowner.

The 34-19, 24-19, and 43-19 wells and their associated infrastructure go through moderately dense (10-15% cover) sagebrush, resulting in the loss of approximately 3 acres of sage-grouse nesting and early brood rearing habitat. No other alternatives were available.

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

Several sage grouse from the Case lek complex were trapped and radio marked by University of Montana researchers in 2004. In 2005 almost all of these grouse were documented to have died as a result of West Nile virus. Since that time no sage grouse have been documented on these leks.

It is BLM Wyoming policy to limit disruptive activities within a two mile radius of occupied lek sites during the nesting season; this radius may be expanded based on site-specific criteria (Bennet 2004). The Western Association of Fish and Wildlife Agencies (WAFWA) sage-grouse management guidelines (Connely et. al. 2004) recommend the protection of suitable habitats within 5 km of leks where habitats are not distributed uniformly such as the W. Gas Draw B project area. Almost the entire project area is within 5 km of nine sage grouse leks all except one of which were inactive in the last two years. **The loss of sage grouse within the W Gas Draw Beta project area is likely the result of habitat loss from existing fee, State and proposed federal CBNG development, West Nile virus from produced and existing water ponds, and increased disruptive activity.**

The Partners in Flight's Western Working Group recommend no net loss of sagebrush habitats (Paige and Ritter 1999). BLM Wyoming policy also states that rehabilitation activities will include sagebrush and appropriate forb species (Bennet 2004).

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).

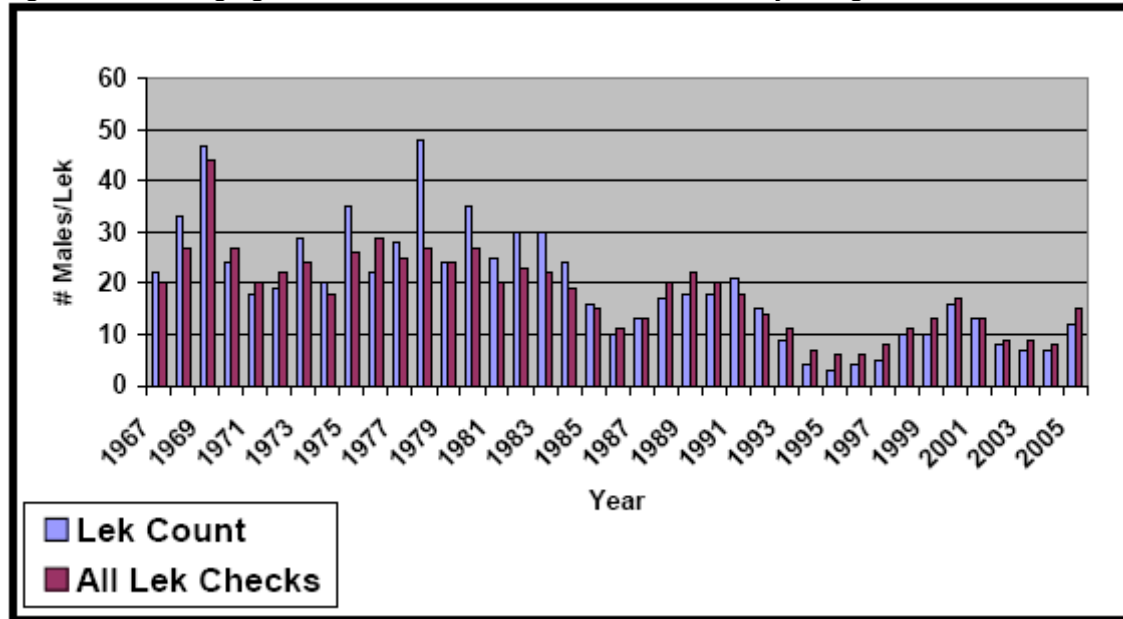
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently 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 Holloran 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, is likely insufficient to reverse the population decline. Moynahan and Lindberg (2004) like WAFWA (Connely et al. 2000) recommend increasing the protective distance around sage grouse leks. Even with a timing limitation on construction activities, sage-grouse may avoid nesting within CBNG fields because of the activities associated with operation and production. As stated earlier, a well density of eight wells per section creates sage-grouse avoidance zones which overlap creating contiguous avoidance areas (WGFD 2004).

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

4.2.5.2.4. Mountain plover

Suitable mountain plover habitat is not present within the project area. The project should not affect

mountain plovers.

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

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

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River and the Little Powder River watersheds and a commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies. The WMP for this POD proposes to use 444 impoundments to store all water produced by CBNG development.

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 15.0 gpm per well or 1005.0 gpm (2.24 cfs or 1,621 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 163,521 acre-feet in 2007 (maximum production is estimated in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells is 1% of the total volume projected for 2007. This volume of produced water is within the predicted parameters of the PRB FEIS.

If just considering the Little Powder River drainage, the projected volume produced within the watershed area was 18,607 acre-feet in 2007 (maximum production is estimated in 2006 at 22,427 acre-feet). As such, the volume of water resulting from the production of these wells is 5% of the total volume projected for 2007. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). The infiltration for the Little Powder River basin is estimated at 37%. For this action, it may be assumed that a maximum of 402 gpm will infiltrate at or near the discharge points and impoundments (648 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 10 to 946 feet compared to 1,190 feet to 1,750 feet to the Wall Coal. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

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

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

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

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

The BLM has installed shallow groundwater monitoring wells at five impoundment locations in the PRB

to assess ground-water quality changes due to infiltration of CBNG produced water. Water quality data has been sampled from these wells on a regular basis. Preliminary data from three sites show increasing TDS level as water infiltrates while two sites are not.

Approximately 1650 new impoundment sites have been investigated with over 1850 borings as of December, 2007. Of those impoundments, 240 met the criteria to provide compliance monitoring data if constructed and used for CBNG water containment. Only 108 monitored impoundments are currently in use. As of the 4th quarter 2007, only 9 monitored impoundments exceed groundwater class of use limits (Fischer, 2008). The BLM requires that operators comply with the DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in one of multiple WDEQ WYPDES permits that cover the West Gas Draw area, and the levels found in West Gas Draw Beta POD’s representative water sample.

Table 4.4 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	TDS, mg/l	SAR	EC, μmhos/cm
Most Restrictive Proposed Limit - Powder		2.0	1,000
Most Restrictive Proposed Limit – Little Powder		3.0	1,000
Least Restrictive Proposed Limit - Powder		10.0	3,200
Least Restrictive Proposed Limit – Little Powder		10.0	3,000
Upper Powder River Watershed at Arvada, WY USGS #06317000 Gauging Station			
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	3,400
Little Powder River Watershed near Weston, WY, Station ID 06324970 Gauging Station			
Historic Data Average at Maximum Flow		4.44	1,785
Historic Data Average at Minimum Flow		6.94	3,300
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirement for WYPDES Permit # WY0048241			
At discharge point	5,000	na	7,500
Predicted Produced Water Quality Big George Coal	654	11.6	1,050

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1470.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS).

The quality for the water produced from the Big George target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 15.0 gallons per minute (gpm) is projected to be produced from these 61 wells, for a total of 1005 gpm for the POD. See Table 4.5.

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

There are 45 discharge points proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 26 impoundments would potentially be constructed within the project area, and along with an additional 18 existing impoundments will contain all CBNG-produced water. These impoundments will disturb approximately 223.0 acres including the dam structures. Of these water impoundments, 28 would be on-channel reservoirs disturbing 118.0 acres, and 16 would be off-channel ponds disturbing 105.0 acres. The off-channel impoundments would result in evaporation and infiltration of CBNG water. Criteria identified in “Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming” (WDEQ, 2002) was used to locate these impoundments. Monitoring may be required based upon WYDEQ findings relative to “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004). Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.34 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the

mainstem of the Upper Powder River of 68 cfs and 13 cfs to the Little Powder (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 61 wells is anticipated to be a total of 1,005 gpm or 2.24 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in Upper Spotted Horse Creek or Horse Creek from this action (0.34 cfs) may add a maximum 0.07 cfs to Upper Powder River or Little Powder River flows, or less than 0.5% of the predicted total CBNG produced water contribution to either drainage. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

The BLM agrees with the operator that this is not expected to occur because:

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

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

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

Permit effluent limits for one of the existing WYPDES permits (WY0048241) for this POD were set at (WYPDES page 1):

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Radium 226	1 pCi/l max
Dissolved iron	253.4 µg/l max
Dissolved manganese	718.6 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	46 mg/l

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The designated point of compliance identified for this permit is end of pipe.

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

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

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

In-channel downstream impacts are addressed in the WMP for the West Gas Draw Unit Beta POD prepared by WWC Engineering for Lance Oil and Gas Company.

4.4.2.1. Surface Water Cumulative Effects

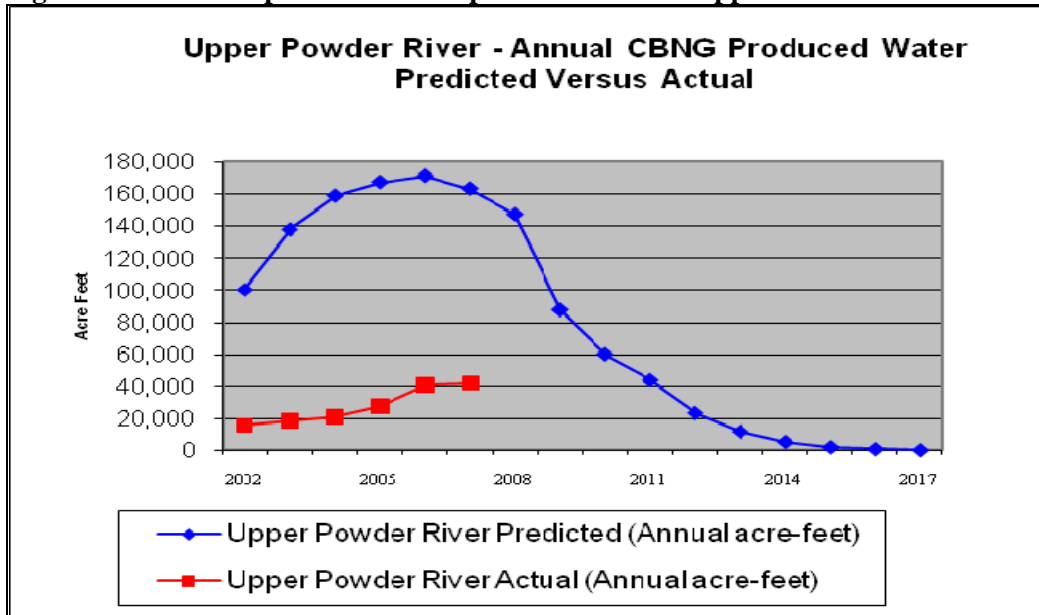
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River and Little Powder River watersheds. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2007, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 166,096 acre-ft of water compared to the predicted 900,040 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.6 and Figure 4.1 below. This volume is 18.5% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.6 Actual vs predicted water production in the Upper Powder River watershed 2007 Data Update 3-08-08

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,112	25.8	166,096	18.5
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	1,285,233		166,096			

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



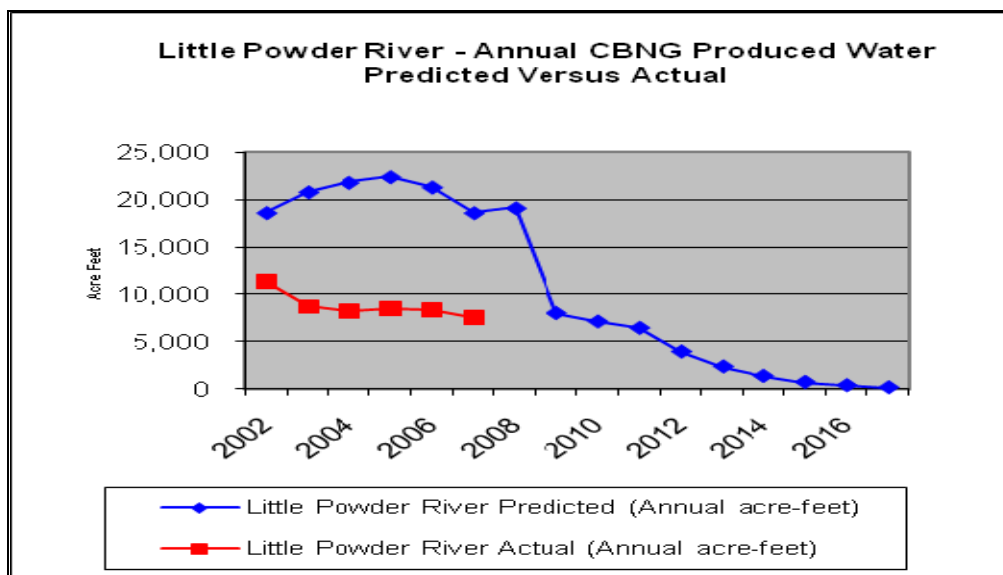
As of December 2007, all producing CBNG wells in the Little Powder River watershed have discharged a cumulative volume of 52,902 acre-ft of water compared to the predicted 123,601 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.6 and Figure 4.1 below. This volume is 42.8% of the total predicted produced water analyzed in the PRB FEIS for the Little Powder River watershed.

Table 4.7 Actual vs predicted water production in the Little Powder River watershed *2007 Data Update 3-08-08*

Year	Little Powder River Predicted (Annual acre-feet)	Little Powder River Predicted (Cumulative acre-feet from 2002)	Little Powder River Actual (Annual acre-feet)		Little Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	18,613	18,613	11,391	61.2	11,391	61.2
2003	20,822	39,435	8,767	42.1	20,158	51.1
2004	21,832	61,267	8,266	37.9	28,424	46.4
2005	22,427	83,694	8,529	38.0	36,953	44.2
2006	21,330	105,024	8,383	39.3	45,336	43.2
2007	18,607	123,631	7,566	40.7	52,902	42.8
2008	19,121	142,752				
2009	8,016	150,768				
2010	7,124	157,892				
2011	6,439	164,331				
2012	3,930	168,261				
2013	2,340	170,601				

Year	Little Powder River Predicted (Annual acre-feet)	Little Powder River Predicted (Cumulative acre-feet from 2002)	Little Powder River Actual (Annual acre-feet)		Little Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2014	1,335	171,936				
2015	699	172,635				
2016	350	172,985				
2017	133	173,118				
Total	173,118		52,902			

Figure 4.2 Actual vs predicted water production in the Little Powder River watershed



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

The PRB FEIS states, “Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ’s (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117)

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 18.5% of the total predicted in the PRB FEIS, and in the Little Powder River drainage, which is approximately 42.8% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged into impoundments.

No additional mitigation measures are required.

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

4.5. Cultural Resources

Eleven of nineteen cultural sites are Eligible or Unevaluated to the National Register. Only one non-eligible site is in an area of direct effect. Recommendations to protect two unevaluated sites are discussed as Specific Conditions of Approval. Otherwise, all proposed developments are located a quarter-mile from eligible or unevaluated sites, or new disturbance is confined to existing disturbed areas.

If previously unreported 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).

Paleontological discoveries will follow the procedures outlined in the *Standard COA* (General)(A)(1).

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Brian Venn	Project Manager	WWC Engineering	Yes
Nathan Rager	Associate Engineer	WWC Engineering	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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