

**FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR**

Yates Petroleum Corporation
Edisto CS Federal POD

ENVIRONMENTAL ASSESSMENT –WY-070-07-075

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Yates Petroleum Corporation’s Edisto Coal Bed Natural Gas (CBNG) POD comprised of the following 50 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	EDISTO AERIAL CS	31	SWSW	35	49N	78W	WYW146911
2	EDISTO AERIAL CS FEDERAL	15	SWSW	27	49N	78W	WYW146911
3	EDISTO AERIAL CS FEDERAL	18	NENW	34	49N	78W	WYW146911
4	EDISTO AERIAL CS FEDERAL	19	SWNW	34	49N	78W	WYW146911
5	EDISTO AERIAL CS FEDERAL	20	SWNE	34	49N	78W	WYW146911
6	EDISTO AERIAL CS FEDERAL	22	NESW	34	49N	78W	WYW146911
7	EDISTO AERIAL CS FEDERAL	23	SWSW	34	49N	78W	WYW146911
8	EDISTO AERIAL CS FEDERAL	24	SWSE	34	49N	78W	WYW146911
9	EDISTO ALERT CS	12	SWNW	29	49N	78W	WYW131237
10	EDISTO ALERT CS	17	NESE	32	49N	78W	WYW131237
11	EDISTO ALERT CS COM	25	NESW	30	49N	78W	WYW131237
12	EDISTO ALERT CS COM	16	NENW	32	49N	78W	WYW131237
13	EDISTO ALERT CS COM	18	SWSW	32	49N	78W	WYW131237
14	EDISTO ALERT CS COM	19	SWSE	32	49N	78W	WYW131237
15	EDISTO ALERT CS FEDERAL	4	NENW	28	49N	78W	WYW131237
16	EDISTO ALERT CS FEDERAL	5	SWNW	28	49N	78W	WYW131237
17	EDISTO ALERT CS FEDERAL	6	SWNE	28	49N	78W	WYW131237
18	EDISTO ALERT CS FEDERAL	7	NESE	28	49N	78W	WYW131237
19	EDISTO ALERT CS FEDERAL	9	SWSE	28	49N	78W	WYW131237
20	EDISTO ALERT CS FEDERAL	13	NESE	29	49N	78W	WYW131237
21	EDISTO ALERT CS FEDERAL	14	SWSE	29	49N	78W	WYW131237
22	EDISTO ALERT CS FEDERAL	15	NENE	32	49N	78W	WYW131237
23	EDISTO ALERT CS FEDERAL	20	NENE	33	49N	78W	WYW131237
24	EDISTO ALERT CS FEDERAL	24	NESE	33	49N	78W	WYW131237
25	EDISTO ALERT CS FEDERAL	23	SWNE	33	49N	78W	WYW131237
26	EDISTO ALERT CS FEDERAL	21	NENW	33	49N	78W	WYW131237
27	EDISTO ALERT CS FEDERAL COM	8	NESW	28	49N	78W	WYW131237
28	EDISTO ALERT CS FEDERAL COM	22	SWNW	33	49N	78W	WYW131237
29	EDISTO BULKHEAD CS	1	NESE	9	48N	78W	WYW134247
30	EDISTO BULKHEAD CS	2	SWSE	9	48N	78W	WYW134247
31	EDISTO CARRIER CS	15	SWNW	19	49N	78W	WYW146910
32	EDISTO CARRIER CS	18	NESW	19	49N	78W	WYW146910
33	EDISTO CARRIER CS	19	SWSW	19	49N	78W	WYW146910
34	EDISTO CARRIER CS	20	SWSE	19	49N	78W	WYW146910
35	EDISTO CARRIER CS	24	NENE	30	49N	78W	WYW146910
36	EDISTO CARRIER CS	25	SWNE	30	49N	78W	WYW146910
37	EDISTO CARRIER CS	27	SWSE	30	49N	78W	WYW146910

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
38	EDISTO CARRIER CS FEDERAL	14	NENW	19	49N	78W	WYW146910
39	EDISTO CS	7	NENW	30	49N	78W	WYW130297
40	EDISTO CS COM	8	NESE	30	49N	78W	WYW130297
41	EDISTO CS COM	9	SWNW	32	49N	78W	WYW130297
42	EDISTO CS FEDERAL	6	SWSW	29	49N	78W	WYW130297
43	EDISTO CS FEDERAL COM	4	SWSW	28	49N	78W	WYW130297
44	EDISTO CS FEDERAL COM	5	SWNE	29	49N	78W	WYW130297
45	EDISTO FRIGATE CS	1	NENE	31	49N	78W	WYW145196
46	EDISTO FRIGATE CS	2	SWNE	31	49N	78W	WYW145196
47	EDISTO FRIGATE CS	3	NESE	31	49N	78W	WYW145196
48	EDISTO FRIGATE CS	5	SWSE	31	49N	78W	WYW145196
49	EDISTO FRIGATE CS COM	4	NESW	31	49N	78W	WYW145196
50	EDISTO IRVING CS FEDERAL	3*	SWSW	18	49N	78W	WYW143126

The following reservoirs were authorized as part of the water management plan for this project:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
1	Talon	NWSE	28	49	78	WYW131237
2	Mario	NWSE	28	49	78	WYW131237
3	Verde	NWSE	28	49	78	WYW131237
4	Flotsam	SWSW	28	49	78	WYW130297
5	Short View	SWNW	28	49	78	WYW131237
6	Wardner #1	NWSE	29	49	78	WYW131237
7	Wardner #2	NWSE	29	49	78	WYW131237
8	Ring	SENE	28	49	78	WYW131237
9	Classic	SENE	29	49	78	Fee
10	Amy	SENE	29	49	78	Fee
11	Anna	SESW	29	49	78	Fee
12	Stranahan #2	SWSW	19	49	78	Fee

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

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

1. The Operator, in their POD, has committed to:
 - Comply with all applicable Federal, State and Local laws and regulations.
 - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
 - Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.

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

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

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

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

Field Manager: _____ Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Yates Petroleum Corporation
Edisto CS Federal POD
PLAN OF DEVELOPMENT
WY-070-070-075**

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on multiple federal oil and gas mineral leases issued to the applicant by the BLM. 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: Yates Petroleum Corporation’s Edisto CS Federal POD Plan of Development (POD) for 50 coal bed natural gas well APD’s and associated infrastructure. A water management plan was developed and submitted as part of this POD to handle the produced water from all the Edisto wells.

Proposed Well Information: There are 50 wells proposed within this POD, as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	EDISTO AERIAL CS	31	SWSW	35	49N	78W	WYW146911
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50	EDISTO IRVING CS FEDERAL	3*	SWSW	18	49N	78W	WYW143126

The following reservoirs were proposed as part of the water management plan for this project:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
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4	Flotsam	SWSW	28	49	78	WYW130297
5	Short View	SWNW	28	49	78	WYW131237
6	Wardner #1	NWSE	29	49	78	WYW131237
7	Wardner #2	NWSE	29	49	78	WYW131237
8	Ring	SENW	28	49	78	WYW131237
9	Classic	SENE	29	49	78	Fee
10	Amy	SENE	29	49	78	Fee
11	Anna	SESW	29	49	78	Fee
12	Stranahan #2	SWSW	19	49	78	Fee
13	Ullrich	NESW	34	49	78	WYW146911
14	Song Bird	SWNW	34	49	78	WYW146911

County: Johnson

Applicant: Yates Petroleum Corporation

Surface Owners:

Wardner Ranch, Indian Creek Land Co LLC, Yates Petroleum Corporation, Teardrop Cattle CO.

The proposed action entails developing the following:

- Drilling of 50 total federal CBM wells in 3 coal seams Roland, Upper Big George, Lower Big George. Depths range from 1395 feet to 2320 feet. Multiple seams will be produced by co-mingling production (a single well per location capable of producing from multiple coal seams).
- An unimproved and improved road network.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 14 discharge points (2 will not be used) and 14 stock water reservoirs that will provide full containment of CBNG discharge water within the Upper Powder River watershed.
- A buried gas, water and power line network.

For a detailed description of how to access the POD area, or detailed descriptions of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan (MSUP), Drilling Plan and WMP(WMP) in the POD and individual APDs. Also see the subject POD and/or APDs for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices is

also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

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

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

1. Comply with all applicable Federal, State and Local laws and regulations.
2. Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
3. Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
4. Provide water analysis from a designated reference well in each coal zone.
5. Install bird ramps on all new constructed tire tanks within the Edisto POD lease hold.
6. Install bird ramps on all existing tire tanks located on Yates Petroleum Corporation surface within the Edisto POD project area.
7. Treat all CBNG reservoirs within the Edisto POD lease hold with Altosid XR (or equivalent product), only if larva are present and BLM approves treatment on Federal surface and private surface owner allows.

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

2.3. Alternative C – Environmentally Preferred

Modifications, or alternatives, to the original proposal received from the operator, were identified as the result of the pre-approval onsite inspection(s).

At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be minimized. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate 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 Edisto CS Federal POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well Name	Well #	QTR/QTR	Section	TWP	RNG	Onsite Notes
EDISTO AERIAL CS	31	SWSW	35	49N	78W	access/utilities: rerouted, now coming in from the 24 Aerial location, will minimize disturbance, better road location, Pad was engineered, but location will not required a pad, water and possible electric will run cross country to SE
EDISTO AERIAL CS FEDERAL	15	SWSW	27	49N	78W	well moved to decrease impact to sage-grouse habitat, access/utilities require engineering
EDISTO AERIAL CS FEDERAL	20	SWNE	34	49N	78W	well move ~250' SW, original site to narrow, new location more room for equipment, no dirt work,

Well Name	Well #	QTR/QTR	Section	TWP	RNG	Onsite Notes
EDISTO ALERT CS FEDERAL	15	NENE	32	49N	78W	access/utilities rerouted to minimize disturbance to sage-grouse habitat, and follow contours of slope
EDISTO ALERT CS FEDERAL	20	NENE	33	49N	78W	well moved, original location required pad and headcut mitigation, new location, no engineered pad required, no head cut mitigation required
EDISTO CARRIER CS	15	SWNW	19	49N	78W	access/utilities to well location rerouted to minimize disturbance to sage-grouse habitat ,utilities to S rerouted, at Rowdy Pipeline's request due to topography issues
EDISTO CARRIER CS	20	SWSE	19	49N	78W	Well moved due to impacts to sage-grouse habitat, utilities rerouted will corridor with road, instead of coming from W cross country
EDISTO CARRIER CS	24	NENE	30	49N	78W	access/utilities rerouted to minimize disturbance to sage-grouse habitat
EDISTO CS FEDERAL	6	SWSW	29	49N	78W	well moved, due to impacts to sage-grouse habitat
EDISTO CS FEDERAL COM	4	SWSW	28	49N	78W	access/utilities rerouted to minimize disturbance to sage-grouse habitat
EDISTO CS FEDERAL COM	5	SWNE	29	49N	78W	well moved due to utility construction work, issue: Wardner ranch water line may need moved or shut off valve moved

Two reservoirs, Ullrich and Songbird, were dropped as a result of the onsite due to poor site conditions. These two sites were located on BLM surface directly above large headcuts more than 20 feet high where a high potential for seepage and subsequent slumping of the headcut and/or dam face exists.

Implementation of committed mitigation measures contained in the Master Surface Use Plan, Drilling Program and Water Management Plan, in addition to the Standard COA contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

1. In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the latest DEQ standards and monitoring guidance.

2.3.2.2. Surface Water

1. Channel Crossings:
 - a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
 - b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.

- c) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
 - d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
 3. 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.
 4. The operator will supply to the BLM copies of the WYPDES permits for this POD as soon as they are available from WDEQ.

2.3.2.3. Soils

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

2.3.2.4. Vegetation

1. Temporarily fence reseeded areas, if not already fenced, for at least two complete growing seasons to insure reclamation success on problematic sites (e.g. close to livestock watering source, erosive soils etc.).

2.3.2.5. Wetland/Riparian

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance can't occur, the minimum number of poles necessary to cross the area will be used.
2. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.
3. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.
4. The lower edge of soil or other material stockpiles will be located outside the active floodplain.
5. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.
6. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.6. Wildlife

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

proposed activities.

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

Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

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

2.3.2.6.2. Mountain Plover

1. A mountain plover nesting survey shall be conducted following U.S. Fish and Wildlife Service protocol within occupied black-tailed prairie dog colonies prior to permit authorization.

Outside of occupied black-tailed prairie dog colonies, a mountain plover nesting survey following U.S. Fish and Wildlife Service protocol is encouraged prior to construction initiation, as project modifications can be made if necessary to protect nesting plovers and natural gas production. If requested in writing, then authorization may be granted for construction activities to occur between August 1 and March 15, outside the mountain plover breeding season. A mountain plover nesting survey following U.S. Fish and Wildlife Service protocol shall be conducted during the first available survey period (May 1 – June 15). Additional measures such as monitoring and activity restrictions may be applied if mountain plovers are documented.

2.3.2.7. Visual Resources

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

2.3.2.8. Noise

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

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

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

1. 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.
2. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12” or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according to the following spacing:

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

3. To prevent rilling, and decrease impacts from vehicle traffic; 4” of aggregate will be placed where grades exceed 8%.
4. The operator is responsible for having the licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
5. 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 Edisto POD is Covert Green (18-0617 TPX).
6. All infrastructure, unless designated otherwise will have a 45 foot working area, with blading within the 45 feet not to exceed 35 foot (unless steep slopes dictate more).
7. All constructed reservoirs and associated disturbance on BLM surface will be fenced to prevent livestock access. The fencing must be wildlife friendly and meet the following parameters:
 - a. No more than three strands
 - b. Bottom wire 16” off the ground
 - c. Top wire not higher than 40”
 - d. At least one gate, which is large enough to accommodate construction equipment and equipped with a mechanical closure, will be included.
 - e. The fence shall be situated at least 20 feet back from the high water line of the impoundment to prevent accidental entrapment of wildlife.

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

Species	% in Mix	Lbs PLS*
<i>Thickspike Wheatgrass</i> (<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>)	10	1.2

Species	% in Mix	Lbs PLS*
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	10	1.2
Western Wheatgrass (Pascopyrum smithii)	40	4.8
Prairie coneflower (Ratibida columnifera)	5	0.6
White or Purple Prairie Clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata) /or American vetch (Vicia americana)	5	0.6
Green needlegrass (Nassella viridula)	25	3.0
Total	100%	12 lbs/acre

*PLS = pure live seed

*Northern Plains adapted species

*Double this rate if broadcast seeding

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

Cultural Resources

1. Road upgrade activities at spot upgrade M (SW ¼ Sec. 32, T49N R78W) will have the following restrictions:
 - a. The spot upgrade will not be approved until an archaeological contractor can re-evaluate and assess recent impacts to site 48JO2982. An updated site form will be required prior to initiating surface disturbing activities.
 - b. The road drainage construction will be restricted to the existing disturbed road corridor slope within 30 ft. from centerline. No ground disturbance/cutting is allowed on the crest of the terrace, nor on the terrace itself. If wing ditches are needed on the terrace, then above ground construction is required (such as sediment/Excelsior logs).
 - c. Wing ditches can be excavated on the slope within the 60 ft. corridor
 - d. The existing deep drainage channel on the north side of the road can be filled in and re-contoured for drainage control, since soils in this location are extremely disturbed and the location has been determined to be a non-contributing portion of the site.
 - e. An archaeological monitor will be required during construction activities.

2. Archeological Monitoring: All earth moving activity in the following areas will be monitored by an archeologist who meets or exceed the qualification standards recommended by the Secretary of the Interior. The Bureau has identified these areas as containing the potential for buried cultural deposits (areas containing deep alluvial deposits). The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of work.
 - a. All earth moving activities within alluvial deposits of Indian Creek in T49N R78W Sections 31, 32 and T48N R78W Sections 2, 3, and 4. The determination of the exact monitoring areas is based on the discretion of the archeological monitor, although, all alluvial deposits within the creek bottom must be monitored.

Wildlife

1. The following conditions will minimize impacts to raptors;
 - a. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This affects the following;

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
49/78	19, 29, 30, 31, 32, 34, 35	Wells: 18CARR, 19CARR, 20CARR, 6EDIS, 8EDIS, 25CARR, 7EDIS, 25ALER, 27CARR, 1FRIG, 9EDIS, 2FRIG, 3FRIG, 4FRIG, 5FRIG, 31ALER, 24AERI, 22AERI, 19AERI, 20AERI, 31AERI and related proposed utility corridors/roads, truck turn around/ storage areas, water discharge points and Stranahan reservoirs.
48/78	3,4,5,9	Wells: BULK 1, 2; and related proposed utility corridors/roads,.

- b. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
- c. Nest productivity checks shall be completed for all raptor nests within the Edisto POD listed in the table below. The productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success/production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year.

NEST ID (BLM ID)	SP	UTME	UTM N	SEC	T_N	R_W	QTRS	SUB	STATUS, 06	COND	YNG	WITHIN .5 MILE OF PROPOSED WELLS ⁱ
(2828)	RTHA/ GHOW	397550	4896083	19	49	78	NENE	CTL	ACTI	FAIR	4	NO
(3845)	RTHA	3397404	4893506	30	49	78	NESE	CTL	ACTI	GOOD	2	Yes
(3846)	RTHA	397299	4892844	31	49	78	NWNE	CTL	INAC	FAIR		YES
(3853)	RTHA/ GOEA	398975	4891031	5	48	78	NENW	CTL	ACTI	GOOD	2	YES
(3854)	FEHA/ GOEA	401762	4890678	3	48	78	SWNW	CREEK BANK	ACTI FAILED	POOR		NO
4443)	NOHA	397325	4892863	3	1	49	78	NWNE	ACTI	GOOD	4EGGS	YES
(4444)	AMKE	397301	4892311	31	49	78	SWNE	CTD	ACTI	NA		YES
(4446)	LEOW	401698	4890876	3	48	78	SWNW	CTL	ACTI	GOOD	1	YES
(4449)	LEOW	410796	4859894	34	49	78	SESE	JUL	ACTI	NA	2	YES

NEST ID (BLM ID)	SP	UTME	UTM N	SEC	T_N	R_W	QTRS	SUB	STATUS, 06	COND	YNG	WITHIN .5 MILE OF PROPOSED WELLS ⁱⁱ
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3 (2828)	RTHA/ GHOW*	397550	4896083	19	49	78	NENE	CTL	ACTI	FAIR	4	NO
6 (3845)	RTHA	3397404	4893506	30	49	78	NESE	CTL	ACTI	GOOD	2	Yes
8 (3846)	RTHA	397299	4892844	31	49	78	NWNE	CTL	INAC	FAIR		YES
15	RTHA/ GOEA*	398975	4891031	5	48	78	NENW	CTL	ACTI	GOOD	2	YES
16	FEHA/ GOEA*	401762	4890678	3	48	78	SWNW	CREEK BANK	ACTI FAILED	POOR		NO
18	NOHA	397325	4892863	3	1	49	78	NWNE	ACTI	GOOD	4EG GS	YES
19	AMKE	397301	4892311	31	49	78	SWNE	CTD	ACTI	NA		YES
21	LEOW	401698	4890876	3	48	78	SWNW	CTL	ACTI	GOOD	1	YES
24	LEOW	410796	4859894	34	49	78	SESE	JUL	ACTI	NA	2	YES

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

2. The following conditions will minimize impacts to sage-grouse:

- a. No surface disturbing activities are permitted within 2 miles of the four sage grouse lek sites identified within the Edisto project area, 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.**

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
49/78	18	Wells: 3 IRVI and related proposed utility corridors/roads, Wells: 15AERI,18AERI,19AERI,20AERI,22AERI,24
	27-34	AERI,31AERI,5ALER,6ALER,7ALER,8ALER,9ALER, 12 ALER,13ALER,14 ALER,15, ALER 16 ALER,17ALER,18 ALER,19ALER,20ALER,21ALER,22 ALER,23 ALER,24ALER, 4EDIS,5 EDIS,6 EDIS,8EDIS, 27CARR, 1FRIG,2FRIG,3 FRIG,4 FRIG,5FRIG, and related proposed utility corridors/roads, storage areas, water discharge points and Ring, Verde, Mario, Talon, Short view, Floatsam, Classic, Wardner 1, Wardner2, Anna, and Stranahan reservoirs.
48/78	3,4,5,9,10	Wells: BULK1,BULK2; and related proposed utility corridors/roads,

- b. A survey is required for sage-grouse between April 1 and May 7, annually, within the project area for the life of the project and results shall be submitted to a BLM biologist.
- c. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.

- d. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
 - e. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15)..
3. The following conditions will minimize impacts to burrowing owls:
- a. No surface disturbing activity shall occur the within the three black-tailed prairie dog colonies located in Sections 30, 32 and 33 of Township 49 North, Range 78 West, and Sections 9, and 10 of Township 48 North, Range 78 West, from April 15 through August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season.

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
49/78	30	Wells: 25 ALER, 27 CARR and related proposed utility corridors/roads,
	32	Wells: 17 and 19 ALER, and related proposed utility corridors/roads,
	33	Utility corridor
48/78	9,10	Wells: 2 BULK; and related proposed utility corridors/roads.

- b. A 0.25 mile buffer will be applied if a burrowing owl nest is identified. This condition will be implemented on an annual basis for the duration of surface disturbing activities until project completion.
4. The following conditions will minimize impacts to mountain plover.
- a. Mountain plover nesting surveys shall be conducted by a biologist within all black tailed prairie dog colonies, following the most current U.S. Fish and Wildlife Service Mountain Plover Survey Guidelines (the survey period is May 1-June 15). All survey results must be submitted in writing to the BFO and approved prior to initiation of surface disturbing activities.
5. If a mountain plover is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).

Civil Engineering:

- 1. Improved, “by template,” road construction is the lowest standard to be used on loop roads and roads accessing four or more wells. Those sections already designated as “engineered” must be constructed according to the approved plans.
- 2. 5 EDIS to SW of 18 CARR: The two sections of road at STA 12+00 and STA 21+00 must be reconstructed as directed by Ms. Chadwick, P.E., to bring the road into compliance with BLM standards for maximum grade.
- 3. SU 5, 13, 14, 17, 24, 25, 38: These roads may be used as primitive two-tracks without modifications. Notify the BLM prior to any construction on these sections of road. Any upgrades must meet BLM “template” construction standards as presented in the Gold Book and BLM Manual 9113.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on April 21, 2006. Field inspections of the proposed Edisto Federal POD CBNG project were conducted on August 29-31, September 1, 2006 by;

Yates Corporation: Trent Knez
 BLM: Eric Holborn, Al Sprague, Clint Crago, Chris Williams, Larry Gerard.

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		Eric Holborn,
Wilderness Values		X		Eric Holborn
ACECs			X	Eric Holborn
Water Resources	X			Chris Williams
Air Quality	X			Eric Holborn
Cultural or Historical Values	X			Clint Crago
Prime or Unique Farmlands			X	Eric Holborn
Wild & Scenic Rivers		X		Eric Holborn
Wetland/Riparian	X			Eric Holborn Chris Williams
Native American Religious Concerns			X	Clint Crago
Hazardous Wastes or Solids		X		Eric Holborn
Invasive, Nonnative Species	X			Eric Holborn
Environmental Justice		X		Eric Holborn

3.1. Topographic Characteristics of Project Area

The Edisto Plan of Development area is located in far eastern Johnson County, Wyoming, immediately south of Interstate 90’s Indian Creek exit. The development area is located within the Indian Creek watershed, which is a tributary to the Upper Powder River. The area is semi-badland country with many erosional features (buttes, badlands, isolated mountains, break valleys, and canyons) and sparse vegetation. The elevation changes and presence of woody species provide a windbreak effect while also capturing additional moisture; therefore, all gradations of cover, from semi-desert to woodland, are supported.

This is an area of extensive existing CBNG development, as well as some existing conventional oil and gas production. Most of the roads which will be used for access to the proposed wells were constructed or improved to accommodate the current Fee or State of Wyoming lands production and/or existing cattle operations.

This is also an area of grazing and farming activity. Approximately one half of the land surface within the POD is privately held (west quadrant of the project area) while Sections 27-29, 33, 34 (T48N R78W) are BLM managed acreage. Each of these tracts is leased for grazing by an adjacent landowner.

3.2. Soils and Vegetation

For this portion of northern Johnson County the NRCS Order 3 soil survey has not yet been published. Preliminary soils mapping indicated large areas identified as 101DE Badland, which is described in National Soil Survey Handbook (NSSH) as miscellaneous areas.

Based on field observations the two ecological sites associated with the project area are Loamy and Shallow Loamy. The identifiable soils vary from those classified as loamy to shallow loamy within the project area. Many locations are not classified as a soil and are designated as miscellaneous areas. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 2 inches on ridges to 4 to 8 inches in bottomland. Erosion potential varies from moderate to severe depending on the site (soil type, vegetative cover and slope). Reclamation potential of sites varies from fair to poor or not rated throughout the project area.

Miscellaneous areas have essentially no soil and support little or no vegetation. They can result from active erosion, washing by water, unfavorable soil conditions, or human activities. Some miscellaneous areas can be made productive, but only after major reclamation efforts (430-VI-NSSH, 1996). Miscellaneous areas identified in the Edisto POD portion of the Northern Johnson County NRCS soil survey include Badlands and Rock outcrop defined in the NSSH (430-VI-NSSH, 1996) as:

- **Badlands.** A landscape which is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes with narrow interfluves. Badlands develop on surfaces with little or no vegetative cover, overlying unconsolidated or poorly cemented materials (clays, silts, or in some cases sandstones) sometimes with soluble minerals such as gypsum or halite. Erosion potential would be classified as severe and the reclamation potential would be classified as not rated.
- **Rock outcrop.** Consists of exposures of bare bedrock. Most rock outcrops are hardrock, but some are soft.

Loamy Sites: This site occurs on gently undulating rolling land. Typical landforms are hill sides, alluvial fans, ridges & stream terraces. The soils are deep to moderately deep (greater than 20" to bedrock), well drained & moderately permeable. Layers of the soil most influential to the plant community varies from 3 to 6 inches thick. These layers consist of the A horizon with very fine sandy loam, loam, or silt loam texture and may also include the upper few inches of the B horizon with sandy clay loam, silty clay loam or clay loam texture.

Shallow Loamy Sites: These sites occur on steep slopes and ridge tops, but may occur on all slopes. Typical landforms are hill sides, ridges and escarpments. The soils are shallow (less than 20" to bedrock) well-drained soils formed in alluvium over residuum or residuum. These soils have moderate permeability and may occur on all slopes. The bedrock may be any kind which is virtually impenetrable to plant roots, except igneous. The surface soil will have one or more of the following textures: very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam. Thin ineffectual layers of other textures are disregarded. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. The main soil limitations include: depth to bedrock, low organic matter content, and soil droughtiness. The low annual precipitation should be considered when planning a seeding. For more detailed soil information, see the NRCS Soil Survey 719 – Northern Johnson County.

The plant community associated with these ecological sites for this project area is;

Mixed Sagebrush/Grass Plant Community

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

Dominant grasses include needleandthread, western wheatgrass, and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and Sandberg bluegrass. Forbs commonly

found in this plant community include plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear can also occur.

3.2.1. Wetlands/Riparian

Riparian areas exist in all parts of the project area, but riparian vegetation is only well enhanced through increased moisture availability along main stem watershed channels such as Indian Creek.

3.2.2. Invasive Species

State-listed noxious weeds and invasive/exotic plant infestations were discovered by a search of Buffalo Field Office Geographic Information Systems data developed from Federal, State and County weed data and during subsequent field investigation by the project proponent. This area of the Powder River corridor maintains populations of russian knapweed, scotch thistle, spotted knapweed, and diffuse knapweed. Additionally, the Johnson County Weed and Pest District lists cocklebur and Buffalobur as noxious weeds of concern, both of which occur in the project area.

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).

Thunderbird Jones and Stokes Wildlife Consultants (TJS) conducted raptor, prairie dog, sage-grouse, sharp-tailed grouse, bald eagle, Ute ladies'-tresses orchid, and mountain plover surveys in 2005, 2006 and updated wildlife information in 2007.

A BLM Biologist conducted field visits on August 29, 30, 31, 2006, and May 23, and August 15, 2007. During this time, the biologists 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 mule deer and pronghorn antelope. The project area is part of the Powder River mule deer herd unit. The 2003 population was 51,401 and the 2004 population was estimated at 55,561. The population objective for the Powder River herd unit is 52,000 (WGFD 2004). Pronghorn antelope belong to the Crazywoman herd unit. Populations of mule deer and pronghorn antelope within their respective hunt areas are above WGFD objectives.

The WGFD has designated the entire project area as Winter Yearlong range for mule deer and Yearlong for pronghorn.

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

3.3.2. Aquatics

The project area is located within the Indian Creek watershed, which is a tributary to the Powder River. Indian Creek is an ephemeral stream which flows in direct response to storm events and snowmelt. Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available about them. Fish that have been identified in the sub-watershed are listed in the PRB FEIS (3-156-159).

3.3.3. Migratory Birds

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

3.3.4. Raptors

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

The BLM database and TJS identified 26 raptor nests within 0.5 mile of the Edisto project area. Sixteen of the nests have been identified to species, while 9 of the nests are unknown or potential magpie nests. Table 4 lists the species and activity status of these nests in 2007.

Table 4. Raptor Nests identified within 0.5 miles of the Edisto POD.

NEST ID (BLM ID)	SP	UTM E	UTM N	SEC	T_N	R_W	QTRS	SUB	STATUS, 07	COND	YNG
(2827)	RTHA	396853	4896830	18	49	78	NESW	CTL	INACTI	Good	
(3841)	PRFA	397049	4896859	18	49	78	NWSE	CLF	INAC	NA	
(2828)	RTHA/ GHOW	397550	4896083	19	49	78	NENE	CTL	GONE	GONE	
(3842)	BUTEO	396504	4894682	19	49	78	SWSW	CTL	GONE	GONE	
(3843)	BUTEO	396572	4894505	30	49	78	NWNW	CTL	INAC	POOR	
(3845)	RTHA	3397404	4893506	30	49	78	NESE	CTL	ACTI	GOOD	
(3844)	UNRA	397391	4893489	30	49	78	NESE	CTL	GONE	GONE	
(3846)	RTHA	397299	4892844	31	49	78	NWNE	CTL	INAC	FAIR	
(3847)	UNK	397296	4892837	31	49	78	NWNE	CTL	INAC	POOR	
(3848)	RTHA	397239	4892312	31	49	78	SWNE	CTL	GONE	GONE	
3849)	GOEA	397280	4892319	31	49	78	SWNE	CTL	INAC	POOR	
(3497)	RTHA	403326	4891655	35	49	78	SESW	PPL	INAC	FAIR	
(3498)	UNK	402729	4891500	35	49	78	SWSW	JUL	INAC	POOR	
(3499)	BUTEO	402788	4891439	35	49	78	SWSW	PPL	INAC	POOR	
(3853)	RTHA/ GOEA	398975	4891031	5	48	78	NENW	CTL	ACTI/F	GONE	
(3854)	FEHA/	401762	4890678	3	48	78	SWNW	CREEK	INAC	POOR	

NEST ID (BLM ID)	SP	UTME	UTMN	SEC	T_N	R_W	QTRS	SUB	STATUS, 07	COND	YNG
	GOEA							BANK			
(2689)	GOEA	401941	4890482	3	48	78	NESW	CTL	ACTI	GOOD	1
(4443)	NOHA	397325	4892863	3	1	49	78	NWNE	GONE	GONE	
(4444)	AMKE	397301	4892311	31	49	78	SWNE	CTD	ACTI	NA	
(4445)	UNK	399529	4891027	5	48	78	NENE	CREEK BANK	INAC	POOR	
(4446)	LEOW	401698	4890876	3	48	78	SWNW	CTL	INACT	FAIR	1
(4447)	GHOW	401611	4890541	3	48	78	NESW	CTL	ACTI	FAIR	2
(4448)	UNK	401664	4892462	34	48	78	SENE	POD	INAC	POOR	
(4449)	LEOW	410796	4859894	34	49	78	SESE	JUL	INACT	POOR	
(2690)	UNK	401419	488859	9	48	78	NESE	CTD	GONE	GONE	
(4450)	GOEA	401553	4892871	34	49	78	NENW	CRK BANK	INAC	POOR	

3.3.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are two species that are Threatened, Endangered, or Candidate for listing under the Endangered Species Act. Threatened and Endangered Species that are known to occur in the proposed project area are discussed below.

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).

Thunderbird identified six active prairie dog colonies within the Edisto project area, and additional four active colonies within .5 miles of the project boundary (see Table). The colonies total approximately 161 acres. The closest ferret reintroduction area is 30 miles north of the Edisto POD.

Black-Tailed Prairie Dog Colonies Within the Edisto POD

COLONY	LOCATION	ACRES
1	W1/2 SEC. 10 4878	88.2
2	SWSE.9/NENE SEC 16 4878	11.4
3	SESE SEC 25 4979	6.4
4	NWNW 9 4878	2.1
5	SWNE SEC 16 4878	.7
6	NESE SEC 19 4978	.6
7	SESW SEC 33 4978/NWNW SEC 4 4878	25.5
8	NESW SEC 30 4978	15
9	NWSE SEC 32 4978	11.3
10	NENW SEC 29 4978	.5

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. Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

The project area is located within the Indian Creek watershed, which is a tributary to the Powder River. Indian Creek is an ephemeral drainage. There are no perennial springs in the project area that could support Ute's Ladies tresses populations, (George, 2006).

3.3.5.2. Sensitive Species

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

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.

Within the project area, cottonwood trees, capable of supporting roosting and nesting bald eagles, are found at the following locations: (1) SWSW Section 19, (2) NESE Section 31, (3) SWSW Section 32 and (4) NENW Section 5.

The project area has a reliable year round prey base in the form of prairie dogs, and lagomorphs (hares and rabbits). Within the project area there are 161 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.

According to the BLM Buffalo Field Office, incidental observations of bald eagles have been made in the area in the winter, (Gerard).

3.3.5.2.2. Black-tailed prairie dog

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). Continued loss of prairie dog habitat and active prairie dog towns will result in the decline of numerous sensitive species in the short grass prairie ecosystem. 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. Thunderbird identified 10 active prairie dog colonies within the project area. The colonies total approximately 161 acres.

Black-Tailed Prairie Dog Colonies Within the Edisto POD

COLONY	LOCATION	ACRES
1	W1/2 SEC. 10 4878	88.2
2	SWSE.9/NENE SEC 16 4878	11.4
3	SESE SEC 25 4979	6.4
4	NWNW 9 4878	2.1
5	SWNE SEC 16 4878	.7
6	NESE SEC 19 4978	.6
7	SESW SEC 33 4978/NWNW SEC 4 4878	25.5
8	NESW SEC 30 4978	15
9	NWSE SEC 32 4978	11.3
10	NENW SEC 29 4978	.5

3.3.5.2.3. Greater sage-grouse

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003). Sage-grouse attend traditional courtship areas called leks which are in or adjacent to sage-brush dominated habitat. Several lek sites form clusters defined as a lek complex. Sage-grouse may be expected to interchange within a lek complex, visiting one lek site to another from one day to the next. Lek sites within a complex are usually < 3 km from one another. Lek complexes are clearly spatially separated from adjacent lek complexes by 6 km (Schroeder et al. 2000).

The Edisto project area is suited for sage-grouse breeding, nesting, and wintering grounds. Habitats within the project area, especially the moderately dense stands of sagebrush grasslands scattered throughout the project area have potential to support sage-grouse throughout the year. Moist draws and tributaries within the project area may provide brood rearing and late summer habitat, while other areas of higher sagebrush densities provide potential for nesting sage-grouse (Vetter 2005).

WGFD data indicates that there are 6 sage-grouse leks sites within 3 miles of the project area, (Vetter 2005).

Sage Grouse lek locations near Edisto POD

LEK	LOCATION	LEGAL LOCATION	DIST. FROM POD BOUNDARY	MALES OBS. (2007)
Ploessers Dry Lake	393919 4891583	SW SE Sec 35 T49 R 79	1.9	0
Indian Creek I	401971 4888778	NESW SEC 10 T 48 R 78	Within	10
Indian Creek II	399320 4891412	SESE SEC 32 T 49 R 78	Within	16
Indian Creek III	398111 4888230	SESE SEC 7 T 48 R 78	1.5	3
Indian Creek IV	396547 4889709	NENE SEC 12 T 48 R 79	1	2
Flying E	394493 4899430	NENE SEC 11 T49 R 79		

3.3.5.2.4. Sharp-tailed Grouse

Sharp-tailed grouse inhabit short and mixed-grass prairie, sagebrush shrublands, woodland edges, and river canyons. In Wyoming, this species is common where grasslands are intermixed with other shrublands, especially wooded draws, shrubby riparian area, and wet meadows (PRB FEIS 3-148).

The Edisto project area is suited for sharp-tailed grouse breeding and nesting grounds. Habitats within the project area have the potential to support sharp-tailed grouse most of the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October. Junipers and cottonwoods, which provide berries and buds to sustain sharp-tailed grouse through the winter, are prevalent within the project area (Vetter 2005).

3.3.5.2.5. Mountain plover

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

Suitable mountain plover habitat is limited to 10 prairie dog towns, a few level ridge tops with sparse grass cover, (Vetter 2005),

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	119	20	None reported	1

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

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

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

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is not necessary to place the briquettes in the main water body because wave action prevents this

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

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

3.5. Water Resources

The project area is within the Upper Powder River drainage system.

3.5.1. Groundwater

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

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

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

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

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

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 18 registered stock and domestic water wells within the POD boundary with depths ranging from 40 to 1,735 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is primarily within the Indian Creek drainage and a small portion of the Dry Creek drainage, both of which are tributary to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels range from well vegetated grassy swales, without defined bed and bank, to deeply incised gullies or arroyos that have steep, eroding banks.

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 CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Upper Powder River watershed, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located at Arvada, WY, Station ID 06317000 (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

A Class III inventory was conducted for the Edisto project prior to on-the-ground project work (BFO project # 70060180). ACR Consultants Inc., conducted the Class III inventory following the Archeology and Historic Preservation: Secretary of the Interior’s Standards and Guidelines (48FR190) for the proposed project. Clint Crago, BFO archaeologist, reviewed the report for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined them to be adequate. The following resources are located within or near the Area of Potential Effect (APE).

Table 3.5 Cultural Resource Sites Identified within the Edisto Project Area

Site Number	Site Type	Eligibility
48JO1741	Prehistoric Lithic Scatter	Not Eligible
48JO1758	Historic Homestead and Artifact Scatter/Prehistoric Artifact Scatter	Not Eligible
48JO2502	Prehistoric Lithic Scatter	Not Eligible
48JO2503	Prehistoric Lithic Scatter	Not Eligible
48JO2506	Prehistoric Lithic Scatter	Not Eligible

Site Number	Site Type	Eligibility
48JO2507	Historic Rock Cairn	Not Eligible
48JO2508	Historic Artifact Scatter	Not Eligible
48JO2509	Historic Artifact Scatter	Not Eligible
48JO2510	Prehistoric Lithic Scatter	Not Eligible
48JO2511	Historic Artifact Scatter	Not Eligible
48JO2514	Prehistoric Feature	Not Eligible
48JO2515	Prehistoric Lithic Scatter	Not Eligible
48JO2516	Historic Homestead and Artifact Scatter/Prehistoric Artifact Scatter	Not Eligible
48JO2517	Prehistoric Lithic Scatter	Not Eligible
48JO2518	Prehistoric Lithic Scatter	Not Eligible
48JO2519	Prehistoric Lithic Scatter	Not Eligible
48JO2943	Historic County Road 231	Not Eligible
48JO2968	Historic Artifact Scatter/ Prehistoric Artifact Scatter	Not Eligible
48JO2969	Historic Artifact Scatter/ Prehistoric Artifact Scatter	Not Eligible
48JO2970	Prehistoric Lithic Scatter	Not Eligible
48JO2971	Prehistoric Lithic Scatter	Not Eligible
48JO2972	Prehistoric Lithic Scatter	Eligible
48JO2973	Prehistoric Lithic Scatter	Not Eligible
48JO2974	Historic Artifact Scatter/ Prehistoric Lithic Scatter	Not Eligible
48JO2975	Historic Artifact Scatter/ Prehistoric Artifact Scatter	Not Eligible
48JO2976	Historic Artifact Scatter	Not Eligible
48JO2977	Prehistoric Artifact Scatter	Not Eligible
48JO2978	Historic Artifact Scatter/ Prehistoric Lithic Scatter	Not Eligible
48JO2979	Prehistoric Lithic Scatter	Not Eligible
48JO2980	Prehistoric Lithic Scatter	Not Eligible
48JO2981	Prehistoric Lithic Scatter	Not Eligible
48JO2982	Historic Artifact Scatter/ Prehistoric Artifact Scatter	Eligible
48JO2983	Prehistoric Lithic Scatter	Not Eligible

Site Number	Site Type	Eligibility
48JO2984	Prehistoric Lithic Scatter	Not Eligible
48JO2985	Historic Artifact Scatter/ Prehistoric Lithic Scatter	Not Eligible
48JO2986	Historic Artifact Scatter	Not Eligible
48JO2987	Historic Artifact Scatter	Not Eligible
48JO3061	Prehistoric Artifact Scatter	Not Eligible
48JO3062	Prehistoric Artifact Scatter	Not Eligible
48JO3063	Prehistoric Lithic Scatter	Not Eligible
48JO3064	Historic Artifact Scatter/ Prehistoric Artifact Scatter	Not Eligible
48JO3228	Historic Homestead	Not Eligible
48JO3229	Historic Artifact Scatter/ Prehistoric Lithic Scatter	Not Eligible
48JO3230	Historic Artifact Scatter/ Prehistoric Lithic Scatter	Not Eligible
48JO3383	Historic Homestead	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Of the 50 proposed well locations, 46 can be drilled without a well pad being constructed and 4 will require a constructed (cut & fill) well pad. Surface disturbance which will occur with the drilling of the 46 wells would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 15 x 60 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 46 wells would involve approximately 0.1 acre/well for a total of 4.6 acres. The other 4 wells requiring cut & fill pad construction would disturb approximately 2.3 acres/well pad for a total of 9.2 acres. The total estimated disturbance for all 50 wells would be 13.8 acres. This would be a short-term, impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Approximately 14.53 miles of improved roads would be constructed to provide access to various well locations. Approximately 2.71 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in “disturbance corridors.” Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.13 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	46	0.1/acre	6.9	Long Term
Constructed Pad	4	2.3/acre		
Monitor Wells	0	0.1/acre	0.0	Long Term
Impoundments	12		34.56	Long Term
On-channel	12	Site Specific	34.28	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	14	Site Specific or 0.01 ac/WDP	0.28	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads				Long Term
No Corridor	4.08	45'	22.30	
With Corridor	10.45	75'	95	
2-Track Roads				Long Term
No Corridor	0.37	20'	0.90	
With Corridor	2.34	45'	12.80	
Pipelines				Short Term
No Corridor(water)	0.11	35'	0.47	
Buried Power Cable				Short Term
No Corridor	0.36	25'	1.10	
Overhead Powerlines	2.38	30' Width	8.70	Long Term
Vehicle turnarounds/storage areas	4	200'x200'	5	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”.

4.1.1. Wetland/Riparian

Wetlands will not be impacted by this project. The riparian area along Indian Creek will be disturbed along an existing road corridor approximately 1.5 miles in length when utilities are installed along the route and six low water crossings are improved. The erosion of fill material placed with this project may occur during sizeable runoff events, and the frequency of localized flooding may increase due to the reduction of floodplain flow capacity by the fill material. Reservoir seepage may convert vegetation to wetland/riparian communities. (Further discussion is presented in the PRB FEIS Page 4-172).

4.1.2. Invasive Species

Utilization of existing facilities and surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water is prone 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.

An Integrated Pest Management Plan (IPMP) was provided by Yates Petroleum Corporation (YPC). YPC has consulted with the Johnson County Weed and Pest Office (JCWPO) and is aware of the identified State-listed noxious weeds and invasive/exotic plant infestations found within the project area. YPC has committed to conduct an ongoing dialogue with private surface owners within the project area to address any concerns they have about weed problems.

YPC has also committed to using preventive practices such as;

- Prompt reseeding and revegetation of areas of disturbed soils with certified weed-free seed
- Cleaning of equipment and vehicles prior to entering and leaving each worksite
- Herbicide application
- Using certified weed free mulch for erosion control

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 parameters of the PRB FEIS for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 14.7% of the total predicted in the PRB FEIS.
- The WMP for the Edisto CS Federal POD proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, Winter/Yearlong range for mule deer and Yearlong ranges for pronghorn antelope would be directly disturbed with the construction of wells, 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 (Madison 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. Additionally, harvest of big game is expected to increase as a result of additional roads into previously undeveloped rough topography. 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

All produced CBNG water will be discharged to 12 proposed impoundments located within the project area. Overflow from the reservoirs may occur only if the addition of water from a storm event or snowmelt exceeds the capacity of the reservoirs. Discharge into the drainages associated with a major storm event will be subject to WDEQ approval (GRG Ass. 2005). In addition to containment reservoirs, water may be rerouted to adjacent containment structures or the Aerial Deep Injector Federal 33 well may be used to re-inject CBNG water into the Madison aquifer.

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

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.

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 similar species (BLM 2003).

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

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

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

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

The BLM database and Thunderbird identified 26 raptor nests within 0.5 miles of the Edisto project area. Eighteen of the nests have been identified to species, while 8 of the nests are unknown or potential magpie nests.

Human activities in close proximity to active raptor nests may interfere with nest productivity. Activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors (Romin and Muck 1999). If mineral development 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 the nests may draw increased predator activity to the area and increase nest predation.

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a one-half mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation to be located greater than one-quarter mile from occupied raptor nests. Despite commitments such as telemetry metering to limit well visits, well visits during the nesting season will occur 2 to 3 times per week which may lead to nest failure through nest abandonment, displacement, and increased predation.

The PRB EIS identified potential effects to the Western Burrowing owl and committed to minimizing physical disturbance to nesting individuals during the construction phase of development. Therefore, BLM BFO requires a .25 mile radius timing limitation during the Western burrowing owl breeding season (April 15 to Aug 31) around active nest locations and within suitable Western burrowing owl habitat (black-tailed prairie dog towns) prior to conducting annual surveys for this species.

Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

4.2.4.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-221.

4.2.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are two species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2. 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	Habitat of insufficient size
Threatened				
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	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.

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

There are less than 1000 acres of prairie dog towns and no complexes within 4 miles of the project area. Suitable habitat is insufficient to support ferrets. Implementation of the proposed project will have **no effect** on black-footed ferrets.

4.2.5.1.2. Ute's Ladies Tresses Orchid

Suitable habitat for Ute ladies'-tresses orchid is not present within the project area. The project area includes dry ephemeral drainages and uplands that lack a perennial or late-season historic water source. The presence of surface water within the project area is very limited. Additionally, the project area lacks mesic edge vegetation to suggest adequate water availability (Vetter 2006). All produced CBNG water will be discharged to 12 proposed impoundments. The project will have **no effect**, on Ute's Ladies tresses Orchid.

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 may effect existing waterways. Prairie not mountain habitat.
Spotted frog (<i>Ranus pretiosa</i>)	Ponds, sloughs, small streams	NP	NI	
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.	K	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 cucularia</i>)	Grasslands, basin-prairie shrub	S	MIIH	Prairie dog towns identified, disturbance is proposed.
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Habitat will be affected.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	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%	S	MIIH	Habitat present, disturbance proposed.
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 billineata</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	Proposed reservoirs.
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 degree.	K	MIIH	Prairie dog towns identified, disturbance proposed.
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, basin-prairie shrub	NP	NI	Cliffs & perennial water not present.
Swift fox (<i>Vulpes velox</i>)	Grasslands	NP	NI	Grassland habitat not present.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Forests, basin-prairie shrub, 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

According to the BLM Buffalo Field Office data base bald eagles have only occasionally been observed within the project area. Within the project area cottonwood trees capable of supporting roosting and nesting bald eagles are found at one location. Also, single cottonwood trees are found scattered throughout the project area in deep narrow draws. With ten active black-tailed prairie dog colonies within and adjacent to the project area bald eagles are likely to be found foraging in the area on a regular basis.

The Edisto project area is surrounded by extensive natural gas development, existing 3-phase overhead powerlines can be found surrounding the project area. There are 2.4 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. Yates will be using existing 3 phase overhead power lines within the project area, and plans to construct an additional 2.4 miles of new overhead powerlines within the Edisto project area. Power to individual wells will be buried from proposed power drops.

The presence of overhead power lines and roads will 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 Edisto 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 powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

An improved county road bisects the northern portion of the project area. With the increase in gas development in the area, vehicle size and traffic volume will also increase. The posted speed limit for the county road is 45 mph. The county road presents a collision hazard as the bald eagles forage through area, bald eagle mortalities are likely to 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 fifteen reservoirs (3 existing and 12 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

Surface disturbing activities are proposed within two prairie dog colonies, on private land. Pipelines are proposed along existing roads within the prairie dog towns. Prairie dogs may be displaced during

construction and there is a potential for increased vehicle collisions and mortality.

4.2.5.2.3. Greater sage-grouse

WGFD data indicates that there are 6 sage-grouse leks sites within 3 miles of the project area, (Vetter 2005). The Indian Creek II (T49N:R78W:S32) and I (T49N:R78W:S10) lek sites are located within the project area. These leks make up one complex and both leks are documented as occupied in the WGFD database. Within the Edisto POD there is approximately 1160 acres of sage grouse habitat.

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

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

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

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

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

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

Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km (1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found 36% of their grouse nesting within 3 km of the capture leks. Moynahan's study area was north-central Montana in an area of mixed-grass

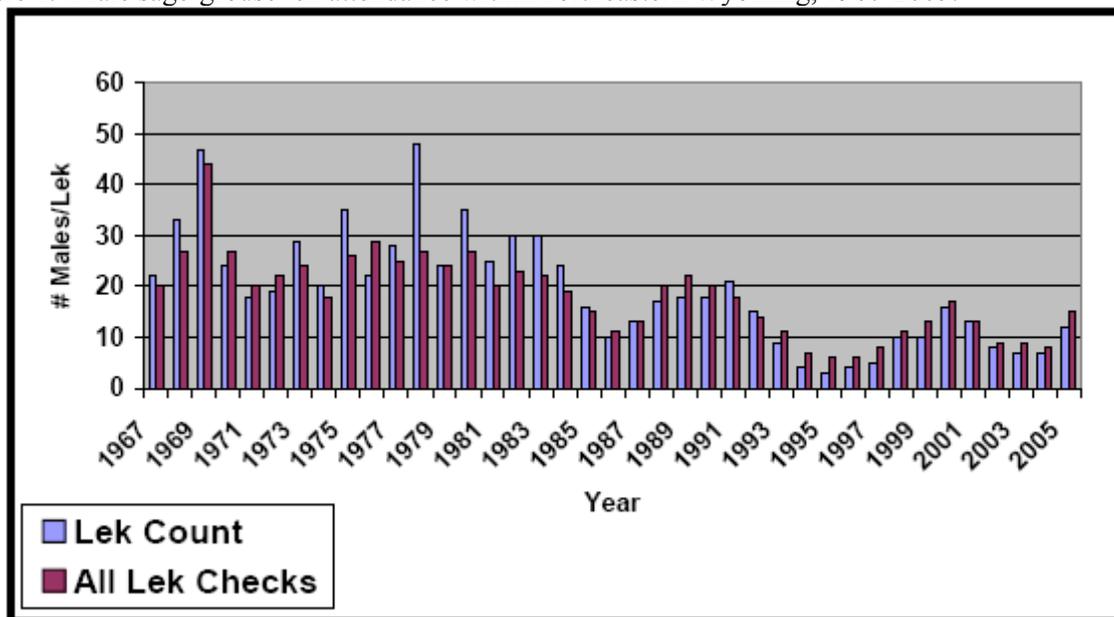
prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. In press).

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

Vegetation communities within the Powder River Basin are naturally fragmented as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. Without contiguous habitat available to nesting grouse it is likely a smaller percentage of grouse nest within two-miles of a lek within the PRB than grouse within those areas studied in the development of the 1977 WAFWA recommendations and even the Holloran and Moynahan study areas. Holloran and Moynahan both studied grouse in areas of contiguous sagebrush habitats without large scale fragmentation and habitat conversion (Moynahan et al In press, Holloran and Anderson 2005). A recent sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within 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 and that less than 50% of grouse are expected to nest within the limitation area is likely insufficient to reverse the population decline. Moynahan and Lindberg (2004) like WAFWA (Connelly 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).

BLM notified Yates that the Edisto POD would adversely affect approximately 1160 acres of sage-grouse habitat within the Edisto POD. Yates was asked to reevaluate their plan of development in this area to reduce their impact on sage grouse habitat.

Mitigation Discussed and Agreed Upon Between Yates and BLM:

- Install bird ramps on all existing tire tanks located on Yates Petroleum Corporation fee surface. This would prevent sage grouse from drowning.
- Install bird ramps on all new constructed tire tanks within the Edisto POD lease hold. This would prevent birds from drowning.
- Treat all CBNG reservoirs within the Edisto POD lease hold with Altosid XR (or equivalent product), only if larva are present and BLM approves treatment on federal surface and private surface owner allows. This would decrease potential West Nile virus transmission to sage grouse.
- Make extra efforts to reduce sagebrush disturbance within the entire Edisto POD. All infrastructure, unless designated otherwise will have a 45 foot working area, with blading within the 45 feet not to exceed 35 foot (unless steep slopes dictate more). This would decrease sage brush fragmentation.
- Yates would be willing to add forbs to the seed mix, type of forbs and rate must be mutually agreed upon. This would provide necessary forbs for sage grouse during the spring.
- Yates will encourage Powder River Energy to retro-fit existing power lines within .5 mile of sage grouse leks and within 1 mile of the Edisto POD lease hold, where Yates is cost sharing the line. This would lessen predation of sage grouse by decreasing perch locations for avian predators.
- Yates has voluntarily proposed to install the majority of electrical power as underground electrical through the planning area. This would lessen overhead powerline collisions and predation by decreasing perch locations for avian predators.
- Yates will consider using equipment, such as a spider plow in the planning area for pipeline installation. This is strictly a voluntary proposal, and is dependent on availability, cost and is a choice made solely by Yates. Due to topography issues the spider plow may not be an applicable construction technique within the identified habitat area.
- Yates will use telemetry on wells to reduce traffic to well locations. Pumpers should only be visiting wells approximately once per month. Without the use of telemetry pumpers would visit each well multiple times per week possibly even daily.

- Construction width for road/pipeline corridors

All infrastructure, unless designated otherwise will have a 45 foot working area, with blading within the 45 feet not to exceed 35 foot (unless steep slopes dictate more). This would lessen disturbance on approximately 5.3 acres.

Well: 20 Carrier

Move well uphill, SE to saddle in ridgeline along access, ~175yds, location would be an eyebrow location off an access/corridor, no VRM issues. Reduce disturbance to .3 acres.

Well: 24 Carrier

Access rerouted to avoid dense sagebrush. Reduce disturbance to .3 acres

Wells: 14Carrier, 15Carrier

Access to 14 and 15 were rerouted to avoid dense sagebrush. Reduce disturbance to 1.2 acres.

Wells: 25 Carrier, 7Edisto, 19 Carrier, 18 Carrier, 12 Alert, 25Alert, 27Carrier

Locations are acceptable.

BLM proposed mitigation not agreed to by Yates

Mitigation: limit loop road type infrastructure

BLM proposal:

Existing two track road in Sec 13 and 24 to be used for drill rig access only, it will not be used for oil/gas traffic purposes, signs will be placed at locations identified at pre-construct. Pumper and occasional use to wells on the western end of the development can access thru the Interstate 90 underpass in SE Sec 13.

Impacts to sage-grouse that will occur if this road is used:

- The road would fragment sage grouse habitat.
- The road is within 100 yards of a potential lek site.
- The first .5 miles of the road is on BLM surface, improving the road would likely increase trespassing on neighboring private property.

Yates response:

The road is an existing two track

- The road is needed to access two of YPC's mineral leases.
- There is a height limit to access under the Interstate.
- The Edisto POD is entirely on the south side of the Interstate, as well as this road.
- The road is required for higher profile vehicles, as well as pumper access.
- YPC has signed legal binding, confidential road use agreement with the private surface owner for which the road lies. This agreement allows continuous access.
- It is unknown which area a pumper is assigned. "Let's presume the pumper will be assigned wells entirely on the south side of the Interstate, Edisto POD wells".
- Limiting the use of this road will increase traffic on the north side of the Interstate.
- Longer routes require more time, which in turn requires more people, which increases traffic.

Mitigation: Limit pipeline corridor in sagebrush.

BLM proposal:

Infrastructure for the 3 IRVI, 14 CARR, and 15 CARR wells would tie into existing infrastructure by boring under Interstate 90. This would avoid fragmenting approximately 317 acres of sage grouse habitat.

Yates response:

The existing infrastructure to the north is at capacity. Also there would be a higher expense to drill under the Interstate.

4.2.5.2.4. Sharp-tailed Grouse

The nearest known lek is located approximately 10 miles southeast of the project area. No new or previously undocumented sharp-tailed grouse leks were discovered on or within 0.64 miles of the project area during surveys conducted in 2004 and 2005.

4.2.5.2.5. Mountain plover

No mountain plovers were identified during surveys conducted. The nearest mountain plover observations were more than 12 miles east of the project area. Surface disturbing activities will not be permitted within suitable habitat, during the mountain plover breeding season prior to conducting mountain plover surveys. Due to this, the proposed project should not impact mountain plover nesting habitat.

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

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus

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

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

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

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

4.4. Water Resources

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

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 24.0 gpm per well or 1200.0 gpm (2.7 cfs or 1937 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 171,423 acre-feet in 2006 (maximum production is estimated in 2006). As such, the volume of water resulting from the production of these wells is 1% of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 48 gpm will infiltrate at or near the discharge points and impoundments (774 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 40 to 1735 feet compared to 1395 feet to 2320 for the Big George. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence 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 fresh water aquifers above the target coal zone. This will ensure that ground water will not be adversely impacted by well drilling and completion operations.

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

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004, and is currently being revised as the “Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments” which should be approved by June, 2006. Approximately 800 new impoundments have

been investigated to date with 102 impoundments in 52 permits that have gone into compliance monitoring. The Wyoming DEQ has established an Impoundment Task Force which is in the process of drafting an “Impoundment Monitoring Plan” to investigate the potential for existing impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments should begin in the spring of 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

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

Development of CBM through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water “...cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch 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 CBM development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5).” (PRB FEIS page 4-65). No additional mitigation is necessary.

4.4.2. 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 an a typical WDEQ WYPDES permit in the area, and the levels found in the POD’s representative water sample.

Table 4.4.2. Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit –		2.0	1,000
Least Restrictive Proposed Limit		10.0	3,200
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
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirements for WYPDES Permit (typical of area)			
At discharge point	5,000	na	7,500
At Irrigation Compliance point	Na	na	na
Predicted Produced Water Quality Big George Coal	2,180	32	3,410

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 24 gpm is projected is to be produced from these 50 wells, for a total of 1,200 gpm for the POD. See Table 4.4 .

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

There are 14 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, 12 impoundments (220.9 acre-feet) would potentially be constructed within the project area. These impoundments will disturb approximately 34.28 acres including the dam structures and all would be on-channel reservoirs. 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 0.4 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 50 wells is anticipated to be a total of 1200 gpm or 2.7 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in Indian Creek from this action (0.4 cfs) may add a maximum 0.32 cfs to the Upper Powder River flows, or 0.4% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Powder River (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). The addition of the water produced from these wells will not significantly impact the water quantity in the mainstem of the Upper Powder River. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 2). The POD is mostly located in headwaters of tributaries to Indian Creek. For an example calculations based on a tributary to Indian Creek watershed above the POD (1.6 sq mi) and an assumed density of 1 wells per location every 80 acres, the potential exists for the development of 13 wells which could produce a maximum flow rate of 191 (0.43 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

1. Some of these wells have already been drilled and are producing.
2. New wells will be phased in over several years, and

3. A decline in well discharge generally occurs after several months of operation.

The potential maximum flow rate of produced water within the watershed upstream of the project area, 66 cfs, is much less than the volume of runoff estimated from the 2-year storm event for Upper Indian Creek drainage. Therefore, the estimated flow rate of water produced from the full development in the watershed above the project area is significantly less than the natural runoff from the area.

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 a typical WYPDES permit for this area are:

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	299.7 µg/l max
Dissolved manganese	629 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 Edisto POD prepared by Gene R. George and Associates, Inc. for Yates Petroleum Company.

4.4.2.1. Surface Water Cumulative Effects

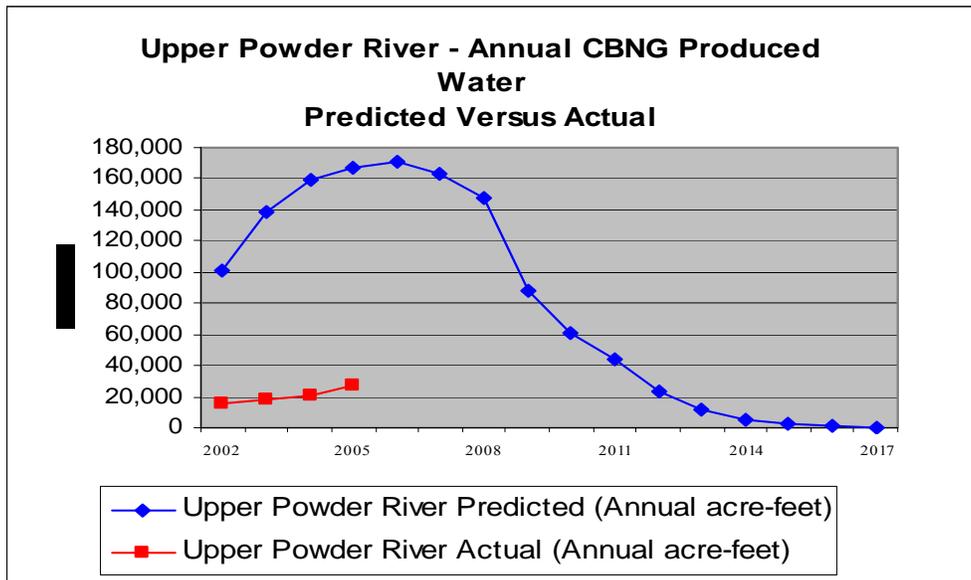
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2005, all producing CBNG wells in the Middle Powder River watershed have discharged a cumulative volume of 83,072 acre-ft of water compared to the predicted 565,096 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.4.2.1 and Figure 2 following. This volume is 14.7 % of the total predicted produced water analyzed in the PRB FEIS for the Middle Powder River watershed.

**Table 4.4.2.1. Actual vs predicted water production in the Upper Powder River watershed 2005
Data Updated 4-5-06**

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	27,658	16.5	83,072	14.7
2006	171,423	736,519				
2007	163,521	900,040				
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	1,285,233					

Figure 2 Actual vs predicted water production in the Upper Powder River watershed



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

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

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 14.7% 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 minimize the volume of water discharged downstream of the POD.

No additional mitigation measures are required.

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

4.5. Cultural Resources

Sites 48JO1741, 48JO1758, 48JO2510, 48JO2516, 48JO2971, 48JO2973, 48JO2974, 48JO2980, 48JO2986, 48JO2987, 48JO3064, 48JO3229 and 48JO3230 will be impacted by the project; however all are considered not eligible to the NRHP. Eligible site, 48JO2982 will be impacted in a non-contributing portion of the site. A COA, including construction monitoring, for road upgrade activities in the vicinity of 48JO2982, will be applied. The Bureau will also require a monitoring stipulation for all ground disturbing activities along the Indian Creek drainage due to a high potential for buried cultural deposits. On 2/22/07, the Bureau electronically notified the Wyoming State Historic Preservation Office (SHPO) following section VI(B)(3) of the Wyoming State Protocol a finding of No Adverse Effect for the proposed project.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Sara Needles	Wyoming SHPO	Wyoming SHPO	No
Trent Knez	Regulatory Agent	Yates Petroleum Corporation	Yes
Brad Rogers	Wildlife Biologist	US Fish and Wildlife Service	No
Carol Chadwick	Civil Engineer	Independent Contractor	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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