



THE DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
CASPER FIELD OFFICE



DUCK CREEK FEDERAL COAL BED NATURAL GAS PROJECT
ENVIRONMENTAL ASSESSMENT
WY060-05-003



Operator: Comet Energy Services, LLC
Location: Township 38 North, Range 72 West, Converse County, Wyoming

January 2005



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BUREAU OF LAND MANAGEMENT
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**ENVIRONMENTAL ASSESSMENT (EA WY060-05-003)
FOR THE DUCK CREEK FEDERAL COAL BED NATURAL GAS
PLAN OF DEVELOPMENT**

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Attachment 2: U. S. Department of Interior, U.S. Fish and Wildlife Service, Duck Creek Federal Coal Bed Natural Gas Plan-of-Development Review, Biological Opinion, Wyoming Field Office, December 15, 2004.

Attachment 3: BLM CBNG Monitor Well Drilling Stipulations

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THE DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
CASPER FIELD OFFICE



**ENVIRONMENTAL ASSESSMENT (EA WY-060-05-03)
FOR THE DUCK CREEK FEDERAL COAL BED NATURAL GAS
PLAN OF DEVELOPMENT FOR COMET ENERGY SERVICES, LLC.
CONVERSE COUNTY, WYOMING**

1. PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

Comet Energy Services, LLC (Comet) submitted to the Casper Field Office (CFO) of the Bureau of Land Management (BLM) a Plan of Development (POD) for its Duck Creek Federal Coal Bed Natural Gas (Duck Creek) project indicating their intent to drill and develop coal bed natural gas (CBNG) wells on federal oil and gas leases in north-central Converse County, Wyoming. The Duck Creek Federal CBNG project proposed by Comet includes 46 federal wells, 7 fee wells, and 1 state of Wyoming well and the associated gas production and water disposal infrastructure for these wells. The federal mineral wells are located on federal oil and gas leases WYW149207, WYW134200, WYW149208, WYW142787, WYW049848, WYW059237, and WYW136943 issued by the BLM to CES, and are listed in the proposed well list included in Section 2.1 of this document.

Western Land Services (WLS), an environmental contractor retained by Comet, submitted the Duck Creek POD on July 23, 2004; it includes Applications for Permit to Drill (APD - Form 3160-3), a Well List, a Master Surface Use Plan (MSUP), a Drilling Plan (DP), a Wildlife Survey/Habitat Assessment, and a Water Management Plan (WMP) for the POD. The surface owners in the POD area are Jeff Reynolds (Reynolds) and Dale Carson (Carson).

Comet has drilled 2 fee CBNG wells, the D1-8 and D3-8 in the SW¹/₄SW¹/₄ and SW¹/₄SE¹/₄, Section 8, T. 38 N., R. 72 W. respectively, within the project area; these wells are presently producing water (no gas). The Duck Creek POD includes the infrastructure (gas lines, water lines, power lines, roads, compressor, metering facility, and sales line) to develop the 2 fee wells already drilled in addition to the proposed federal, fee and state wells.

All externally proposed actions on public lands or resources under BLM jurisdiction must be reviewed for National Environmental Policy Act (NEPA) compliance. The site specific Duck Creek Environmental Assessment (EA) No. WY-060-05-03 was prepared to aid in NEPA compliance, to analyze impacts of the Proposed Action on the quality of the human environment, to provide a mechanism for interdisciplinary review and for developing mitigation measures for the proposed action. This EA tiers into and incorporates by reference the information and analysis contained in the Final Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS), No. WY-070-02-065 (April 2003), pursuant to 40 CFR 1508.28 and 1502.21. This project EA addresses site-specific resources and/or impacts that are not covered within the PRB EIS. The Record of Decision (ROD) for the PRB FEIS approves the proposed amendments to the Buffalo and Platte River RMPs described in the PRB FEIS. This EA is available for public review at the Casper Field Office at 2987

Prospector Drive, Casper, WY (Telephone: (307) 261-7600) or on the BLM Casper web site at <http://www.wy.blm.gov/cfo/>.

1.2 Purpose and Need

The purpose of the Proposed Action is to drill and develop CBNG resources on the federal oil and gas mineral leases issued by the BLM to Comet. The CBNG on the federal mineral leases will be drained by adjacent existing and future fee and state of Wyoming mineral development wells in the area if the federal mineral leases are not developed in a timely manner. Federal lease royalties on the produced federal minerals will be lost, and the lessee will be deprived of the federal gas they have the rights to develop, if the operator is not permitted to develop the CBNG resource in the project area.

1.3 Conformance With Applicable Land Use Plan

The Proposed Action is in conformance with the development and land use decisions contained in the Platte River Resource Area (PRRA) Resource Management Plan (RMP) Environmental Impact Statement (EIS) and Record of Decision (ROD) (BLM, 1985) as required by 43 CFR 1610.5.

The project area is located in PRRA *Resource Management Unit (RMU) 14 –Remaining Platte River Resource Area*. The following excerpt from the Energy and Minerals Land Use Decision under Planning Decisions in the RMP Record of Decision refers to all areas with oil and gas potential in the Platte River Resource Management Area:

LAND USE DECISIONS

Energy and Minerals

M1: Oil and Gas

BLM – administered lands will remain open to oil and gas leasing and exploration subject to the following provisions:

Oil and gas leasing will be subject to the Wyoming BLM standard stipulations quoted at the end of this section. Leasing and development will be subject to the planning decisions. Mitigating measures prescribed in the Platte River oil and Gas EA (USDI, BLM 1982) and the South Big Horn oil and gas EA (USDI, BLM 1979) will be applied case by case.

The Proposed Action, with the applied mitigation and monitoring measures developed in this EA, is in conformance with the Platte River Area RMP Record of Decision, pages 9 and 10, M1: Oil and Gas, Energy and Minerals Planning Decision.

2. THE PROPOSED ACTION AND ALTERNATIVES

2.1 Description of the Proposed Action (Alternative A)

Proposed Action Title/Type: The Duck Creek project proposed by Comet includes 46 federal wells, 7 fee wells, and 1 state of Wyoming well and the associated gas production and water disposal infrastructure for these wells.

Proposed Well Information: The 46 federal wells proposed in the Duck Creek POD are listed below:

Well Name & No.	Seam	Elev.	Location	Total Depth	Footages
<u>Lease</u> <u>WYW149207</u>					
Duck Creek Fed. A2-4-3872	Upper & Lower Pawnee	5154'	Lot 3, T38N., R72W Section 4	2024'	652' FNL & 2145' FWL
Duck Creek Fed.	Upper & Lower	5130'	Lot 1, T38N., R72W	2000'	649' FNL & 606'

Table 2.1 - Duck Creek Federal CBNG Project - Proposed Wells

Well Name & No.	Seam	Elev.	Location	Total Depth	Footages
A4-4-3872	Pawnee		Section 4		FEL
Duck Creek Fed. B1-4-3872	Upper & Lower Pawnee	5186'	SWNW, T38N., R72W Section 4	2056'	1854' FNL & 657' FWL
Duck Creek Fed. B3-4-3872	Upper & Lower Pawnee	5145'	SWNE, T38N., R72W Section 4	2015'	2042' FNL & 2023' FEL
Duck Creek Fed. C2-4-3872	Upper & Lower Pawnee	5163'	NESW, T38N., R72W Section 4	2015'	2128' FSL & 2067' FWL
Duck Creek Fed. C4-4-3872	Upper & Lower Pawnee	5199'	NESE, T38N., R72W Section 4	2069'	2014' FSL & 701' FEL
Duck Creek Fed. D1-4-3872	Upper & Lower Pawnee	5168'	SWSW, T38N., R72W Section 4	2038'	638' FSL & 666' FWL
Duck Creek Fed. D3-4-3872	Upper & Lower Pawnee	5127'	SWSE, T38N., R72W Section 4	1997'	557' FSL & 1958' FEL
Duck Creek Fed. A4-5-3872	Upper & Lower Pawnee	5118'	Lot 1, T38N., R72W Section 5	1988'	555' FNL & 835' FEL
Duck Creek B Fed. 3-5-3872	Upper & Lower Pawnee	5159'	SWNE, T38N., R72W Section 5	2029'	2214' FSL & 2160' FEL
Duck Creek Fed. C2-5-3872	Upper & Lower Pawnee	5174'	NESW, T38N., R72W Section 5	2044'	2073' FSL & 1965' FWL
Duck Creek Fed. C4-5-3872	Upper & Lower Pawnee	5203'	NESE, T38N., R72W Section 5	2073'	2021' FSL & 718' FEL
Duck Creek Fed. D1-5-3872	Upper & Lower Pawnee	5165'	SWSW, T38N., R72W Section 5	2035'	491' FSL & 771' FWL
Duck Creek Fed. D3-5-3872	Upper & Lower Pawnee	5231'	SWSE, T38N., R72W Section 5	2100'	616' FSL & 1848' FEL
Duck Creek B Fed. 4-6-3872	Upper & Lower Pawnee	5062'	Lot 1, T38N., R72W Section 6	1932'	711' FNL & 444' FEL
Duck Creek Fed. B3-6-3872	Upper & Lower Pawnee	5102'	SWNE, T38N., R72W Section 6	1972'	1885' FSL & 1834' FEL
Duck Creek Fed. C2-6-3872	Upper & Lower Pawnee	5208'	NESW, T38N., R72W Section 6	2150'	1835' FSL & 2236' FWL
Duck Creek Fed. C4-6-3872	Upper & Lower Pawnee	5134'	NESE, T38N., R72W Section 6	2004'	2071' FSL & 457' FEL
Duck Creek Fed. D3-6-3872	Upper & Lower Pawnee	5213'	SWSE, T38N., R72W Section 6	2083'	546' FSL & 1731' FEL
Duck Creek Fed. A2-7-3872	Upper & Lower Pawnee	5161'	NENW, T38N., R72W Section 7	2031'	576' FNL & 2078' FWL
Duck Creek Fed. A4-7-3872	Upper & Lower Pawnee	5185'	NENE, T38N., R72W	2055'	659' FNL & 580' FEL

Table 2.1 - Duck Creek Federal CBNG Project - Proposed Wells

Well Name & No.	Seam	Elev.	Location	Total Depth	Footages
			Section 7		
Duck Creek Fed. B1-7-3872	Upper & Lower Pawnee	5193'	Lot 2, T38N., R72W Section 7	2063'	1948' FNL & 642' FWL
Duck Creek Fed. B3-7-3872	Upper & Lower Pawnee	5077'	SWNE, T38N., R72W Section 7	2046'	2104' FNL & 1869' FEL
Duck Creek Fed. C2-7-3872	Upper & Lower Pawnee	5100'	NESW, T38N., R72W Section 7	2069'	2016' FSL & 2247' FWL
Duck Creek Fed. D1-7-3872	Upper & Lower Pawnee	5118'	Lot 4, T38N., R72W Section 7	1988'	703' FSL & 853' FWL
Duck Creek Fed. A2-9-3872	Upper & Lower Pawnee	5163'	NENW, T38N., R72W Section 9	2033'	744' FNL & 1723' FWL
Duck Creek Fed. A4-9-3872	Upper & Lower Pawnee	5086'	NENE, T38N., R72W Section 9	1956'	637' FNL & 764' FEL
Duck Creek Fed. B1-9-3872	Upper & Lower Pawnee	5093'	SWNW, T38N., R72W Section 9	1963'	2022' FNL & 724' FWL
Duck Creek Fed. B3-9-3872	Upper & Lower Pawnee	5025'	SWNE, T38N., R72W Section 9	1895'	2122' FNL & 1963' FEL
<u>Lease</u> <u>WYW134200</u>					
Duck Creek Fed. A2-8-3872	Upper & Lower Pawnee	5212'	NENW, T38N., R72W Section 8	2082'	620' FNL & 2134' FWL
Duck Creek Fed. A4-8-3872	Upper & Lower Pawnee	5195'	NENE, T38N., R72W Section 8	2065'	644' FNL & 630' FEL
Duck Creek Fed. B1-8-3872	Upper & Lower Pawnee	5174'	SWNW, T38N., R72W Section 8	2044'	1976' FNL & 668' FWL
Duck Creek Fed. B3-8-3872	Upper & Lower Pawnee	5127'	SWNE, T38N., R72W Section 8	1997'	1964' FNL & 1926' FEL
<u>Lease</u> <u>WYW149208</u>					
Duck Creek Fed. B1-17-3872	Upper & Lower Pawnee	4982'	SWNW, T38N., R72W Section 17	1852'	1990' FNL & 517' FWL
Duck Creek Fed. C4-17-3872	Upper & Lower Pawnee	4937'	NESE, T38N., R72W Section 17	1807'	2007' FSL & 675' FEL
Duck Creek Fed. D1-17-3872	Upper & Lower Pawnee	4965'	SWSW, T38N., R72W Section 17	1835'	741' FSL & 699' FWL
Duck Creek Fed. D3-17-3872	Upper & Lower Pawnee	4929'	SWSE, T38N., R72W Section 17	1800'	690' FSL & 1967' FEL
<u>Lease</u> <u>WYW142787</u>					
Duck Creek Fed.	Upper & Lower	5041'	NENW, T38N.,	1911'	621' FNL & 2315'

Table 2.1 - Duck Creek Federal CBNG Project - Proposed Wells

Well Name & No.	Seam	Elev.	Location	Total Depth	Footages
A2-18-3872	Pawnee		R72W Section 18		FWL
Duck Creek Fed. B1-18-3872	Upper & Lower Pawnee	5138'	Lot 2, T38N., R72W Section 18	2008'	1909' FNL & 832' FWL
Duck Creek Fed. C2-18-3872	Upper & Lower Pawnee	5088'	NESW, T38N., R72W Section 18	1958'	2160' FSL & 2245' FWL
Duck Creek Fed. D1-18-3872	Upper & Lower Pawnee	5117'	Lot 4, T38N., R72W Section 18	1987'	601' FSL & 993' FWL
<u>Lease</u> <u>WYW049848</u>					
Duck Creek Fed. C2-8-3872	Upper & Lower Pawnee	5095'	NESW, T38N., R72W Section 8	1965'	1989' FSL & 1782' FWL
Duck Creek Fed. C4-8-3872	Upper & Lower Pawnee	5054'	NESE, T38N., R72W Section 8	1924'	2046' FSL & 622' FEL
<u>Lease</u> <u>WYW059237</u>					
Duck Creek Fed. B3-17-3872	Upper & Lower Pawnee	4981'	SWNE, T38N., R72W Section 17	1851'	2010' FNL & 2002' FEL
Duck Creek Fed. B3-18-3872	Upper & Lower Pawnee	5017'	SWNE, T38N., R72W Section 18	1887'	1954' FNL & 1874' FEL
<u>Lease</u> <u>WYW136943</u>					
Duck Creek Fed. C4-7-3872	Upper & Lower Pawnee	5080'	NESE, T38N., R72W Section 7	2150'	2036' FSL & 512' FEL

Applicant: Comet Energy Services, LLC

Surface Owners: Jeff Reynolds, Box 146, 706 Willow Creek Road, Douglas, WY 82633
(Home) 307-358-3693, (Cell) 307-359-1012
Dale Carson, Route 2 Jenne Trail Road, Douglas, WY 82633 (307-358-4442)

The Proposed Action as described in the POD includes the following:

- x The drilling and completion of 46 federal CBNG wells in the Upper and Lower Pawnee Coal Zones of the Tongue River Member of the Fort Union Formation to depths ranging from 4937 feet to 5231 feet. Electronic natural gas flow measurement equipment utilizing telecommunications data gathering will be installed; gas measurement will occur at each individual wellhead.
- x Construction of a central POD gathering/metering facility and two screw compressor facilities (booster stations).
- x Constructing new and improved-existing access routes for wells (46 new federal wells, 7 fee (2 existing and 5 new), and 1 state of Wyoming) and facilities in the project area. Some access route construction will involve corridor construction that contain buried pipelines (water and gas gathering systems), and power cables in the road construction corridor. Eleven low water crossings (LWC) and 2 culverts are planned to manage water flow on road drainage crossings.
- x Constructing buried pipeline and power cable corridors not associated with the access routes.
- x Construction of an overhead power line from the NE¼, Sec. 16, T. 38 N., R. 73 W. to the central

POD gathering/metering facility.

- x Implementing a Water Management Plan (WMP) that will utilize two options for the management of produced water (the effluent for the 46 new federal wells, 7 fee wells (2 existing and 5 new), and 1 state of Wyoming well):
 - x
 - (1) Land Application Disposal (LAD) and In-Channel Discharge (ICD) (see below) during non-freezing periods and;
 - (2) ICD only during freezing periods to existing and proposed surface reservoir facilities. Produced CBNG water will be directed to 12 in-channel outfall facilities (2 existing outfalls and 10 new outfalls) that will receive the effluent. Other water management components will include containment reservoirs, water gathering and discharge lines, low water crossings (roads), and culvert crossings (roads).

Comet will drill wells for testing and producing CBNG from the proposed wells in the project area. Comet has provided a project map which shows the location of: the proposed well sites; pipeline and power line routes; existing, improved and new access routes; water sources; facility locations; and water discharge locations and impoundments. Minimal construction will be required for most of the well pads; Comet provided a typical rig layout diagram and well bore diagram (Attachment D) in the MSUP. The typical rig layout consists of the drilling rig, pipe trailer, casing storage area (on timbers), two 5' X 15' reserve pits, an air compressor, and two soil piles (reserve pit excavation). Attachment D also contains the site diagrams and cross sections for the four well sites that will require cut and fill leveling.

Refer to the Master Surface Use Plan (MSUP), Master Drilling Plan (MDP), and the WMP in the POD for a detailed description of the drilling, construction and water management plans to be implemented in the project area. The POD contains maps of the proposed well location and infrastructure layout. Standard CBNG drilling, development, and construction practices are also available for review in Volume 1, pages 2-9 and 2-40 of the PRB FEIS (January 2003). The Standard Conditions of Approval (COAs) contained in the PRB FEIS ROD, Appendix A, are incorporated and analyzed in this alternative.

In the Duck Creek Federal POD, Comet committed to the following:

- x Use of Best Management Practices (BMP) in utilizing soil erosion control measures to reduce the potential for soil erosion.
- x To locate and design pipelines to meet federal, state, and local regulations and to design, test, operate and maintain the pipelines in accordance with standard safety practices.
- x Construct all new roads, road upgrades, low water crossings and culverts to the construction standards outlined in the BLM "Gold Book" (Surface Operating Standards For Oil and Gas Exploration and Development, January 1989).
- x Legally permit all reservoirs (existing and proposed) with the Wyoming State Engineer's Office (WSEO) and construct as per WSEO and Wyoming Oil and Gas Conservation Commission (WOGCC) regulations.
- x Designate a POD reference well (first effluent well) that will have the ability to be sampled at the wellhead, to submit water samples for analysis within 30-60 days of initiation, and provide the results to the BLM CFO for review.
- x Monitor all facilities and stream channels on a monthly basis during the first year of production and make all monitoring records available to the BLM CFO.
- x To work together with the landowner(s) on pest (weed) management issues.

2.2 Environmentally Preferred Alternative to the Proposed Action (Alternative B)

Prior to and during the pre-approval on-site inspection on 8/26/2004, alternatives to the original POD received from the operator were identified and assessed to ensure that potential impacts of the Proposed Action to the natural resources in the project area would be minimized. The resulting changes to the

Proposed Action resulting from the POD assessments and the on-site inspection will be incorporated as modifications to Alternative A, and will be analyzed as Alternative B. The alternatives to different components of a proposed action are routinely analyzed and applied as pre-approval changes, site-specific mitigation and/or as COAs to the Proposed Action.

Alternative locations and construction methods for each project component (roads, well pads, utility lines and facilities) were discussed and analyzed by BLM personnel and Comet representatives during the on-site inspection in order to select alternatives that would accomplish the objectives of the Proposed Action without causing unnecessary and undue environmental degradation.

The location and design of the components of the WMP (reservoirs, outfall locations, drainage crossings, and monitor wells) and the proposed erosion control mitigation measures were inspected and/or analyzed during the on-site inspection to select the alternatives that would be most protective of the soil, vegetation, biological and water resources in the project area and in potentially affected downstream drainages.

In some cases, roads were re-routed and well locations, pipelines, and water management control structures were moved, modified, mitigated, or deleted in order to eliminate or reduce potential adverse environmental impacts. The specific proposed modifications identified and analyzed by the BLM during and after the on-site inspection for the Duck Creek POD are listed in Section 2.2.1 below.

Alternative B, as described, is a modification of Alternative A with the proposed modifications developed during and after the on-site inspection applied. Alternative B, as such, is the environmentally-preferred alternative between A and B, and will be the action alternative analyzed throughout the remainder of this document.

The applicant-committed mitigation and monitoring measures contained in the MSUP, DP, and WMP in Alternative A are carried forward into Alternative B. The Standard COAs and Programmatic Mitigation Measures contained in the PRB EIS ROD, Appendix A, are incorporated and analyzed for Alternative B also. Table 2.1 below summarizes the type and amount of surface disturbance associated with Alternative B.

TABLE 2.2 – ALTERNATIVE B					
DUCK CREEK FEDERAL CBNG PROJECT SURFACE DISTURBANCE SUMMARY					
Company Name: Comet Energy Services, LLC, 1241 Eagle View Drive, Buffalo, WY 82834 Phone: (307) 684-8884					
Project Name: Duck Creek Federal CBNG No. of Federal Wells: 46					
Location: Sections 4-9, 17 and 18, T. 38 N., R. 72 W., Converse County, WY					
Federal Oil and Gas Leases: WYW149207, WYW134200, WYW149208, WYW142787, WYW09848, WYW059237, WYW136943					
Surface Owners: Jeff Reynolds, Box 146, 706 Willow Creek Road, Douglas, WY 82633 (Home) 307-358-3693, (Cell) 307-359-1012 <u>Dale Carson</u> , Route 2 Jenne Trail Road, Douglas, WY 82633 (307-358-4442)					
Component	No.	Description	Length (miles)	Area (ac)	Term
Wells	45	Drill/complete - 2 (5'X15') pits, soil piles, rig level		2.9	Short
Wells	3	Cut and fill well pad construction required		0.9	Short
Wells	48	Production/Monitor – wellhead, meters		0.3	Long
Roads		Existing improved road (40' includes 10' for utilities)	3.7	17.9	Long

Roads		Existing 2-track not in corridor (12')	8.5	12.4	Long
Roads		Proposed 2-track not in corridor (14')	1.0	1.7	Long
Road		Existing 2-track (12') with proposed utility corridor (18')	7.4	26.9	Long
Roads		Proposed 2-track and utility corridor (30')	10.65	38.7	Long
Corridor		Proposed corridor not in access (20')	0.96	2.3	Short
Corridor		Proposed pipeline not in corridor (20')	0.78	1.9	Short
Power lines		Proposed - within POD	0.55	0.1	Long
Outfalls	8	2 Existing – 6 proposed		0.01	Long
Reservoir	5	Existing			Long
Reservoir	4	Proposed		7.6	Long
Compressor	2	Compressor facilities – In POD		2.0	Long
Facility	1	Central gathering/metering		0.5	Long
		Existing Disturbance Total		36.6	
		Proposed New Disturbance (w/o reservoirs)		71.9	

2.2.1 Post On-site Inspection Changes to the POD

- x The access road to the C2-18 was modified from access from the B3-18 to access off of the existing access road to eliminate a low water crossing and reduce surface disturbance.
- x The access road to the B1-18 was modified from to a route starting at the C2-18 to a route starting from the access road south of the C2-18 in order to avoid steep slope. LWC 11 eliminated.
- x The access road to the B3-8 was modified from a western access to a route starting south of the well at the existing access road between Low Water Crossings (LWC) 6 and 10. This eliminated the original LWC 5.
- x In order to avoid discharging produced water into the Bear Creek drainage to the north of the Cheyenne River Divide, the number of discharge points were reduced to 8, none in the Bear Creek drainage (DP 2 and 3 eliminated).
- x Existing road layout in the N½, Sec. 18, T. 38 N., R. 72 W. changed as wells as the access to the A2-18 well.
- x Proposed 2-track road and corridor connection between A2-7 and B1-7 wells eliminated.
- x LWC 6 was renamed LWC 5, LWC 7 renamed LWC 6, LWC 8 renamed LWC 7, LWC 10 added between new LWC 6 and 7, LWC 10 renamed LWC 9, LWC 9 renamed LWC 8.
- x An engineer certified design was required for the D3-4 access road due to the steep slope between the existing 2-track road and the D3-4 well location.
- x It was determined that a cut and fill design would not be necessary for the D1-5 location if the rig orientation was rotated to parallel the ground slope in the project area.
- x A slight relocation of Discharge Point No. 5 closer to the receiving channel bottom.
- x The elimination of Discharge Point No. 6 and its associated culvert crossing (combined with another existing discharge point).
- x The construction of a dedicated monitor well set for the project constructed according to BLM CBNG monitoring well stipulations.
- x The surface location of the A4-5 moved at least ¼ mile from the raptor nest located on the well site.
- x The construction of an overhead power line from the NE¼, Sec. 16, T. 38 N., R. 73 W. to the central POD gathering/metering facility was completed prior to the Duck Creek POD approval in order to supply power to 2 existing fee CBNG well presently producing water. The overhead power line installation was taken into consideration in the U.S. Fish and Wildlife (FWS) review Biological Opinion (BO) of the Duck Creek POD issued on December 15, 2004.

An APD for the dedicated monitor well set was submitted to the CFO with the WMP. The specific location for the monitor well set was determined in consultation with the BLM; it may only be drilled only on a federal oil and gas lease. The well set will be permitted through the Wyoming State Engineers'

Office (WSEO) as a monitor well set, and will be constructed and equipped as per guidelines furnished to Comet by the BLM Hydrologist (Attachment 3). It will also be assigned an American Petroleum Institute (API) No. by the Wyoming Oil and Gas Conservation Commission (WOGCC) for tracking purposes but will not be permitted or approved by the WOGCC.

DUCK CREEK FEDERAL CBNG PROJECT – ALTERNATIVE B DEDICATED MONITOR WELL SET					
Well Name & No.	Seam	Elev.	Location	Total Depth	Footages
Duck Creek Fed. D4-19-3872	Upper & Lower Pawnee	4938'	SE¼SE¼, Sec. 19, T38N., R72W	1850'	685' FSL & 68' FEL

Alternatives to the different aspects of the Proposed Action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate or minimize environmental effects of the operator's proposal. The changes listed above in Section 2.2.1 are changes to the original Proposed Action as described in Section 2.1 (Alternative A). These changes will be incorporated as pre-approval changes to the POD and analyzed as part of Alternative B.

2.2.2 Standard Conditions of Approval (PRB FEIS ROD)

Standard Conditions of Approval are those measures that are applied to the Proposed Action if they are not specifically addressed in the POD. Section A.4.1 (pp. A-21 – A-23, PRB FEIS ROD) applies to CBNG wells only while Section A.4.2 (pp. A-23 – A-30) applies to all oil and gas development. Comet shall ensure that all of the mitigation and monitoring measures in Section A.4.1 and A.4.2 of the PRB FEIS ROD are addressed during the development of the Duck Creek CBNG project.

2.2.3 Programmatic Mitigation Measures (PRB FEIS ROD) Identified

Programmatic mitigation measures are measures from the PRB FEIS ROD determined through analysis which may be applied at the time of APD approval if site specific conditions warrant. These measures are applied as COAs by the BLM as determined in the site-specific NEPA analysis.

- x (A.5.15 Air Quality) During construction, dust from road and well pad construction will be minimized by the application of water or other dust suppressants, with at least 50% control efficiency. Roads and wells constructed on soils susceptible to wind erosion could be appropriately surfaced or stabilized to reduce the amount of dust generated by traffic or other activities. Dust inhibitors (surfacing material, non-saline dust suppressants, and water) could be used as necessary on unpaved access roads. Chemical dust suppressants will require prior approval from the BLM AO.
- x (A.5.7 Vegetation) Temporarily fence reseeded areas, if not already fenced, for at least two complete growing seasons to insure reclamation success on problematic sites.
- x (A.5.11.6) All power lines will be built to protect raptors, including wintering bald eagles, from accidental electrocution using methods detailed by the Avian Power Line Interaction Committee.

2.2.3 Site Specific Mitigation Measures

1. No surface-disturbing activity will be allowed within ½ mile of all documented raptor nest from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing stipulation affects Sections 4, 5, 6, 8, 9 and 17, T. 38 N., R. 72 W. in the project area and would apply to the following wells, discharge points, reservoirs and their supporting infrastructure (roads, pipelines, culverts, low water crossings, etc.):

Section 4:

Wells: B3-4, C4-4, D3-4, D1-4, B1-4, A2-4

Discharge Points: 2

Reservoirs: None

Section 5:

Wells: C4-5, B3-5, A4-5

Discharge Points: None

Reservoirs: None

Section 6:

Wells: A4-6, B3-6

Discharge Points: None

Reservoirs: None

Section 8:

Wells: D3-8 (Fee)

Discharge Points: 5, 6

Reservoirs: Reynolds 24-8-3872, Reynolds 44-8-3872

Section 9:

Wells: D1-9, D3-9, A2-9, A4-9,

Discharge Points: 3, 7

Reservoirs: Reynolds 14-9-3872, Reynolds 32-9-3872

Section 17:

Wells: B1-17, B3-17, C4-17, D1-17

Discharge Points: None

Reservoirs: None

2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates “Standard Environmental Colors.” The color selected for this project is Carlsbad Canyon, 2.5Y 6/2.
3. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultivation 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. The seed mix will be selected by the landowner as stated in the SUP.

2.3 No Action Alternative (Alternative C)

A No Action Alternative was analyzed on pages 2-54 through 2-62 in Volume 1 of the PRB FEIS. This alternative would not approve any new federal wells, and the oil and gas resources in the PRB would be developed only on state and private mineral ownership. The authority of the Department of the Interior (DOI) to implement a “No Action” alternative that would preclude oil and gas development is limited; 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.” Under the No Action Alternative, the Duck Creek Federal CBNG Project would not be approved.

3. THE AFFECTED ENVIRONMENT

The initial applications to drill were received on July 23, 2004. An on-site field inspection was conducted by BLM CFO personnel on August 26, 2004 that included the following persons:

Ken McMurrough, BLM Physical Scientist (Co-Lead)

Mike Brogan, BLM Hydrologist (Co-Lead)

Jim Wright, BLM Wildlife Biologist

Jim Aksamit, Western Land Services Representative

Allen Aksamit, Western Land Services Wildlife Biologist

Mark Deibert, Resource Specialist, Western Land Services

Kent Fink, Operations Manager, Comet Energy Services, LLC
 Jeff Reynolds, Landowner

This section describes the affected environment that would be affected by implementation of Alternative B and Alternative C described in Chapter 2 above. Aspects of the affected environments described in this section focus on the relevant major issues.

3.1 Critical Elements of the Human Environment

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				
Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species	X			Jim Wright
Floodplains		X		Mike Brogan
Wilderness Values			X	Ken McMurrrough
ACECs			X	Ken McMurrrough
Water Resources	X			Mike Brogan
Air Quality		X		Ken McMurrrough
Cultural or Historical Values		X		Chris Arthur
Prime or Unique Farmlands			X	Ken McMurrrough
Wild & Scenic Rivers			X	Ken McMurrrough
Wetland/Riparian		X		Mike Brogan
Native American Religious Concerns			X	Chris Arthur
Hazardous Wastes or Solids		X		Ken McMurrrough
Invasive, Nonnative Species	X			Ken McMurrrough
Environmental Justice			X	Ken McMurrrough

3.2 General Setting

The project area is located in the Northern Great Plains that includes most of northeastern Wyoming. The vegetation in the Northern Great Plains is primarily sagebrush and mixed-grass prairie; the climate is semi-arid. May and June are the wettest months (4.39 inches), and February is the driest month (0.29 inches). Snowfall averages 25.1 inches per year with most of the snowfall occurring in March and December. July is the warmest month, with a daily mean temperature of 70 degrees F., and January is the coldest month, with a daily mean temperature of 20.5 degrees F.

3.2.1 Physiographic Setting

The project area is located approximately 30 miles north of the town of Glenrock, Wyoming in Converse County, Wyoming one mile north of the Dry Fork Cheyenne River (Dry Fork). The project area is in a high plains area within the eastern portion of the Powder River Basin (PRB), with elevation ranging from 4917 to 5247 feet above sea level. The Cheyenne River Divide extends in a general northeast-southwest

direction through the northern portion of the project area separating the project area into the primarily north-draining Bear Creek Watershed and the primarily south-draining Dry Fork Watershed.

3.2.2 Geology

The project area is located on the west-dipping east flank of the PRB near the Eocene Wasatch- Paleocene Fort Union contact. The surface in the project area is comprised of the Wasatch and Ft. Union Formations. The Upper and Lower Pawnee coal beds of the Tongue River Member of the Fort Union Formation are the CBNG targets at 1358 to 1803 feet in the project area.

3.3 Soils

Table 3.3a below describes the general soil map units and their properties that are present on the surface in the project area the project area. The general soil map unit can be used to compare the suitability of large areas for general land use.

General Soil Map Unit (STASGO)	General Description of Soil map Unit	Wells in Soil Map Unit	Discharge Points in Soil Map Unit	Reservoirs In Soil Map Unit
Tassel-Hiland-Vonalee (T-H-V)	Shallow and deep, well drained and somewhat excessively drained, undulating to hilly soils, on uplands	C2-6, B3-6, A4-6	0	None
Hiland-Shingle-Ulm (H-S-U)	Deep and shallow, well drained, nearly level to hilly soils, on uplands and adjacent foot slopes, toe slopes and alluvial fans	All Sec. 4, 5, 7, 8, and 18 wells, Wells C4-6, D3-6, A4-9, A2-9, B1-9, B3-9, D1-9, C2-9B1-17, D1-17, B3-17	1, 2, 3, 4, 5, 6, 7, 8	All reservoirs
Ulm-Bidman-Renohill (U-B-R)	Deep and moderately deep, well drained, nearly level to hilly soils, on uplands and adjacent foot slopes, toe slopes and alluvial fans	C4-9, D3-9, C4-17, D3-17	None	None

Table 3.3b below describes the properties of the soil taxonomic units that are present in the project area:

Soil Taxonomic Map Unit	Depth	Drainage	Perm-ability	Available Water Capacity	Runoff	Water Erosion Hazard	Wind Erosion Hazard	Potential Plant Community
Tassel-Hiland-Vonalee General Soil Map Unit (loamy sand/sandy loam-sandy clay loam-loamy sand/sandy loam)								
Tassel	shallow	well drained	moderately rapid	very low	medium	moderate	moderate	western wheatgrass, bluebunch wheatgrass, needleandthread, little bluestem
Hiland	deep	well drained	moderate	moderate	slow	slight	moderate	western wheatgrass, thickspike wheatgrass, needleandthread
Vonalee	deep	somewhat excessively rapid	rapid	low	medium	moderate	severe	needleandthread, prairie sandreed, Indian ricegrass, little bluestem

Hiland-Shingle-Ulm General Soil Map Unit (sandy clay loam-clay loam-clay loam)								
Hiland	deep	well drained	moderate	moderate	slow	slight	moderate	western wheatgrass, thickspike wheatgrass, needleandthread
Shingle	shallow	well drained	moderate	low	medium	severe	slight	western wheatgrass, bluebunch wheatgrass, needleandthread, little bluestem
Ulm	deep	well drained	slow	high	slow	moderate	slight	western wheatgrass, thickspike wheatgrass, green needlegrass
Ulm-Bidman-Renohill General Soil Map Unit (clay loam-sandy loam-fine sandy loam)								
Ulm	deep	well drained	slow	high	slow	moderate	slight	western wheatgrass, thickspike wheatgrass, green needlegrass
Bidman	deep	well drained	slow	high	medium	moderate	moderate	western wheatgrass, thickspike wheatgrass, green needlegrass
Renohill	moderately deep	well drained	slow	moderate	medium	moderate	moderate	western wheatgrass, thickspike wheatgrass, needleandthread

The major soil components in the Duck Creek Federal project proposed disturbance areas are sandy clay loams and clay loams. The soils in the project area range from shallow to deep; however, the most widespread soil in the project area, the Hiland sandy clay loam, is deep. Most of the soil complexes in the project area are well-drained; however, the Vonalee loamy sands/ sandy loams are somewhat excessively drained. The permeability of most of the soil complexes ranges from slow to moderate, however, the Vonalee has a rapid permeability. The available water capacity in the soils varies from very low to high. Runoff for the soil complexes varies from slow to medium. The hazard for water erosion for most of the soil units is moderate, but ranges from slight (Ulm) to severe (Vonalee). The hazard for wind erosion for the soil units ranges from slight to moderate except for the Vonalee sandy loams/ loamy sands which are severe. The potential plant communities for the soil complexes in the project area include western wheatgrass, bluebunch wheatgrass, needleandthread, little bluestem, green needlegrass, and thickspike wheatgrass. For more detailed information, refer to the Soil Survey of North Converse County or contact the Natural Resources Conservation Service (www.nrcs.usda.gov/).

3.3.1 Land Application Disposal

The WMP states that during periods when the temperature is above 32° F, Comet plans to utilize a portion of produced effluents for irrigation purposes. Baseline effluent quality and soils information collected from the Duck Creek project area demonstrates that no adverse environmental impacts will occur to natural resources from the proposed Land Application Disposal (LAD). LAD will be concentrated in 2 soil types, the Highland and Forkwood Series, which are both deep, well drained mixes of sands and sandy loams with low clay content throughout the soil profile. These 2 soil types have chemical and physical properties that would facilitate LAD without a negative reaction with produced effluents. Soil samples collected from a representative site were analyzed by an approved laboratory to confirm physical and chemical properties of the samples and the referenced results are included in Attachment F of the WMP. Sodium Adsorption Ratio (SAR) and Electro Conductivity (EC) were plotted on a Hanson Chart (Attachment F, WMP) to review the potential effect of the proposed LAD to soil infiltration. The results show no reduction in infiltration should occur. Effluent will be pumped from a containment reservoir to a large rain-bird sprinkler where it will be applied to the surface at a rate such that no surface runoff will occur.

3.4 Vegetation

Two principal vegetation types were identified in the project area: mixed-grass prairie (80%) and sagebrush shrubland (20%) (Aksamit, 2004). Common species of mixed-grass prairie vegetation type include needleandthread grass, western wheatgrass, blue grama, and prickly pear cactus. In the sagebrush

shrublands, dense, moderately dense and sparse stands of Wyoming big sagebrush with a variety of grasses and forbs were identified during surveys. Common species associated with the sagebrush shrubland vegetation type include Wyoming big sagebrush, silver sagebrush, western wheatgrass, junegrass, needleandthread grass, Sandberg bluegrass, prickly pear cactus, scarlet globemallow, and rabbit brush.

3.4.1 Wetland/Riparian

The U.S. Fish and Wildlife Service (FWS) defines wetlands as: lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water, and have one or more of the following 3 attributes:

- (1) at least periodically, the land supports predominantly hydrophytes,
- (2) the substrate is predominantly undrained hydric soil,
- (3) the sub-strata is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Riparian areas are ecosystems whose soils and soil moisture are influenced by the high water table due to the proximity to adjacent rivers, streams, creeks, or subsurface water, and are unique because of their linear form.

The unnamed drainages feeding into Bear Creek and the Dry Fork in the project area exhibit ephemeral to intermittent flow regimes characterized by irregular stream flows. The vegetation within these channels is generally made up of upland species; however, where water discharge from surface springs is present and in low areas along the drainages, narrow bands or pockets of wetland vegetation have developed along these intermittent and ephemeral channels.

Wetlands generally include swamps, marshes, bogs, and similar areas. Non-navigable, isolated intrastate wetlands (e.g. playas) and other waters of the U. S. are not considered jurisdictional, and therefore are not within the extent of Corps of Engineers (COE) regulatory review. There are no jurisdictional wetlands in the project area.

3.4.2 Invasive Species

The Wyoming State Legislature enacted the Wyoming Weed and Pest Control Act in 1973. The Act legitimately established each Wyoming County as a Weed and Pest Control District. The project area falls within the Converse County Weed and Pest Control Districts located in Douglas, Wyoming (see below).

District	Address	City	State	Zip Code	Phone Number
State Weed & Pest Coordinator	2219 Carey Ave.	Cheyenne	WY	82002	(307) 777-6585
Converse Co. Weed & Pest Control District	PO Box 728	Douglas	WY	82633	(307) 358-2775

The following is a list of designated and prohibited noxious weeds for Wyoming. This list can be accessed at the following BLM website: <http://www.wy.blm.gov/weeds/whatis.htm>. The management of noxious weeds and invasive species need not be limited to the species on this list; other recognized regional or national noxious weed or invasive species lists may be available.

WYOMING WEED & PEST CONTROL ACT DESIGNATED LIST
Designated Noxious Weeds .S. 11-5-102 (a)(xi)
and
Prohibited Noxious Weeds W.S. 11-12-104

- (1) Field bindweed (*Convolvulus arvensis* L.)
- (2) Canada thistle (*Cirsium arvense* L.)
- (3) Leafy spurge (*Euphorbia esula* L.)
- (4) Perennial sowthistle (*Sonchus arvensis* L.)
- (5) Quackgrass (*Agropyron repens* (L.) Beauv.)
- (6) Hoary cress (whitetop) (*Cardaria draba* and *Cardaria pubescens* (L.) Desv.)
- (7) Perennial pepperweed (giant whitetop) (*Lepidium latifolium* L.)
- (8) Ox-eye daisy (*Chrysanthemum leucanthemum* L.)
- (9) Skeletonleaf bursage (*Franseria discolor* Nutt.)
- (10) Russian knapweed (*Centaurea repens* L.)
- (11) Yellow toadflax (*Linaria vulgaris* L.)
- (12) Dalmatian toadflax (*Linaria dalmatica* (L.) Mill.)
- (13) Scotch thistle (*Onopordum acanthium* L.)
- (14) Musk thistle (*Carduus nutant* L.)
- (15) Common burdock (*Arctium minus* (Hill) Bernh.)
- (16) Plumeless thistle (*Carduus acanthoides* L.)
- (17) Dyers woad (*Isatis tinctoria* L.)
- (18) Houndstongue (*Cynoglossum officinale* L.)
- (19) Spotted knapweed (*Centaurea maculosa* Lam.)
- (20) Diffuse knapweed (*Centaurea diffusa* Lam.)
- (21) Purple loosestrife (*Lythrum salicaria* L.)
- (22) Saltcedar (*Tamarix* spp.)
- (23) Common St. Johnswort (*Hypericum perforatum*)
- (24) Common Tansy (*Tanacetum vulgare*)

The Wyoming internet CBM Clearinghouse map viewer (<http://www.cbmclearinghouse>) indicated that Leafy Spurge (LS), though not present in the project area, is present west and northeast of the project area in parts of Converse County. Other noxious weeds and invasive species may be present in the project area so the weed management plan for the Duck Creek Federal CBNG project area should address all potential noxious weeds and invasive species. Comet stated in the POD that they will work together with the surface owners on weed and other pest management issues.

3.4.2.1 Leafy Spurge

LS, a Eurasian native, was brought to the United States as a seed impurity around 1827. It has spread aggressively in rangelands and other dry areas throughout the northern half of the U.S. and can cause severe irritation to the mouths and digestive tracts of domestic and wild grazing animals. Its spreading and persistent nature makes it a serious problem weed wherever it grows. The seed capsules explode when dry, shooting the seeds as far as 15 feet and the seeds remain viable in the soil for up to 8 years

LS normally grows 2 to 3 feet tall from a woody crown that is below the soil surface. Each crown area produces several upright stems, giving the plant a clump-like appearance. The plant bears numerous linear-shaped leaves with smooth margins. The leaves have a characteristic bluish-green color but turn yellow or reddish-orange in the fall. Stems originating from crown buds and roots begin growth in late April, making LS one of the first plants to emerge in the spring. The early and rapid growth gives leafy spurge a competitive advantage over crop and pasture plants. All parts of the plant contain a milky juice called latex, which is a useful identifying characteristic. LS produces a flat-topped cluster of yellowish-green petal-like structures called bracts, which bear the true flowers (Figure 1). The showy, yellow bracts appear in late May and early June, giving the plant the appearance of "blooming." However, the true flowers, which are small and green, do not develop until mid-June. The distinction between bract appearance and true flowering is important for timing of herbicide applications. Spring-applied herbicides are more effective on plants with developing true flower parts than on plants with developed bracts but undeveloped flowers.

Although LS can be controlled using herbicides alone, the best long-term solution is an integrated approach that incorporates herbicides with grazing, competitive grass species, and/or biological control agents (see Integrated Management of Leafy Spurge, NDSU Extension Service Circular W-866R).

3.5 Wildlife

The project area is located approximately 1½ miles north of the Dry Fork and consists of a gently rolling terrain and minor drainages. A few scattered rock outcrops are present on the ridge hilltops. Mature stands of cottonwoods are present along much of the Dry Fork and Duck Creek south of the project area. The primary habitat within the project area consists of a mixed-grass prairie with scattered sagebrush communities occurring within some drainages along the north half of the project area. Common wildlife species that typically occur in these habitat types are listed in the PRB EIS (p. 3-114 and 3-115).

Common raptor species expected to occur within the project area are discussed in the PRB EIS (p. 3-141 to 3-147). Several species of upland game birds may occur within the project area and these are discussed in the PRB FEIS (p. 3-148 to 3-150).

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migrant birds are those that migrate from wintering grounds to breeding grounds in North America. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (p. 3-151).

The habitat types within the Duck Creek Federal project area are of importance to many wildlife species. Prior to project approval 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 and Casper Field Offices wildlife biologists, the PRB FEIS, the Wyoming Game and Fish Department (WGFD) big game and sage grouse maps, and wildlife survey reports prepared by Western Land Services. Species that have been identified in the project area or that have been noted as being of special importance are described below.

3.5.1 Big Game

Two big game species inhabit the project area Mule Deer (*Odocoileus hemionus*) and Pronghorn Antelope (*Antilocapra Americana*). There are no crucial big game winter ranges delineated for these species, as both species inhabit this area yearlong. For both antelope and mule deer the Wyoming Game and Fish Department (WGFD), has determined that the project area to be yearlong range use. Yearlong use is when a substantial portion of a population makes general use of the habitat on a year-round basis.

Mule Deer:

The project area resides within the North Converse Mule Deer herd (herd unit 755). This herd is comprised of approximately 8,400 animals, approximately 8% below the objective of 9,100. According to the 2002 Wyoming Game and Fish Herd Unit Reports, population growth within this herd is believed to be limited due to the affects of drought on the available habitat.

Pronghorn Antelope:

The project area resides within the core of the North Converse Pronghorn Antelope herd (herd unit 748). This herd is comprised of approximately 25,715 animals, approximately 9% below the objective of 28,000. According to the 2002 Wyoming Game and Fish Herd Unit Reports, this population continues to exhibit good fawn recruitment even during drought conditions. However, fawn recruitment, as well as declining habitat conditions due to the persistent drought in the area, is limiting the growth of this population.

3.5.2 Fisheries

The proposed Duck Creek Federal project area is located within the Cheyenne River Basin. Existing limiting factors of the Cheyenne River Basin, such as extreme fluctuations in stream flow and temperature, low aquatic invertebrate production, and high turbidity, limit the ability of most streams to support game fish, particularly cold- and cool-water species. The Dry Fork is located approximately 1½ mile south of the project area. This drainage is classified as intermittent, with little or no perennial water to support a fishery. The Wyoming Department of Environmental Quality (WDEQ) regulates effluent discharge through the National Pollution Discharge Elimination System (NPDES) 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 fish, aquatic life other than fish, wildlife, and other water uses. Impact to any downstream fish species will likely be minimal. Fisheries will not be discussed any further in this document.

3.6 Threatened and Endangered Species (T&E), Special Status Species

Wildlife Surveys and habitat assessments were conducted by Western Land Services. A subsequent field visit was completed by Jim Wright, BLM Wildlife Biologist on August 26, 2004. A Biological Assessment (BA) (Attachment 1) for the Duck Creek Federal CBNG project was prepared by the CFO in accordance with Section 7 of the Endangered Species Act (ESA) to identify the possible effects to endangered, threatened, experimental, proposed, or candidate species known to occur or that may occur within the area influenced by the proposed action. A Biological Opinion (BO - FWS) (Attachment 2) was received from the FWS on December 15, 2004. The BA and BO are tiered to the PRB FEIS, and the FWS Final Biological and Conference Opinion (FBCO) for the Powder River Basin Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties, Wyoming.

3.6.1 Bald Eagles

The project area was evaluated for potential bald eagle nesting and roosting habitat by Allen Aksamit, Western Land Services (WLS), as indicated by the appended report.

Suitable bald eagle roosting habitat is present in cottonwood stands along the Dry Fork Cheyenne River and Duck Creek south of the project area. Three winter roost surveys were conducted by Allen Aksamit during the winter of 2004. Bald eagles were observed on the following dates and locations:

Survey Date	# Observed	Location
1/23/04	2 mature	SE¼SW¼, Sec. 21, T. 38 N., R 72 W.
2/04/04	2 immature, 1 mature	NE¼SW¼, Sec. 30, T. 37 N., R 72 W.
2/25/04	1 mature	SE¼NW¼, Sec. 6, T. 37 N., R 72 W.
2/25/04	1 mature	NE¼SW¼, Sec. 30, T. 37 N., R 72 W.

Survey records from the 1980's also indicate that small groups of eagles utilize cottonwood stands along the Dry Fork Cheyenne several miles east of the project area as diurnal roost sites. None of the historical records reviewed documented any bald eagle use in the vicinity of the proposed project area. No communal roost sites were identified in or adjacent to the project area.

3.6.2 Ute ladies'-tresses

Surveys for potential Ute ladies-tresses habitat along the Dry Fork were conducted by WLS. Based on these surveys, it was determined that suitable habitat is not present to support the Ute ladies'-tresses (Aksamit 2004). Based on these findings and subsequent field visits to the area, a "no affect" determination was made for Ute ladies'-tresses. This species will not be discussed further in this document.

3.6.3 Black-footed Ferrets

Suitable habitat for the black-footed ferret consists of black-tailed prairie dog colonies or complexes greater than 80 acres. No prairie dog colonies exist within or immediately adjacent to the project area in which to support black-footed ferrets. Based on these findings, a "no effect" determination was made for Black-footed ferrets and this species will not be discussed further in the document.

3.6.4 Other T&E and Candidate Species

The proposed project area is not within the expected range of Preble's Meadow Jumping Mouse or Colorado Butterfly Plant, and does not contain sand dunes, which is the expected habitat for blowout penstemon (Attachment 1).

3.6.5 Sensitive Species

3.6.5.1 Greater Sage Grouse

Potential nesting habitat may occur in scattered sagebrush communities along the northern portion of the project area. No sage grouse have been documented within the project area; however, droppings were documented at one location. A search of BLM and WGFD records indicated that no active leks are present within the project area or within two mile of the project boundary. The closest known sage grouse activity is a historical sage grouse lek approximately 2.75 mile north of the project boundary (Aksamit 2004).

3.6.5.2 Mountain Plover

Surveys of the project area revealed that mixed-grass prairie make up approximately 80% of the vegetative habitat. Sagebrush makes up the remaining 20% of the available habitat within the project area. Additionally, no positive habitat indicators, such as the presence of prairie dog colonies are present within the project area. Field surveys conducted by WLS or BLM field visits revealed no mountain plover sightings or indications of potential habitat. Based on this information, mountain plovers are not believed to inhabit the project area and will not be discussed further in this document.

3.6.5.3 Raptors

The entire project area was surveyed for the presence of raptors and all raptor nest locations were recorded and the nests classified. Eleven nest sites were identified during surveys conducted by Western Land Services (Aksamit 2004). None of the nests will be physically disturbed by Alternative B; however, eight of the eleven are within ½ mile of proposed construction within the project area.

3.7 West Nile Virus

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

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

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

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

3.8 Water Resource

The project area is located on the divide between Duck Creek (tributary to the Dry Fork and Bear Creek (tributary to Antelope creek) which are both tributaries to the Cheyenne River. The project includes the construction of 54 well sites (46 federal, 1 state, 7 fee) with one well per site dual completed in the Upper and Lower Pawnee coal seams.

3.8.1 Groundwater

The WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for total dissolved solids (TDS): 500 milligrams per liter (mg/l) TDS for drinking water (Class I), 2000 mg/l for Agricultural Use and 5000 mg/l for Livestock Use.

The PRB FEIS Record of Decision includes a Monitoring, Mitigation and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation the FEIS. 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:

- x 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 and provide site specific guidance on the placement and design of CBM impoundments. Shallow groundwater wells would be installed and monitored where necessary.
- x A battery of 35 new groundwater monitoring well locations will be installed throughout the project area.

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 that 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) that 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. A fifty-foot thick shale layer separated the two water-bearing zones. 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 total dissolved solids 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.

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

A search of the WSEO Ground Water Rights Database for this area shows four wells (approximately 1480-1660 feet TD) potentially completed in the target coal zone within six miles of the project area. This search also shows an additional six registered irrigation, stock and/or domestic water wells within the one mile Circle of Influence (including four within the boundaries of the POD) with depths up to 1293 feet. There are also 10 wells completed for miscellaneous/monitoring purposes associated with the uranium industry ranging from 118 to 230 feet in depth within the POD boundaries. For additional information on water, please refer to the PRB FEIS, Chapter 3, Affected Environment, pages 3-1 through 3-36 (groundwater) and 3-36 through 3-56 (surface water).

As stated in the MMRP, a battery of new ground water well locations will be installed throughout the project area. One of these monitoring well locations (including 2 wells – one a production zone completion and a second completed in an overlying sand aquifer) is included in this POD. These monitoring wells will help insure that the important overlying sand aquifers are not significantly impacted by the development of CBNG.

3.8.2 Surface Water

The project area is located on the divide between Duck Creek (tributary to the Dry Fork and Bear Creek which are both tributaries to the Cheyenne River. The drainages are characterized by intermittent flow through the project area. Most of the main channels are dominated by grassy swales vegetated with primarily upland species. Portions of the channels are well defined, in other areas the channels broaden and flatten becoming less well defined.

The PRB FEIS presents the historic mean EC in $\mu\text{mhos/cm}$ and 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 Antelope Creek Watershed, the EC ranges from 1,800 at Maximum monthly flow to 2,354 at Low monthly flow and the SAR ranges from 2.82 at Maximum monthly flow to 2.60 at Low monthly flow. These values were determined at the USGS station located on Antelope Creek

near Teckla, WY (PRB FEIS page 3-49). For the Dry Fork Cheyenne River Watershed, the EC ranges from 630 to 2600 and the SAR is less than one. The Dry Fork Cheyenne values were determined at the USGS station “Dry Fork Cheyenne River near Bill, WY”, station number 06365300. For Upper Cheyenne River Watershed (which includes both Antelope Creek and the Dry Fork Cheyenne River), the EC ranges from 2,271 at Maximum monthly flow to 4,127 at Low monthly flow and the SAR ranges from 5.63 at Maximum monthly flow to 8.66 at Low monthly flow.

The Wyoming Department of Environmental Quality conducted a Cumulative Hydrologic Impact Assessment (CHIA) of the Antelope Creek Drainage for the Horse Creek Amendment, Antelope Coal Mine. The report (November, 2001) states:

“In general, surface water quality at the Antelope Coal Mine is poor. Pre-mining surface water quality sampling of Antelope Creek and some tributaries in the vicinity of Antelope Coal Mine indicate surface water quality was generally a calcium-sodium-sulfate type (CaNaSO₄). The pH ranged from 6.7 to 8.2. In addition to high salinity, concentrations of other trace contaminants resulted in surface water that was typically in excess of criteria for agriculture (irrigation) and domestic use. TDS concentrations in surface water were lower in areas where the coal seam discharges groundwater to the surface. Suspended sediment loads ranged from 100-300 mg/l for discharges up to 21.5 cubic feet per second (cfs). Based on existing data, surface water in the vicinity of Antelope Coal Mine was suitable for livestock”

Forty-three water quality samples obtained by Antelope Coal Company on Antelope Creek just below the confluence with Spring Creek and very near the project boundary have an average TDS of 2,902, and average SAR of 3.5. These average values are consistent with the water quality values from the USGS gauging Station on Antelope Creek near Teckla, WY, which was used in the Powder River Basin FEIS to predict cumulative surface water quality impacts.

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

The operator indicated in the WMP that there are no springs within ½ mile of the project area.

3.9 Cultural Resource

WLS conducted a cultural resource inventory for the Duck Creek project area from January 20, 2004, to March 19, 2004; the report is on file with the BLM. Four ineligible previously recorded cultural sites were located and 11 ineligible newly recorded cultural sites were located. One non-contributing eligible cultural site was also located. Cultural clearance was approved by the CFO on September 27, 2004, with the standard cultural stipulation. WLS conducted a cultural resource inventory for a water monitoring well on October 10, 2004, that was added to the original Proposed Action. One ineligible cultural site was located, and cultural clearance was approved by the BLM on December 13, 2004, with the standard cultural stipulation.

3.10 Air Quality

Most oil and gas well drilling operations potentially could affect the air quality, either from emissions from equipment associated with construction, drilling, testing, completing or producing of wells or from gaseous escapes from chemicals or mud additives associated with drilling, completion or producing of wells. In areas with natural gas or associated gas potential, potential contamination from the gas or associated gas contaminants such as H₂S or CO₂ exist. Neither of these contaminants is found in the CBNG produced from the Upper and Lower Pawnee Coal reservoir in the PRB. Wind erosion from disturbed soil surface areas associated with construction of the well pads, infrastructure facilities, roads, pipelines or WMP components is a potential source of wind-blown dust.

3.11 Foot Rot

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

3.12 Visual Resource

The proposed action is in an area categorized as Visual Class IV. There are no public roads in the vicinity of the Proposed Action and the project area will not be visible to the general public. Persons having visual contact with the project area would be limited mostly to ranchers, oil field workers, and landowner-permitted recreationists. No further analysis will be conducted on the visual resource of the project area in this document.

4. ENVIRONMENTAL CONSEQUENCES

The environmental consequences for Alternatives B and C are discussed in this chapter. The applied standard, programmatic, and site-specific mitigation and monitoring measures developed in the Duck Creek EA (tiered off of the PRBOGP FEIS and ROD), and the applied applicant-committed mitigation and monitoring measures will reduce the potential for environmental degradation to the natural resources in the Duck Creek project area. This is in conformance with one of the missions of the BLM to promote the exploration and development of oil and gas reserves on public lands while protecting the natural environment using the best practicable means available.

Direct impacts are caused by the action and occur at the same time and place as the proposed action. Indirect impacts are caused by the action and occur later in time or further removed in distance, but still are reasonably foreseeable. Some mitigation measures are applied to prevent a direct, adverse impact from occurring in the first place; other mitigation measures are applied to prevent the indirect impact by removing or reducing the effects of the unavoidable, direct, adverse impact. Direct and indirect impacts to the resources in the project area will be discussed and analyzed in this chapter where appropriate.

Residual impacts are long-term impacts to the natural environment by an action that remain after mitigation measures have been implemented. The residual impact to each resource is discussed in more detail in this chapter where appropriate. CBNG productive life is relatively short-lived (8-15 years) compared to conventional oil and gas field life which may extend well beyond 15 or 20 years; some conventional oil and gas fields are still producing after 100 years of production. After successful field reclamation is achieved at the end of CBNG development, the long-term impact from production will eventually be reduced and finally eliminated as the project area returns to its pre-development natural state. Some residual impacts might remain in the project area in the foreseeable future like soil loss to erosion or loss of resources due to continued use of roads that did not exist before development was initiated.

Another effect on the environment is the irreversible or irretrievable commitment of resources as a result of an action. If a federal oil and gas lease is issued, the lease operator has a right to drill, evaluate, and develop oil and gas resources on that lease; therefore, therefore some of the natural resources of the project area will potentially undergo some irreversible or irretrievable loss. The oil and gas resource in the subsurface will be lost as a result of the Proposed Action if the well is productive, but will be not considered within the environmental focus of this document. Once pre-drilling construction begins, irreversible and irretrievable impacts may continue to affect the project area through the culmination of drilling and development (if initial drilling successful), and until complete reclamation of the project area

is achieved. If mitigation and monitoring practices fail to fully meet their intended objectives, the project area may never return to the same or similar state or condition that it would have been in if oil and gas leasing and subsequent drilling and development had not occurred. The irreversible or irretrievable commitment of resources will be discussed in this chapter where appropriate.

Under Alternative C, the “No Action” alternative, the 46 federal CBNG wells would not be approved at this time. Without the productive federal wells in the project area to help remove the water from the Pawnee coal seams in an economically reasonable length of time, the economic feasibility of a CBNG project with just fee and state wells producing would probably need to be reevaluated. It is possible that no further CBNG development would occur under the present natural gas price structure, in which case no additional impact to natural resources would occur in the project area. If CBNG development did proceed without the federal wells being drilled, some impact to the natural resources from the construction of roads, pipelines, utility lines, and water management structures would still take place on the Duck Creek project surface lands, but on a considerably smaller scale due to the reduced amount of infrastructure needed to support fewer producing CBNG wells. Federal lease royalties on the produced federal minerals would be lost, and the lessee will be deprived of the federal gas they have the rights to develop, if the operator is not permitted to develop the CBNG resource in the project area.

4.1 Soils And Vegetation Impacts

The drilling and development of the 46 proposed wells and the Duck Creek CBNG development will directly disturb approximately 71.9 acres of new soils and vegetation areas (Table 4.1) in addition to the existing surface disturbance of 36.6 acres for a total disturbance area of 115.95 acres, not including existing reservoirs. Approximately 29 acres will be short-term disturbance along reclaimed buried utility corridors and reclaimed drilling sites. Approximately 80 acres will be long term (life of un-reclaimed CBNG field), most of which consists of proposed and existing roads.

The direct impact to the soils in the well pad area will consist of topsoil and subsoil removal and stockpiling, soil compaction by construction and operations vehicles, and temporary or long-term modification of the land and drainage contour in the project area. An indirect impact to the soil would be a reduction in the permeability and infiltration properties of the soil due to compaction, thereby increasing water run-off volume and speed, and subsequently increasing erosion potential. Also, due to the breakdown of the natural soil structure due to the loss and disturbance of organic matter in non-compacted stockpile material, these soils will be more susceptible to erosion than if not disturbed. Much of the potential indirect impact to the severe wind erosion hazard soils would be attributed to wind erosion from disturbed surfaces and from stockpiled spoil and topsoil piles. Indirect impacts to the vegetation, wildlife and visual resources would result from the loss of the soil resource or a loss of the ability of the soil in the project area to support healthy vegetative growth.

If the CBNG production in the Duck Creek project proves non-commercial, most of the roads and other disturbance in the project area should be reclaimed as soon as possible. If the project is not approved, no new construction or disturbance should occur. After successful field reclamation is achieved at the end of the Duck Creek CBNG development, the long-term impact from production will eventually be reduced and finally eliminated as the project area returns to its pre-development natural state. Soil loss to erosion is a residual impact that can be reduced by properly implemented mitigation measures. Continued use of roads that did not exist prior to CBNG development might be a residual impact to soils, vegetation, and visual resources in the project area if road use is not properly managed during and after project reclamation is initiated. No irretrievable or irreversible commitment to soil or vegetation resources should occur if soil and vegetation mitigation measures are properly implemented.

The PRB FEIS made predictions regarding the potential impact of produced water to the various soil types found throughout the PRB, in addition to physical disturbance effects. “Government soil experts state that SAR values of only 13 or more cause potentially irreversible changes to soil structure, especially in clayey soil types, that reduce permeability for infiltration of rainfall and surface water flows,

restrict root growth, limit permeability of gases and moisture, and make tillage difficult.” (PRB FEIS page 4-144).

Table 4.1 summarizes the proposed surface disturbance in the Duck Creek Project Area:

Table 4.1 – Surface Disturbance Estimates – Duck Creek Federal CBNG Project					
Component	No.	Description	Length (miles)	Area (ac)	Term
Wells	45	Drill/complete - 2 (5’X15’) pits, soil piles, rig level		2.9	Short
Wells	3	Cut and fill well pad construction required		0.9	Short
Wells	48	Production/Monitor – wellhead, meters		0.3	Long
Roads		Existing improved road (40’ includes 10’ for utilities)	3.7	17.9	Long/Short
Roads		Existing 2-track not in corridor (12’)	8.5	12.4	Long
Roads		Proposed 2-track not in corridor (14’)	1.0	1.7	Long
Road		Existing 2-track (12’) with proposed utility corridor (18’)	7.4	26.9	Long/Short
Roads		Proposed 2-track and utility corridor (30’)	10.65	38.7	Long
Corridor		Proposed corridor not in access (20’)	0.96	2.3	Short
Corridor		Proposed pipeline not in corridor (20’)	0.78	1.9	Short
Power lines		Proposed - within POD	0.55	0.1	Long
Outfalls	8	2 Existing – 6 proposed		0.01	Long
Reservoir	5	Existing			Long
Reservoir	4	Proposed		7.6	Long
Compressor	2	Compressor facilities – In POD		2.0	Long
Facility	1	Central gathering/metering		0.5	Long
		Existing Disturbance Total		36.6	
		Proposed New Disturbance (w/o reservoirs)		71.9	

The designation of the duration of disturbance is defined in the PRB EIS (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”.

Under Alternative C, it is possible that no further CBNG development would occur, in which case no additional surface disturbance to the soil and vegetation resources would occur in the project area. If fee and state CBNG development did proceed without the drilling of federal wells, some surface disturbance to soil and vegetation resources from the construction of roads, pipelines, utility lines, and water management structures would take place on the reduced infrastructure area.

4.1.1 Wetland/Riparian

The PRB FEIS identified effects to gallery forests of mature cottonwood trees stating that “(they) may be lost by bank undercutting caused by the increased surface water flows in channels.” Included in the ROD is programmatic mitigation “which *may be* appropriate to apply at the time of APD approval if site specific conditions warrant.”(PRB FEIS ROD page A-30). One of the conditions included in that section addresses the impact to trees in A.5.8-2: “To reduce adverse effects on existing wetlands and riparian areas, water discharge should not be allowed if increased discharge volumes or subsequent recharge of shallow aquifers will inundate and kill woody species, such as willows or cottonwoods.”(PRB FEIS ROD Page A-32).

“Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges. Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas.” (PRB FEIS Page 4-175).

4.1.2 Invasive Species

Utilization of existing facilities and surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants. However, mitigation as required by BLM-applied COAs and from the applicant-committed weed management program with the landowner(s), should ensure that potential impacts from noxious weeds and invasive plants will be minimal.

4.1.3 Soils and Vegetation Cumulative Impacts

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 an EC 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 relative to this project are anticipated to be minimal for the following reasons:

- x They are proportional to the total amount of water predicted to be produced by the Proposed Action in the Antelope Creek and Dry Fork watersheds and that amount of cumulatively produced water is only approximately 28.6% of the predicted discharge for the total Cheyenne watershed in the year 2003 in the PRB FEIS (see Section 4.5.4).
- x The WDEQ/WQD enforcement of the terms and conditions of the NPDES permit that are designed to protect irrigation downstream.
- x Predicted water quality changes using the mass balance modeling techniques outlined in the PRB FEIS, and actual reported produced water volumes through December 2003, indicate only minor changes to irrigation season EC and SAR values (Table 4.5.4.a)

No additional mitigation measures are required.

4.2 Wildlife

The drilling and development of the 46 proposed wells and the associated CBNG development infrastructure will directly disturb approximately 79.35 new acres of wildlife habitat (Table 4.1).

4.2.1 Big Game Impacts

Under the proposed alternative, pronghorn and mule deer yearlong habitat and mule deer will be disturbed. Big game is likely to be displaced from the project area during infrastructure construction; most individuals are expected to return following construction. Human activities associated with operation and maintenance could also displace big game. Metering will be done at the central facilities visited once or twice per month, greatly reducing site visits and potential big game disturbance. Prompt reclamation is required for all surface disturbances in the project area. Reclamation should minimize habitat loss for big game. Both direct and indirect impacts to big game are analyzed in the PRB FEIS (p. 4-181 to 4-211).

4.2.2 Big Game Cumulative Impact

The cumulative effects associated with Alternative B 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. No additional mitigation measures are required.

4.2.3 Migratory Birds Impact

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migrant birds are those that migrate from wintering grounds to breeding grounds in North America. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (p. 3-151).

Disturbance of prairie and sagebrush habitats within the project area could impact migratory birds. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Produced water is to be discharged into surface drainages; the increased water may increase mosquito breeding habitat and transmission of West Nile Virus. Many migratory bird species, particularly corvids, are susceptible to West Nile Virus. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (p. 4-231 to 4-235).

4.2.4 Migratory Birds Cumulative Impact

The cumulative effects associated with Alternative B 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. No additional mitigation measures are required.

4.2.5 Raptor Impact

The entire project area was surveyed for the presence of raptors and all raptor nest locations were recorded and the nests classified. Eleven intact raptor nests or nest sites were present within 1.5 miles of the project area (Aksamit 2004). None of the nests will be physically disturbed by the proposed action; however, 8 of the 11 recorded nest sites are within ½ mile of proposed construction within the project area. Well A4-5 will be relocated or eliminated due to a raptor nest being located on the proposed well site location. The company is currently evaluating its options.

The wells, discharge points, roads, pipelines, and overhead transmission lines may impact raptors nesting and foraging within the project area. Direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS. Mitigation measures for raptors in the Duck Creek CBNG project area are included in the mitigation measures listed in Section 4.3 below that will also be included in the site-specific COAs for the proposed action.

4.2.6 Raptors Cumulative Impact

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

4.3 Threatened, Endangered and Special Status Species

The following mitigation measures for Threatened, Endangered, Proposed, or Candidate Species were listed in the Duck Creek CBNG Biological Opinion (consultation review, see Attachment 2 – extracted from Powder River Oil and Gas Project (PROGP) Programmatic Biological and Conference Opinion (PBCO), 2002).

Required Mitigation

1. If any dead or injured threatened, endangered, proposed, or candidate species is located during construction or operation, the U.S. Fish and Wildlife Service's Wyoming Field Office (307-772-2374) and law enforcement office (307-261-6365) and BLM Casper Field Office (307-261-7600) shall be notified within 24 hours (T&C1)
2. Operator constructed roads will be designed for a maximum travel speed of 25 mph to minimize road related wildlife mortality (CM11). Maximum travel speeds on operator maintained roads shall not exceed 25 mph.
3. Native seed mixes (selected by landowner, or if requested, by the BLM CFO) will be used to re-establish short grass prairie vegetation during reclamation (T&C19).
4. If any dead or injured sensitive species is located during construction or operation, the BLM Casper Field Office (307-261-7600) shall be notified within 24 hours.
5. The Record of Decision for the Powder River Basin FEIS includes a programmatic mitigation measure that states, "The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time" (M32). The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters.
6. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.
7. No surface disturbing activity will be allowed within ½ mile of all documented raptor nest from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing stipulation affects the entire project area.
8. Surveys to document raptor nest activity in the area shall be conducted between April 15 and June 30. 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 any surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
9. Well metering and other site visits within 0.5 miles of occupied raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.
10. If an undocumented raptor nest is located during project construction or operation, the Casper Field Office (307-261-7600) shall be notified within 24 hours.
11. If a raptor nest within 0.5 miles of the project is determined to be occupied, nest occupancy checks shall be completed for the first five years following project completion. The occupancy check 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 Casper BLM biologist in writing no later than July 31 of each survey year.
12. If a mountain plover is located during project construction or operation, the Casper Field Office (307-261-7600) shall be notified within 24 hours.
13. If a mountain plover nest is documented, the following conditions shall apply:

- A. A seasonal disturbance-free buffer zone of 0.25 mile will be maintained around all active mountain plover nest sites outside of black-tailed prairie dog towns between March 15 and July 31 (T&C13).
- B. Documented nesting areas will be surveyed for five years following project completion. Surveys will be conducted by a BLM approved biologist and follow the most current version of the Service's Mountain Plover Survey Guidelines (USFWS 2002 or most current version).
- C. Maximum allowed travel speed on roads within 0.5 mile of identified mountain plover nesting areas shall not exceed 25 miles per hour from March 15 to July 31 (T&C17). Work schedules and shift changes should be set to avoid the periods from one-half hour before to one-half hour after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active T&C22).
- D. No dogs will be permitted at work sites to reduce the potential for harassment of plovers (T&C23).

Recommended Mitigation

- x Remote technology (telemetry, central metering facility, etc.) should be utilized to reduce human activities which are potentially disturbing to wildlife.

4.3.1 Threatened and Endangered Species Impact

4.3.1.1 Bald Eagle

The proposed Duck Creek CBNG project will result in an adverse affect to the bald eagle through the development of the proposed action. Bald eagles forage opportunistically throughout the PRB including the project area. The presence of overhead power lines may adversely affect foraging bald eagles. Measures have been included in the project design to minimize the risk, such as building overhead power lines to raptor safe standards, and access roads are proposed to remain 2-track with a 25 mph maximum speed design criterion to be included as a COA for future development/improvement of roads in the project area. Despite the lack of special habitats and the mitigation measures added to reduce impacts, some risk of harm remains (BLM BA 2004).

The FWS Duck Creek CBNG BO is also tiered to the Incidental Take Statement (ITS) accompanying the FWS PBO for the Powder River Oil and Gas Project. The Duck Creek CBNG project is a component of the approximately 7,136 miles of new improved roads and 5,311 miles of overhead power lines identified in the PBCO. This total level of affect has been anticipated to cause the incidental take of up to four bald eagles within the Powder River Oil and Gas Project. The FWS has determined that the following Reasonable and Prudent Measures (RPMs) contained in the ITS accompanying the PBCO are needed to minimize the effects of the anticipated take:

- x RMP 1: The BLM shall ensure implementation of all conservation measures identified and committed to as part of the proposed action (fully described in September 3, 2002 Final Biological Assessment (FBA) for the Powder River Oil and Gas Project.
- x RMP 2: The BLM shall ensure direct habitat disturbance does not exceed that discussed in the FBA and evaluated in the FWS Duck Creek CBNG BO. Through minimization and monitoring of direct habitat disturbance, indirect disturbance to the species will also be minimized.
- x RMP 3: Reduce the possibility of vehicular collision with bald eagles, including reducing the amount of carrion present as a result of vehicular collision to discourage foraging by bald eagles.
- x RMP 4: Reduce the possibility of electrocutions of bald eagles.

No additional RPMs are necessary or appropriate to minimize the effects of the anticipated incidental take. The FWS attached a non-discretionary list of applicable Terms and Conditions (T&Cs) for BLM compliance in order to be exempt from section 9 of the ESA. The T&Cs are attached (Attachment 1)

to this document and are included as an attachment to the FWS Duck Creek Federal CBNG BO. The following is a list of mitigation measures (not included in Section 4.3 list above) to be included as site-specific operator COAs for the Proposed Action:

- x Power lines will be built to standards identified by the Avian Power line Interaction Committee (1996) to minimize electrocution potential. Moreover power lines will be built to the additional specification (see T&C 6, Attachment1):

For new distribution lines and facilities:

- A. Bury distribution lines where feasible.
- B. Raptor-safe structures (e.g., with increased conductor-conductor spacing) are to be used that provide adequate spacing for bald eagles (i.e. minimum 60" for bald eagles).
- C. Equipment installations (overhead service transformers, capacitors, reclosers, etc.) are to be made bald eagle safe (e.g., by insulating the bushing conductor terminations and by using covered jumper conductors).
- D. Jumper conductor installations (e.g. corner, tap structures, etc.) are to be made bald eagle safe by using covered jumpers or providing adequate separation.
- E. Employ covers for arrestors and cutouts, when necessary.
- F. Lines should avoid high avian use areas such as wetlands, prairie dog towns, and grouse leks.

For modification of existing facilities:

- A. Existing structures, such as dead ends, tap or junction poles, transformers, reclosers and capacitor banks or other structures with less than 60" between conductors or a conductor and ground will need to be retrofitted to provide adequate spacing for bald eagles (i.e. minimum 60" for bald eagles).
 - B. Cover exposed jumpers
 - C. Gap any pole top ground wires
 - D. Isolate grounded guy wires (install insulating link)
 - E. On transformers, install insulated bushing covers, covered jumpers, and cutout covers and arrestor covers, if necessary
 - F. If bald eagle mortalities occur on existing lines and structures, bald eagle protection measures are to be applied (e.g. modify for raptor-safe construction, install safe perches or perching deterrents, nesting platforms or nest deterrent devices, etc.)
 - G. In areas where midspan collisions are a problem, install line-marking devices that have been proven effective. All transmission lines that span streams and rivers, should maintain proper spacing and have markers installed
- x A minimum year-round disturbance-free buffer zone (no surface occupancy (NSO)) of 0.5 mile will be established for all bald eagle nests. An alternative would be development of a site management plan, as discussed in the GYBEWG and the MBEWG, by the BLM (with the cooperation and approval of the FWS) for each bald eagle nest or winter roost site. Each site management plan will include the following zones: Zone 1 (Occupational Nesting Zone), Zone 2 (Primary use areas), and Zones 3 (home ranges). The BLM will restrict and monitor the types of activities to occur within each of these zones. No surface occupancy or use is allowed within 0.5 miles of known bald eagle nest sites which have been active within the past 5 years.

- x A seasonal disturbance-free buffer zone of 1 mile will be established for all bald eagle nests (February 15 - August 15). This buffer zone and timing may be adjusted based on site specific information through coordination with and with written concurrence of the Service's Wyoming Field Office.
- x A year-round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle roost sites. This buffer zone restriction may be adjusted based on site specific information through coordination with and with written concurrence of the FWS Wyoming Field Office.
- x An additional seasonal buffer zone of 0.5 mile will be established for all bald eagle roost sites (November 1 - April 1). This buffer zone will start at the outside boundary of the 0.5 mile year-round disturbance-free buffer zone and extend out an additional 0.5 mile. However, within this seasonal buffer zone less restrictive measures such as remote monitoring of wells and/or restricting well maintenance visitations or human activity critical to project operations to between 9:00 AM and 3:00 PM may be allowed after coordination with the FWS's Wyoming Field Office and a demonstration that measures more protective of bald eagles are not reasonable or feasible.
- x Nest productivity monitoring will be conducted by the BLM or a BLM-approved biologist in areas with high levels of development (i.e., areas with greater than or equal to 4 well pads/section) within 1 mile of a bald eagle nest between March 1 and mid-July to determine nesting success (i.e., number of nestlings/fledglings per nest).
- x Appropriately-timed surveys for active bald eagle nests and winter roost sites will be conducted within 1 mile of proposed actions prior to permit (i.e. Application for Permit to Drill/POD, Right-of-way grants, or Sundry Notices) approval.

4.3.2 Sensitive Species Impact

4.3.2.1 Greater Sage Grouse

Potential nesting habitat may occur in scattered sagebrush communities along the northern portion of the project area. However, no sage grouse have been documented within the project area. Sage grouse droppings were believed to be found at one location within the project area. Subsequent visits have failed to document any additional sage grouse sign. If sage grouse do utilize this area, use is limited due to the amount of available habitat present. Sage grouse, if present, may be displaced from the project area during infrastructure construction; most individuals are expected to return following construction. Human activities associated with operation and maintenance could also displace sage grouse temporarily.

4.3.3 Sensitive Species Cumulative Impact

The cumulative effects associated with Alternative B 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. No additional mitigation measures are required.

4.4 West Nile Virus

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

disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNV species and its effects in Wyoming.

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

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

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

4.5 Water Resource

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 Antelope Creek and Dry Fork Cheyenne watersheds 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 Wyoming State Engineers Office (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 30 gpm per well or 1620 gpm (3.61 cfs or approximately 2600 acre-feet per year) for this POD. As of December 2003 the average water production for wells in the Antelope Creek Watershed was 7.9 gpm and for the Upper Cheyenne was 4.2 gpm, according to data obtained from the Wyoming Oil and Gas Conservation Commission web site. 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 Antelope Creek drainage basin, the projected volume produced within the watershed area was 17,685 acre-feet and for the Upper Cheyenne 8,365 acre-feet in 2004. As such, the volume of water resulting from the production of these wells is 28.6% of the total volume projected for the Cheyenne River for 2003. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.5.1 Groundwater Impact

The PRB FEIS predicts 28% of the CBNG produced water will recharge groundwater aquifers and coal zones in the Antelope Creek drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 35 gpm will infiltrate at or near the discharge points and impoundments. 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 p. 4-54). Analyses of impacts to changes in groundwater quality resulting

from coal mining in the Antelope Creek Drainage (WDEQ 2001) near this POD indicate: “Initially, TDS concentrations may increase in the backfill aquifer. However, with time, the TDS concentrations will decrease and approach pre-mine groundwater quality. Even with the changes in TDS and other constituents, groundwater quality in most instances has the same use classification as the pre-mine groundwater.” It is likely that the infiltration of CBM produced water will have effects similar to the recharge of backfill areas near the coal mines. Therefore, the chemical nature and the volume of the discharges water will not degrade the antecedent groundwater.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBNG 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 in the water wells in the area. The 2003 Annual Report of the Gillette Area Groundwater Monitoring Organization indicates that changes to groundwater levels in the vicinity of the proposed POD have already occurred. Impacts from development of CBNG wells in this POD will be in addition to any impacts that have already occurred as a result of coal mining in the area. The permitted water wells in the area produce from zones above, below and in the targeted coal bed natural gas producing zones. 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 any potential fresh water aquifers above the target coal zone. This will ensure that ground water will not be adversely impacted by well drilling and completion operations.

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

As a COA of the approval of the Duck Creek Federal POD, Comet shall be responsible for drilling, completing, and equipping a set of monitoring wells, as described in the *BLM CBNG Monitor Well Stipulations* (Attachment 4). The specific location will be determined in consultation with the BLM, and may only be drilled in a location where the oil and gas mineral estate is owned by the federal government.

Shallow ground water monitoring is ongoing at several 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.

However, site characteristics can be compared between the proposed impoundments in the Duck Creek POD and the currently most intensively monitored site along Beaver Creek which is showing elevated constituents in sub-surface water bearing zones. The sites differ in that the some of the reservoirs associated with the Duck Creek POD are existing structures which have impounded natural run-off events for many years. Alluvial materials in and around these existing impoundments have been subjected to

numerous leaching volumes over the years, and should not contribute elevated levels of dissolved solids as a result of the infiltration of CBM produced water.

4.5.2 Groundwater Cumulative Impact

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

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

4.5.3 Surface Water Impact

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS EIS pg 4-69). The water quality projected for this POD is less than 500 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS).

A maximum volume of 30 gallons per minute (gpm) is projected is to be produced from these 54 wells, for a total of 1620 gpm for the POD. The quality for the water produced from the Upper and Lower Pawnee target coal zones from these wells is predicted to be similar to the water quality samples collected from the Reynolds D1-8 & D3-8 presented in the Water Management Plan for the POD. That water quality was determined to be 485 to 765 µmhos/cm EC, 270 to 440 mg/l total dissolved solids (TDS) and 1.5 to 2.5 SAR. By comparison DEQ 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 and 5000 mg/l for Livestock Use. For more information, please refer to the Water Management Plan (WMP) included in this POD.

Based on the onsite review of 9 discharge points, they have been appropriately sited and utilize appropriate water erosion dissipation design. The anticipated total maximum volume of water discharged in this POD is 1620 gpm. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite inspection.

The operator has obtained WDEQ NPDES Permit WY0052264 for the discharge of water produced from this project. The permit effluent limits were set at the following:

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 8.5
Total Dissolved Solids	5000 mg/l max
Specific Conductance	2000mg/l max
Sulfates	3000 mg/l max

Chlorides	46 mg/l max
SAR	10
Radium 226	1 pCi/l max
Dissolved iron	1000 µg/l max
Dissolved manganese	910 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	2.4 µg/l max
Total Flow	2.2 MGD

Water produced in association with this POD will be directly discharged at 8 outfall points as permitted by WDEQ NPDES permit WY0037052. The NPDES permit was issued under option 2 of the coal bed methane permitting options. Under this permitting option, the produced water is immediately discharged to a class 2 or class 3 receiving stream, which is eventually a tributary to a class 2AB perennial water of the state. The permit establishes effluent limits for the end of pipe, which are protective of all the designated uses defined in Chapter 1 of Wyoming Water Quality Rules and Regulations. The daily maximum flow for this facility is 2.2 million gallons/day (MGD) and must be monitored monthly. The permit limits total petroleum hydrocarbons to 10 mg/l and must be monitored yearly. The pH must remain within 6.5 and 8.5 standard units. Effluent limits for total dissolved solids (5,000 mg/l) and sulfates (3,000 mg/l) are included to protect stock and wildlife watering. In order to monitor and regulate coal bed methane discharge for compliance with Chapter 1, Section 20 (protection of agricultural water supply), effluent limits for sodium adsorption ratio (SAR) and specific conductance are included in this permit. The Wyoming DEQ has determined that a SAR of 10 and specific conductance of 2,000 micromhos/cm is intended to be protective of agriculture use in the Belle Fourche and Cheyenne River drainages.

The discharge of wastewater and the effluent limits that are established in this permit have been reviewed by the WDEQ to ensure the levels of water quality necessary to protect the designated uses of the receiving waters are maintained and protected. An antidegradation review was conducted by WDEQ and verifies that the permit conditions, including the effluent limitations established, provide a level of protection to the receiving water consistent with the antidegradation provisions of the Wyoming surface water quality standards.

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 2004 at a total contribution to the main stem of the Antelope Creek Drainage of 13 cfs (PRB FEIS EIS pg 4-81) and 19 cfs to the Upper Cheyenne. The predicted maximum discharge rate from the 54 wells in this POD anticipated to be a total of 1620 gpm or 3.61 cfs. Using an assumed conveyance loss of 20% (PRB FEIS EIS pg 4-74), this action may add a maximum 2.89 cfs to Dry Fork Cheyenne River (tributary to Upper Cheyenne), or 15.2% of the predicted total CBNG produced water contribution. The addition of the water produced from these wells will not significantly impact the water quantity in the Upper Cheyenne watershed. Furthermore, as presented in the Duck Creek POD WMP, it is not anticipated that any water will leave the project area. For more information regarding the maximum predicted water impacts to the Powder River resulting from the discharge of produced water, see Table 4-6 (PRB-EIS pg 4-85).

The proposed method for surface discharge provides passive treatment through the aeration supplied by the energy dissipation configuration at each discharge point outfall. Aeration adds dissolved oxygen to the produced water that 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 quality for the water produced from the Upper and Lower Pawnee coal zones is predicted to be similar to the sample water quality collected from a location in the POD. That water quality was determined to be 485 to 765 µmhos/cm electrical conductivity (EC), 270 to 440 mg/l total dissolved solids (TDS) and 1.5 to 2.5 sodium adsorption ratio (SAR). For comparison to existing and proposed surface water and groundwater quality in the area, the criteria applied in the evaluation of waters discharged to the Antelope Creek Watershed under the preferred alternative (2A) in the PRB FEIS (pg 4-73, 4-85 and Appendix B) are listed below in Table 3: Comparison of Regulated Water Quality Parameters to Predicted Water Quality.

Table 4.5.3b - Comparison of Regulated Water Quality Parameters to Predicted Water Quality			
Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit		10	2000
Least Restrictive Proposed Limit	5000	10	2500
Primary Watershed at Antelope Creek Near Teckla, WY Gauging station			
Historic Data Average at Max Flow		2.8	1,800
Historic Data Average at Min Flow		2.6	2,354
Cheyenne River nr Riverview, WY Gauging Station			
Historic Data Average at Mean Monthly Flow		8.7	4,127
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 Requirement for NPDES Permit # WY0052264			
At discharge point	5,000	10	2,000
Predicted Produced Water Quality			
Coal Zones 1 & 2 combined	355	2.0	625

In order to determine to 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 designated a reference well to each coal zone within the POD boundary. The well was sampled for analysis and a copy of the water analyses is included in the WMP.

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.

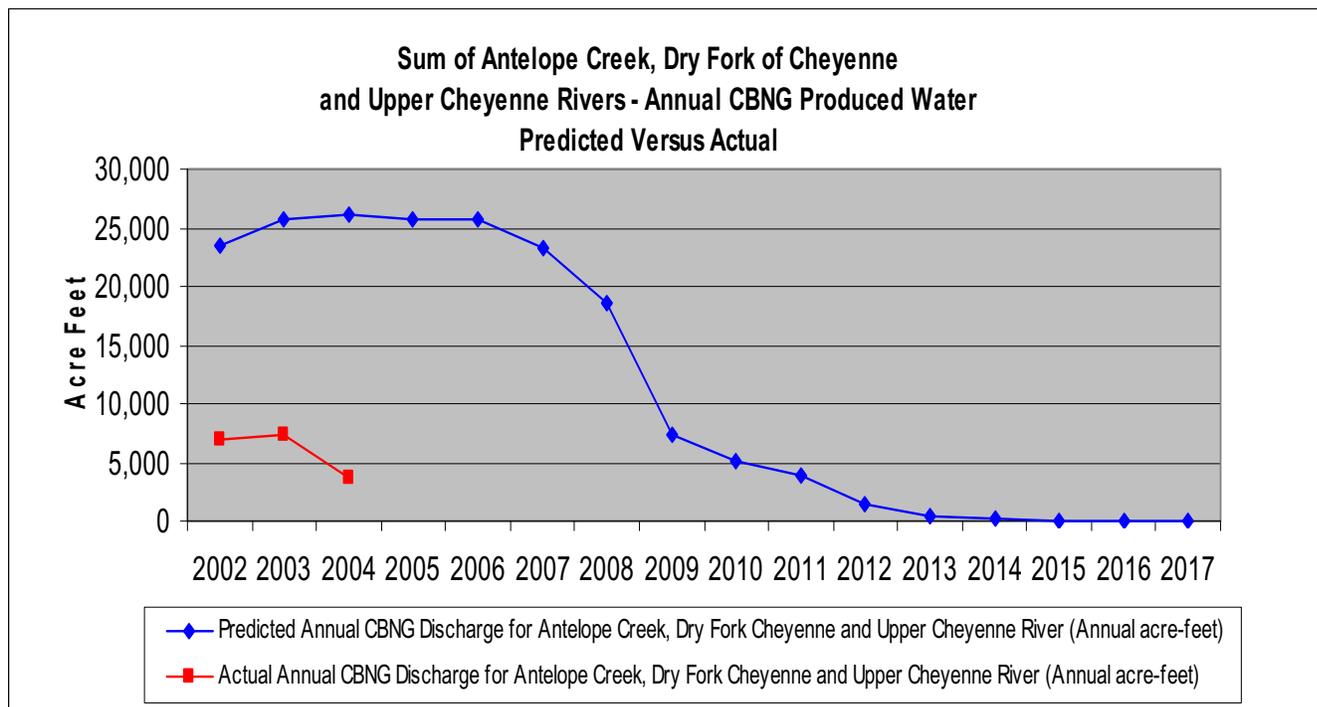
4.5.4 Surface Water Cumulative Impact

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

As of December 2003, all producing CBNG wells in the Cheyenne River watershed (including the Upper Cheyenne, Dry Fork Cheyenne and Antelope Creek) discharged an annual volume of 7,371 acre-ft of

water compared to the predicted 25,692 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.4 following. This volume is 71% less than the annual predicted produced water analyzed in the PRB FEIS for the Cheyenne River watershed.

Figure 4.1 Actual vs predicted water production in the Cheyenne River.



Year	Predicted Water Production (Annual acre-feet)	Actual Water Production (Annual acre-feet)	Predicted Cumulative Water Production (Acre-feet starting 2002)	Actual Cumulative Water Production (acre-feet starting 2002)	Percentage Actual vs. Predicted Cumulative Water Production
2002	23,438	7,028	23,438	7,028	30%
2003	25,692	7,370	49,130	14,399	29%
2004	26,050	3,722	75,180	18,121	24%
2005	25,778		100,958		
2006	25,613		126,571		
2007	23,182		149,753		
2008	18,510		168,273		
2009	7,370		175,633		
2010	5,030		180,663		
2011	3,969		184,632		
2012	1,398		186,030		
2013	488		186,518		
2014	167		186,685		
2015	54		186,739		
2016	17		186,756		
2017	4		186,760		
Total	186,760	18,121			

The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Conductivity (EC) and Sodium Adsorption Ratio (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 BLM requires each POD approved under the PRB FEIS to have a designated reference well to be sampled within 60 days of initial production. There is also a series of monitoring wells that are providing additional data. This new data will be evaluated periodically to assess effects.

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 relative to this project are anticipated to be minimal for the following reasons:

- x They are proportional to the total amount of water predicted to be produced in the Cheyenne River watershed and that amount of cumulatively produced water is only approximately 30% of the total predicted in the PRB FEIS.
- x The WDEQ/WQD enforcement of the terms and conditions of the NPDES permit that are designed to protect irrigation downstream.
- x As described in the Duck Creek WMP water balance analyses, it is not anticipated that any discharged water will leave the project area.

4.6 Cultural Resources Impact

If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operations in the project area, they will be left intact and the Casper Field Manager notified. Further discovery procedures are explained in the Conditions of Approval (General) (III)(A)(1). If the cultural resource mitigation and monitoring measures are properly applied, there should be no direct impact to the cultural resources in the project area, and no residual, irretrievable, or irreversible impacts should occur to the cultural resources in the project area.

4.7 Air Quality

Wind erosion from disturbed soil surface areas associated with construction of the well pads, infrastructure facilities, roads, pipelines or WMP components is a potential source of wind-blown dust. 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. The applied soil and vegetation mitigation measures contained in the Comet MSUP and the applied soil and vegetation mitigation measures included as COAs should reduce the potential for air contamination from wind-blown soils.

If surface disturbance areas are promptly reclaimed as soon as possible after utility corridors or well pad areas are removed from active use, there should be no long-term impact to the air quality in these areas in the foreseeable future.

There should be no residual, irretrievable or irreversible impacts to the air quality in the project area if the CBNG production in the project area is not commercially viable and the surface disturbance areas are promptly reclaimed or if the project is not approved and the construction disturbance does not occur.

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at On-site
Jeff Reynolds	Representative	Reynolds Ranches	Yes
Kent Fink	Operations Mgr.	Comet Energy Services	Yes
Jim Aksamit	Representative	Western Land Services	Yes
Allen Aksamit	Wildlife Biologist	Western Land Services	Yes
Mark Deibert	Resource Specialist	Western Land Services	Yes
Mike Brogan	Hydrologist	BLM	Yes
Ken McMurrough	Physical Scientist	BLM	Yes
Jim Wright	Wildlife Biologist	BLM	Yes
Jodi Bush	Asst. Field Supv.	U.S. Fish and Wildlife	No
Brad Rogers	Wildlife Biologist	U.S. Fish and Wildlife	No

6. OTHER PERMITS REQUIRED

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

7. REFERENCES AND AUTHORITIES

U. S. Code of Federal Regulations (CFR)

- x 40 CFR All Parts and Sections inclusive Protection of Environment, Revised as of July 1, 2001.
- x 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2000.

The Endangered Species Act of 1973, Section 7(a)(2), as amended (50 CFR 402.14)

The Federal Land Policy and Management Act, as amended. Public Law 94-579. U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001.

The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).

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8. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS

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Ellen Burris, Legal Land Examiner
Sherry Grose, Legal Assistant
Lloyd Wright, Petroleum Engineer

Chris Arthur, Archaeologist
 Bob Specht, Geologist
 Jim Wright, Wildlife Biologist
 Patrick Moore, Assistant Field Manager, Mineral and Lands

9. LIST OF ACRONYMS AND ABBREVIATIONS USED

American Petroleum Institute	API
Area of Critical Environmental Concern	ACEC
Application for Permit to Drill	APD
Best Management Practices	BMP
Biological Assessment	BA
Biological Opinion	BO
Bureau of Land Management	BLM
Carson, Dale (Landowner)	Carson
Casper Field Office	CFO
Coal Bed Methane	CBM
Coal Bed Natural Gas	CBNG
Condition(s) of Approval	COA(s)
Comet Energy Services, LLC	Comet
Controlled Surface Use	CSU
Cubic Feet Per Second	cfs
Drilling Plan	DP
Duck Creek Federal CBNG Project	Duck Creek
Electrical Conductivity ($\mu\text{mhos/cm}$)	EC
Endangered Species Act	ESA
Environmental Assessment	EA
Environmental Impact Statement	EIS
Final Environmental Impact Statement and Resource Plan Amendment (PRBOGP)	- FEIS
Gallons Per Minute	gpm
In-channel Discharge	ICD
Incidental Take Statement (FWS PBO)	IT
Land Application Disposal	LAD
Leafy Spurge	LS
Master Surface Use Plan	MSUP
Milligrams per Liter	mg/l
Million Gallons Per Day	MGD
Monitoring, Mitigation, and Reporting Plan	MMRP
National Environmental Policy Act	NEPA
National Pollution Discharge Elimination System	NPDES
No Surface Occupancy	NSO
Plan of Development	POD
Powder River Basin	PRB
Powder River Basin Oil and Gas Project	PRBOGP
Platte River Resource Area	PRRA
Programmatic Biological and Conference Opinion (FWS, Dec. 17, 2002)	- PBCO
Reasonable and Prudent Measure(s) (FWS PBO)	RMP(s)
Record of Decision	ROD
Resource Management Plan(s)	RMP(s)
Reynolds, Jeff (Landowner - Reynolds Ranch)	Reynolds
Sodium Adsorption Ratio	SAR
Terms and Conditions (FWS PBO)	T&C

Threatened and Endangered Species	T&E
Total Dissolved Solids	TDS
U.S. Corps of Engineers	(COE)
U.S. Department of the Interior	DOI
U.S. Fish and Wildlife Service	FWS
U. S. Geological Service	USGS
Water Management Plan	WMP
West Nile Virus	WNV
Wyoming Department of Environmental Quality	WDEQ
Wyoming Game and Fish Department	WGFD
Wyoming Oil and Gas Conservation Commission	WOGCC
Wyoming State Engineer's office	WSEO

/s/ Patrick Moore
Assistant Field Manager, Mineral and Lands
Casper Field Office

January 3, 2005
Date

Attachment 1: Duck Creek Federal CBNG Development, Biological Assessment (informal consultation initiation letter to U.S. Fish and Wildlife Service), U. S. Department of the Interior, Bureau of Land Management, Casper Field Office, November 22, 2004.

(On file at the Casper Field Office.)

Attachment 2: U. S. Department of Interior, U.S. Fish and Wildlife Service, Duck Creek Federal Coal Bed Natural Gas Plan-of-Development Review, Biological Opinion, Wyoming Field Office, December 15, 2004.

(On file at the Casper Field Office.)

Attachment 3: BLM CBNG Monitor Well Drilling Stipulations

(On file at the Casper Field Office.)

Attachment 4: On-site Inspection Photographs

(On file at the Casper Field Office.)