FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Coleman Oil & Gas, Inc.
Leavitt Federal POD
ENVIRONMENTAL ASSESSMENT –WY-070-08-170

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Coleman Oil & Gas, Inc.'s Leavitt Federal Coal Bed Natural Gas (CBNG) POD comprised of the following 18 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	LEAVITT	12-5	SWNW	5	42N	72W	WYW139640
2	LEAVITT	21-5	NENW	5	42N	72W	WYW139640
3	LEAVITT	12-6	SWNW	6	42N	72W	WYW139640
4	LEAVITT	21-6	NENW	6	42N	72W	WYW139640
5	LEAVITT	23-6	NESW	6	42N	72W	WYW139640
6	LEAVITT	31-6	NWNE	6	42N	72W	WYW139640
7	LEAVITT	32-6	SWNE	6	42N	72W	WYW139640
8	LEAVITT BRIDLE BIT RANCH	14-18	SWSW	18	42N	72W	WYW141649
9	LEAVITT BRIDLE BIT RANCH	31-18	NWNE	18	42N	72W	WYW140779
10	LEAVITT BRIDLE BIT RANCH	41-18	NENE	18	42N	72W	WYW140779
11	LEAVITT BRIDAL BIT RANCH	12-25	SWNW	25	42N	73W	WYW139653
12	LEAVITT BRIDAL BIT RANCH	14-25	SWSW	25	42N	73W	WYW141652
13	LEAVITT BRIDAL BIT RANCH	21-25	NENW	25	42N	73W	WYW139653
14	LEAVITT BRIDAL BIT RANCH	23-25	NESW	25	42N	73W	WYW141652
15	LEAVITT BRIDAL BIT RANCH	31-25	NWNE	25	42N	73W	WYW141652
16	LEAVITT BRIDAL BIT RANCH	32-25	SWNE	25	42N	73W	WYW141652
17	LEAVITT BRIDAL BIT RANCH	34-25	SWSE	25	42N	73W	WYW141219
18	LEAVITT BRIDAL BIT RANCH	43-25	NESE	25	42N	73W	WYW139653

The following impoundment locations were inspected and approved for use in association with the water management strategy for the POD. These impoundments were designated a secondary in the WMP, therefore they will not be used until a sundry is submitted to the BLM along with proof of bonding.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	Red	NWNE	25	42	73	35.24	6.2	WYW 141652
2	Res 13-30	NWSW	30	42	72	10	3.5	WYW 143941

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

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

1. The Operator, in their POD, has committed to:
    - Comply with all applicable Federal, State and Local laws and regulations.
    - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
    - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
    - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.

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

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

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

Field Manager:_____ Date: _____

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Coleman Oil & Gas, Inc.
Leavitt Federal POD
PLAN OF DEVELOPMENT
WY-070-08-170

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to produce coal bed natural gas (CBNG) on 6 federal oil and gas mineral leases issued to the applicant by the BLM.

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Coleman Oil & Gas, Inc.'s Leavitt Federal Plan of Development (POD) for 19 coal bed natural gas well APDs and associated infrastructure.

Proposed Well Information: There were 19 wells proposed within this POD; the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from the Wyodak coal seam. Proposed well house dimensions are 6ft wide x 6ft length x 6ft height. Well house color is Covert Green (18-0617 TPX), selected to blend with the surrounding vegetation. Proposed wells are located as follows:

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	LEAVITT	12-5	SWNW	5	42N	72W	WYW139640
2	LEAVITT	21-5	NENW	5	42N	72W	WYW139640
3	LEAVITT	12-6	SWNW	6	42N	72W	WYW139640
4	LEAVITT	21-6	NENW	6	42N	72W	WYW139640
5	LEAVITT	23-6	NESW	6	42N	72W	WYW139640
6	LEAVITT	32-6	SWNE	6	42N	72W	WYW139640
7	LEAVITT	41-6	NENE	6	42N	72W	WYW139640
8	LEAVITT BRIDLE BIT RANCH	14-18	SWSW	18	42N	72W	WYW141649
9	LEAVITT BRIDLE BIT RANCH	21-18	NENW	18	42N	72W	WYW140779
10	LEAVITT BRIDLE BIT RANCH	32-18	SWNE	18	42N	72W	WYW140779
11	LEAVITT BRIDLE BIT RANCH	41-18	NENE	18	42N	72W	WYW140779
12	LEAVITT BRIDAL BIT RANCH	12-25	SWNW	25	42N	73W	WYW139653
13	LEAVITT BRIDAL BIT RANCH	14-25	SWSW	25	42N	73W	WYW141652
14	LEAVITT BRIDAL BIT RANCH	21-25	NENW	25	42N	73W	WYW139653
15	LEAVITT BRIDAL BIT RANCH	23-25	NESW	25	42N	73W	WYW141652
16	LEAVITT BRIDAL BIT RANCH	32-25	SWNE	25	42N	73W	WYW141652
17	LEAVITT BRIDAL BIT RANCH	34-25	SWSE	25	42N	73W	WYW141219
18	LEAVITT BRIDAL BIT RANCH	41-25	NENE	25	42N	73W	WYW141652
19	LEAVITT BRIDAL BIT RANCH	43-25	NESE	25	42N	73W	WYW139653

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

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	Red	NWNE	25	42	73	35.24	6.2	WYW 141652
2	Res 13-30	NWSW	30	42	72	10	3.5	WYW 143941

County: Campbell

Applicant: Coleman Oil & Gas, Inc.

Surface Owners: Jerry Dilts, Richard W. Leavitt Trust

Project Description:
The proposed action involves the following:

- Drilling of 19 total federal CBNG wells in the Wyodak coal seam to depths ranging from 890 to 1125 feet. A single well bore will be installed at each location.

- Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.

- Well metering shall be accomplished by telemetry and well visitation. Metering would entail 8 to 10 visits per month to each well.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: all water produced as a result of CBNG operation will be directly discharged at 12 discharge points (5 existing, 7 proposed) directly into area stream channels and a portion of the water can be stored in 2 existing stock reservoirs within the Antelope Creek watershed.

- An unimproved and improved road network.

- An above ground power line network to be constructed by a contractor. A total of 6.85 miles of overhead powerlines will be installed for Coleman's fee, federal and State CBNG development in the general area. Only 0.28 miles of overhead power fall within the POD boundary. The proposed route has been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. Power line construction has not been scheduled and will not be completed before the CBNG wells are producing. Until overhead power is operational, portable generators may be placed at 9 proposed power drops (1 within the POD boundary in Sec. 6) to provide initial power for the submersible pumps.

- A storage tank of 1000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for approximately six to twelve months. Fuel deliveries are anticipated to be two times per week. Noise level is expected to be 74.6 decibels at 100 feet distance.

- A buried gas, water and power line network. All electrical lines in Sec. 18 and 25 will be placed underground.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

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

2.3.1. Changes as a result of the on-sites

Well#	Aliquot	Sec	T/R	Notes
32-25	SWNE	25	42/73	The well location was moved approx. 90ft N/NW, closer to the main access road. The water line and outfall were also relocated to accommodate the new well location. The associated water infrastructure will now be placed closer to the dam embankment of the Red Reservoir, upstream from the previous location. The pipeline corridor between 32-25 and 41-25 was rerouted to follow the existing primitive access road. A segment of this corridor will cross the adjacent creek/bottom channel.
21-25	NENW	25	42/73	Due to the location's upland/summit location and exposure to potential wind erosion, a 30-day interim reclamation and site stabilization COA will be implemented.
43-25	NESE	25	42/73	Well location moved approx. 90ft S, closer to the main access road. Due to the fragility of the location's soils, a 30-day interim reclamation and site stabilization COA will be implemented. The proposed pipeline/utility corridor heading NW to the 32-25 well location was rerouted. It will follow the existing primitive road between the 43-25 and 34-25 well locations.
23-25	NESW	25	42/73	The reserve pit was moved to maintain a safe distance from the adjacent creek channel. Due to the fragility of the location's soils, a 30-day interim reclamation and site stabilization COA will be implemented. The operator will place drilling equipment & infrastructure away from the dense sagebrush & creek drainage.

Well#	Aliquot	Sec	T/R	Notes
12-25	SWNW	25	42/73	Well location moved approx. 90ft S/SE, to an open grass pocket. The operator will rotate drilling equipment/infrastructure on location to avoid disturbance of adjacent sagebrush. The access road/utility corridor will be moved slightly to accommodate the new well location. To avoid disturbance of sagebrush along the proposed access route, the operator will be allowed a maximum working width of 30ft with a blading/clearing width not to exceed 15ft.
14-25	SWSW	25	42/73	Rerouted the access corridor to follow the edge the location's sagebrush. To avoid disturbance of sagebrush along the proposed access route, the operator will be allowed a maximum working width of 30ft with a blading/clearing width not to exceed 15ft.
41-25	NENE	25	42/73	The well location was moved approx. 690ft W/SW, outside of the line-of-sight and ¼ mile buffers of active raptor nests. The new well location is slightly sloped and may require additional earthwork to accommodate drilling equipment. Due to the fragility of the location's soils, a 30-day interim reclamation and site stabilization COA will be implemented. No major changes were made to N/NE utility corridor. However, the operator will reroute the corridor in some areas to avoid erosion features and sagebrush disturbance. New well location number: 31-25.
14-18	SWSW	18	42/72	Due to reclamation potential and erosion concerns, a 30-day interim reclamation and site stabilization COA will be implemented, specifically from the well location to PCULV 21-19.
41-18	NENE	18	42/72	Rerouted the access corridor to follow the existing primitive access road. Due to the fragility of the location's soils and poor reclamation potential, a 30-day interim reclamation and site stabilization COA will be implemented.
32-18	SWNE	18	42/72	The well location was dropped due to highly erosive soils and poor reclamation potential.
21-18	NENW	18	42/72	Well location dropped due to wildlife concerns. The well location was within the line-of-sight as well as within the 1/4 mile buffer of a raptor nest. No suitable locations not within line-of-sight were found. This well location was replaced by the 31-18 well location. The 31-18 sits on top of a ridge/summit located across the drainage, N/NE of well location 21-18. The access corridor will be sited along the fence line W of the 41-18 well location.

Well#	Aliquot	Sec	T/R	Notes
21-5	NENW	5	42/72	The well location was moved approx. 90ft S/SW, outside of the sagebrush stand and closer to the main access road. The new location sits within an open grass pocket surrounded by a sagebrush perimeter. The access road and pipeline corridor were rerouted to follow the existing main access road The access corridor will follow the existing road and T-off to follow the road towards the 12-5 well location.
12-5	SWNW	5	42/72	The well location was moved approx. 470ft N/NE along the existing access road. A similar "eye brow" location was found. The original location was within line-of-sight and within the 1/4 mile buffer of a raptor nest. The proposed discharge point and waterline were also moved to be in line with the new well location.
23-6	NESW	6	42/72	Rerouted the access/pipeline corridor to follow the existing primitive access road from the 12-5 well location.
12-6	SWNW	6	42/72	The grade of the access road is approx. 9% and climbs approx. 150yds to the well location. A minimum of 2 inches of aggregate (gravel) will be added across the width of the primitive road (approx. 10ft) to prevent soil erosion and accommodate safe, environmentally-sound access.
21-6	NENW	6	42/72	The proposed well was located within high quality sage grouse breeding habitat and in close proximity to a lek. The operator moved the well location approx. 490ft W/SW to a nearby clearing and outside of the area of concern. The access road and pipeline corridor will be rerouted within the open grass pockets along the edge of the sagebrush. The proposed route will connect with the main access road at a location west of the proposed discharge point.
41-6	NENE	6	42/72	The original well location was situated within less than 300 feet of a well-maintained ferruginous hawk nest. A new location with minimal sagebrush cover was found approx. 1250ft W/SW. The new location is still within line-of-sight of the nest. No other locations or topographic features were found in the general area that would further minimize the visual impacts of the well on the nest location. New well location number: 31-6.

2.3.2. Water Management

Outfall #	Aliquot	Section	T/R	Notes
Outfall 006	NENE	18	42/72	The original outfall location was located immediately upstream of several erosive headcuts; it was moved to a more stable stream reach along with the pipeline route feeding the outfall.
Outfall 007	SWSW	18	42/72	The original outfall location was located above several erosive headcuts; it was deleted from the WMP.

2.3.3. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.3.1. Groundwater

1. In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

2.3.3.2. Surface Water

1. Channel Crossings:
   a) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
   b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.

3. Concerns regarding the quality of the discharged CBNG water on downstream irrigation use may require operators to increase the amount of storage of CBNG water during the irrigation months and allow more surface discharge during the non-irrigation months.

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

5. Identified springs will be sampled for flow rate and water quality prior to development of this POD and annually during and following operation of the field.

2.3.3.3. Soils

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

2.3.3.4. Wetland/Riparian

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

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

when the ground is frozen during the winter.

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

4. Material stockpiles will be located outside the active floodplain.

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

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

2.3.3.5. Wildlife

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

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

3. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include increasing the visibility of the individual conductors.

2.3.3.6. Threatened, Endangered, or Sensitive Species

2.3.3.6.1. Bald Eagle

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

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

2.3.3.6.2. Black-footed Ferret

1. Additional mitigation measure may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to black-footed ferrets or their habitat. In the event that a mountain plover is located during construction or operation, the USFWS' Wyoming Field Office (307-772-2374) and the USFWS' Law Enforcement Office (307-261-6365) will be notified within 24 hours.

2.3.3.6.3. Mountain Plover

1. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.

2. Creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.

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

2.3.3.7. Noise

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

2.3.3.8. Air Quality

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

2.3.4. Site specific mitigation measures

General

1. All changes made at the pre-approval onsite will be followed. They have all been incorporated into the operator's plan of development (POD). Please refer to Table 2.3.1 "Changes as a result of the onsite" on pages 6-9 of EA#WY-070-EA08-170, and/or the Post-Onsite Deficiency Letter dated 04/18/2008 and 05/06/2008.

2. Coleman O&G field representatives and contractors will have a copy of the approved POD map and conditions of approval (COAs) at all times while conducting activities within the Leavitt Federal POD project area.

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

Surface Use

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

2. Interim Reclamation of disturbed areas will adhere to the following guidance (as per the Wyoming Policy on Reclamation (IM WY-90-231):
   A. The reclaimed area shall be stable and exhibit none of the following characteristics:
      i. Large rills or gullies.
      ii. Perceptible soil movement or head cutting in drainages.
      iii. Slope instability on, or adjacent to, the reclaimed area in question.
   B. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
   C. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself.
      This shall be demonstrated by:

i. Successful onsite establishment of species included in the planting mixture or other desirable species.
ii. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.

D. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

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

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

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

Sandy Ecological Site Seed Mix		
Species	**% in Mix**	**Lbs PLS***
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	20	2.4
Prairie sandreed (Calamovilfa longifolia)	30	3.6
Indian ricegrass (Achnatherum hymenoides)	20	2.4
Needleandthread (Hesperostipa comata ssp. comata)	15	1.8
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Scarlet Globemallow (Sphaeralcea coccinea) / or ***Blue flax***(Linum lewisii)	5	0.6
Totals	**100%**	**12 lbs/acre**

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

5. The disturbance areas identified below have limited reclamation potential that shall be stabilized in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities. Stabilization efforts include mulching, matting, soil amendments, etc.
   - Wells: 21-25, 43-25, 23-25, 31-25, 14-18, 41-18, 31-18, and 12-6.
   - All access roads and pipeline corridors in Sec. 18 and 25.

6. Due to soils fragility, poor reclamation potential, and road grades equal to or greater than 8%, the access road/utility corridor to well location 12-6 will not exceed a disturbance width of 15ft. A minimum of 2 inches of aggregate will be added across the width of the primitive road (approx. 10ft) to prevent soil erosion and accommodate safe, environmentally-sound access.

7. On well locations 12-25 and 23-25, the operator will rotate drilling equipment and infrastructure to minimize disturbance of sagebrush.

8. The access road to well locations 12-25 and 14-25 will be allowed a maximum working width of 30ft with a blading/clearing width not to exceed 15ft.

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

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

Wildlife

Mountain Plover

The following conditions will alleviate impact to mountain plovers:

1. A mountain plover nesting survey shall be conducted in the prairie dog colonies in SE S7 T43N R72W. This condition will be implemented on an annual basis for the duration of surface-disturbing activities. Mountain plover nesting surveys shall be conducted by a biologist following the most current USFWS Mountain Plover Survey Guidelines (the survey period is May 1-June 15). All survey results must be submitted in writing to the BFO.

    a. If occupied mountain plover habitat is identified, then BLM shall be consulted regarding use of any road that travels through the area for the remainder of that breeding season.

    b. If no mountain plover observations are identified, then activities may be permitted until the following breeding season (March 15).

2. No dogs will be permitted at work sites to reduce the potential for harassment of mountain plovers.

3. 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.

Swift Fox

The following conditions will alleviate impacts to swift fox:

1. A swift fox survey will be required in SE S7 T43N R72W between April 15 and June 15. This condition will be implemented on an annual basis for the duration of surface disturbing activities. All survey results must be submitted in writing to the BFO.

    a. If occupied swift fox habitat is identified, then BLM shall be consulted regarding use of the road that travels through the area for the remainder of that breeding season.

Raptors

The following conditions will alleviate impacts to raptors:

1. No surface disturbing activity shall occur within 0.5 mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect the following existing nests and any nests observed during construction of the POD:

Legal	Infrastructure
S05 T42N R72W	Wells 21-5, 12-5. Corridor in NW. Outfall 002 in SWNW. Construction of channel in eastern NW.
S06 T42N R72W	Wells 21-6, 31-6, 32-6, and 23-6. All corridors in section, except last 275 feet of corridor to 12-6. All roads in section. Outfall 001 in SENW.
S18 T42N R72W	Well 31-18, 41-18. All corridors and all roads in section except in SWSW. Outfall 006 in NENE.
S25 T42N R73W	Wells 31-25, 21-25, 32-25, 23-25, 34-25, 43-25. All corridors in section, except last 1,850 feet (0.4 miles) to well 14-25. All roads in section, except last 1,850 feet (0.4 miles) to well 14-25. Outfall 008 (NENE), 009 (SWNE), and 010 (NENE). Monitoring wells in NE.

2. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.

3. Nest occupancy and productivity checks shall be completed for nests within a 0.5 mile of any surface disturbing activities (e.g., well drilling or pipeline installation) across the entire POD for as long as the POD is under construction. Once construction of the POD has ceased, nest occupancy and productivity checks shall continue for the first five years on all nests that are within a 0.5 mile of locations where any surface-disturbing activities took place. Productivity checks shall be completed only on those nests that were verified to be occupied during the initial occupancy check of that year. The productivity checks shall be conducted no earlier than June 1 or later than June 30, and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. In 2009, this applies to the nest(s) listed in Table 1and is subject to change each year after that, pending surveys.

4. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.

5. Well metering, maintenance and other site visits within 0.5 miles of raptor nests should be minimized as much as possible during the breeding season (February 1 – July 31).

Sage-Grouse

The following conditions will alleviate impacts to sage-grouse:

1. No surface disturbing activities are permitted within 2 miles of the Spring Creek lek (S06 T42N R72W) between March 1 and June 15, prior to completion of a sage-grouse lek survey. This condition will be implemented on an annual basis for the duration of surface disturbing activities. This timing limitation will affect the following:

Legal	Wells and Infrastructure
S05 T42N R72W	All wells (21-5, 12-5). All roads, corridors, and water management facilities.
S06 T42N R72W	All wells (12-6, 21-6, 23-6, 31-6, 32-6). All roads, corridors, and water management facilities.
S16 T42N R72W	All wells (14-18, 31-18, 41-18). Road and corridor in NESE and NE. Outfall 006 in NENE. Outfall 007 in SWSW. Waterline in SWSW.

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

3. Well metering, maintenance and other site visits within 2.0 miles of documented sage grouse lek sites should be minimized as much as possible during the breeding season (March 1– June 15).

Water Management

1. At Hardwater Spring collect spring and fall flow rates and water quality samples and submit for analysis using the list of analytes identified in WDEQ WYPDES permit and forward the lab analysis results and flow rates to the BLM hydrology staff. On the same schedule, check for flow in Maycock Spring and sample if flow is observed.

Cultural

1. Use of the existing road, proposed for well access, in T42N R73W Sections 2, 11, 13, 14, and 24; and T43N R73W Sections 25, 26, and 35 will not be authorized until the Bureau receives an acceptable Class III cultural inventory of the proposed routes and completes the consultation process with the Wyoming SHPO.

2.4. Alternatives considered but not analyzed in detail

Other water management alternatives that were considered but not selected are discussed below.

Re-injection

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

Land Application
Land application of produced water within the Leavitt POD was considered. Land application would involve applying the water to cropland at agronomic rates through an irrigation system. Land application is at best a seasonal approach and would require the construction of several reservoirs to store produced water during the non-irrigation season. Due to the high construction and operating costs and lack of landowner interest, land application was ruled out.

Total Containment
Total containment within existing and proposed reservoirs was assessed and discounted due to the number of reservoirs necessary to contain the overall volume of CBNG production water associated with this POD. Landowner concerns coupled with the large number of new reservoirs required under this alternative resulted in poor economics and high surface disturbance prompting the selection of other alternatives.

2.5. Summary of Alternatives

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

Table 2.5 Summary of the Alternatives

The Leavitt Federal POD is located approximately 10 miles south of Wright, WY within Sections 5, 6, and 18, T42N R72W; and, Sec. 25, T42N R73W. Existing energy development in the general project area includes Federal, Fee, and State CBNG and conventional oil and gas wells and associated infrastructure. The general project area consists of 9,450 acres, mostly operated by Coleman Oil & Gas, which includes the Stoddard Federal CBNG POD, EA# WY-070-07-010, approved on 12/07/2006, located within Sections 10, 20 and 21, T42N R72W covering an area of 1,280 acres. Future energy development in the area will bring in Coleman's Wilkinson Federal CBNG POD, which will cover the sections between the Stoddard and Leavitt PODs with approximately 28 proposed CBNG wells and infrastructure.

Other federal CBNG PODs in the general vicinity include Tuit (EA# WY-070-04-098) & Tuit Draw (EA# WY-070-04-026), Uprising (EA# WY-070-04-305), and Coleman's SW Reno Flats (EA# WY-070-07-196).

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Total CBNG Wells	70	19	18
Fed	23	19	18
State	8	0	0
Fee	39	0	0
Total Locations		19	18
Nonconstructed Pads		19	18
Slotted Pads		0	0
Constructed Pads		0	0

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Conventional Wells (Plugged & Abandoned)	4	0	0
Gather/Metering Facilities	0	0	0
Compressors	0	0	0
Monitor Wells	0	0	0
Impoundments	5		
On-channel		2	2
Off-channel		0	0
Water Discharge Points	13	13	12
Improved Roads	2.47	0	0
No Corridor		0	0
With Corridor		0	0
2-Track Roads	23.77	14.33	16.68
No Corridor		6.52	9.90
With Corridor		7.81	6.78
Buried Utilities	29.70	5.37	1.39
No Corridor		2.40	0.24
With Corridor		2.97	1.15
Overhead Powerlines	5.25	0.28	0.28
Acres of Disturbance	204.66	84.45	64.44

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 06/01/2007. Field inspections of the proposed Leavitt Federal CBNG project were conducted on 04/07/2008 and 04/08/2008. A third onsite date was completed on 04/30/2008. The following personnel participated on the pre-approval onsite inspections:

NAME	TITLE	AGENCY
Brian Heath	Wildlife Biologist	Arcadis
Clint Crago	Archeologist	Bureau of Land Management
Leigh Grench	Archeologist	Bureau of Land Management
Chris Williams	Hydrologist	Bureau of Land Management
Andy Perez	Natural Resource Specialist (Trainee)	Bureau of Land Management
Julian Serafin	Natural Resource Specialist (Lead)	Bureau of Land Management
Travis Kern	Natural Resource Specialist (Trainee)	Bureau of Land Management
Bill Ostheimer	Wildlife Biologist	Bureau of Land Management
Courtney Frost	Wildlife Biologist (Lead)	Bureau of Land Management
Dave Lervick	Area Foreman	Coleman Oil & Gas
Anna Morgan	Land/Operations	Coleman Oil & Gas
Crystal Lesmeister	Project Manager – Civil & Water Resources	WWC Engineering

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

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

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

3.1. Topographic Characteristics of Project Area

The topography throughout the project area is characterized by gently sloped draws rising to mixed sagebrush and grasslands uplands. The uplands abruptly develop into scoria buttes and sandstone outcrops within several areas. Ephemeral tributaries of Porcupine Creek and Spring Creek drain the northern and southern project areas, respectively. No perennial streams are located within the Leavitt Federal POD, although portions of Spring Creek were observed with water in April and May, 2008. Elevations within the project area range from 4,800 to 5,100 feet above sea level. The climate is semi-arid, averaging 12 to 14 inches of precipitation annually, more than 60% of which occurs between April and September. Conventional oil and gas production, as well as CBNG development exists around and within the proposed Leavitt Federal project; this, in conjunction with livestock grazing, are the major land uses within the general area.

3.2. Vegetation & Soils

The general vegetation community within the project area consists of a mixed sagebrush/grassland mosaic. Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) intermixed with various native bunch grasses dominates the project area. The greatest concentrations of sagebrush occurred among the gentler upland slopes with patches of silver sagebrush (*Artemisia cana*) and rubber rabbitbrush (*Chrysothamnus nauseous*) occurring infrequently throughout the area.

Soils have developed in alluvium and residuum derived from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstones and sandstones with minor coal seams resulting in a wide variety of surface and subsurface textures of silt loam and fine sandy loam. Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Soils are generally productive, though varies with texture, slope and other characteristics such as topographic location, slope and elevation.

Soils within the project area were identified from the *South Campbell County Survey Area, Wyoming (WY605).* The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

The dominant map units identified for the soils within this project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary. The map unit symbols within this project area were filtered and map units representing 3.0% or greater in extent within the pod boundary are displayed.

Soil Map Unit Types

Map Unit	Map Unit Name	Acres	Percent
111	Bidman-Parmleed loams, 0 to 6 percent slopes	291.5	18%
217	Theedle-Shingle loams, 3 to 30 percent slopes	246.8	15%
158	Hiland-Bowbac fine sandy loams, 6 to 15 percent slopes	209.2	13%
206	Samday-Shingle-Badland complex, 10 to 45 percent slopes	208.3	13%
208	Savageton-Silhouette clay loams, 0 to 6 percent slopes	102.3	6%
210	Shingle-Taluce complex, 3 to 30 percent slopes	84.9	5%
205	Samday-Savageton clay loams, 3 to 15 percent slopes	50.8	3%
227	Ulm clay loam, 0 to 6 percent slopes	45.8	3%
160	Hiland-Vonalee fine sandy loams, 6 to 15 percent slopes	44.4	3%

Additional site specific soil information is included in the Ecological Site interpretations below.

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

Approximately 556 acres (36 percent of the project area) within the POD boundary have been identified as having low reclamation potential by utilizing Soil Survey Geographical Data (SSURGO). The areas of low reclamation potential were located predominately in sections 18 and 25; other areas were also identified and mitigated.

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

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

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

Map Units and Ecological Sites

Map Unit	Ecological Site
111	Loamy 10-14" Northern Plains
217	Loamy 10-14" Northern Plains
158	SANDY (10-14 NP)
206	SHALLOW CLAYEY (10-14 NP)

208	Clayey 10-14" Northern Plains
210	SHALLOW SANDY (10-14 NP)
205	SHALLOW CLAYEY (10-14 NP)
227	Clayey 10-14" Northern Plains
160	SANDY (10-14 NP)

Ecological Sites and Plant Communities identified in this POD and its infrastructure are predominately Loamy with areas of Clayey and Sandy sites.

Loamy Sites occur on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10-14 inch precipitation zone. These soils are moderately deep to very deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability. The present plant community is a Mixed Sagebrush/Grass. Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Cool-season mid-grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include bluebunch wheatgrass, rhizomatous wheatgrass, blue grama, and little bluestem. Other grasses occurring on the state include Cusick's and Sandberg bluegrass, and prairie junegrass.

Sandy Sites occur on nearly level to steep slopes on landforms which include alluvial fans, hillsides, plateaus, ridges, and stream terraces in the 10-14 inch precipitation zone. The soils of this site are moderately deep to very deep (greater than 20"to bedrock), well drained soils that formed in eolian deposits or residuum derived from unspecified sandstone. These soils have moderate, moderately rapid, or rapid permeability. The main soil limitations include low available water holding capacity, and high wind erosion potential. The present plant community is a Needleandthread/ Threadleaf sedge/ Fringed sage Plant Community. Cool-season mid-grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. The dominant understory grasses include needleandthread, threadleaf sedge, prairie junegrass, and fringed sagewort.

Clayey Sites occur on nearly level to steep slopes on landforms which include hill sides, alluvial fans and stream terraces in the 10-14"precipitation zone. The soils of this site are moderately deep to very deep (greater than 20" to bedrock), well-drained soils that formed in alluvium or alluvium over residuum derived calcareous shale. These soils have slow permeability. The bedrock is clay shale which is virtually impenetrable to plant roots. The present plant community is a Mixed Sagebrush/Grass. Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include rhizomatous wheatgrasses, green needlegrass, blue grama, and prairie junegrass. Forbs include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, and scarlet globemallow. Fringed sagewort and plains pricklypear and also occur.

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

Summary of Ecological Sites

Ecological site	Acres	Percentage
Loamy 10-14" Northern Plains	712.2	46%
SANDY (10-14 NP)	269.0	17%
SHALLOW CLAYEY (10-14 NP)	259.1	17%
Clayey 10-14" Northern Plains	200.2	13%

Ecological site	Acres	Percentage
SHALLOW SANDY (10-14 NP)	84.9	5%
LOWLAND (10-14 NP)	34.5	2%

3.2.1. Wetlands/Riparian

Wetlands within and near the POD area are found along Spring Creek reaches that are currently receiving CBNG discharge. Enhanced riparian vegetation is also present on the larger tributaries to Spring Creek.

3.2.2. Invasive Species

The Wyoming Energy Resource Information Clearinghouse (WERIC) web site (www.weric.info) identifies skeletonleaf bursage (*Ambrosia tonentosa* Nutt.) as a known state-listed noxious weed population in T41N R73W, T41N R72W, T42N R72W, and T42N 73W. The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices.

The operator inspected the project area for noxious weeds and confirmed isolated patches of skeleton leaf bursage within the project area. The following is a list of additional State and County Designated Noxious Weeds that were encountered within the Leavitt Federal POD:

- Canada thistle (*Cirsium arvense* L.)
- Scotch thistle (*Onopordum acanthium* L.)

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

3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by ARCADIS in 2007 and 2008 (ARCADIS 2007a, 2007b, 2008). All surveys were conducted according to the Powder River Basin Interagency Working Group's (PRBIWG) accepted protocol (available on the CBM Clearinghouse website at www.cbmclearinghouse.info). ARCADIS performed surveys for bald eagles, raptor nests, greater sage-grouse, sharp-tailed grouse, black-tailed prairie dog colonies, mountain plovers, and Ute ladies'-tresses orchid.

A BLM biologist conducted field visits on April 7 and 8, 2008. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

3.3.1. Big Game

Big game species expected to be within the Leavitt project area include pronghorn and mule deer. During the onsite, pronghorn individuals and sign were observed throughout the project area. Mule deer sign was noted across the POD. WGFD has determined that the project area contains yearlong range for pronghorn and mule deer. Yearlong use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions. Populations of pronghorn and mule deer within their respective hunt areas are above WGFD objectives. Big game range maps are available in the PRB FEIS (3-119 to 3-143) and from WGFD.

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of Porcupine Creek and Spring Creek. Spring Creek

reaches are currently receiving CBNG discharge. No perennial streams are located within the project area. Fish that have been identified in the Lower Antelope Creek watershed are listed in the PRB FEIS (3-156 to 3-159).

Amphibian and reptile species occur throughout the Basin, but baseline information is limited. Confluence Consulting, Inc., (2004) identified the following species within the Clear Creek and Powder River watersheds: Woodhouse's toad, Northern leopard frog, gopher snake, and garter snake. Because sampling at the upper two sites on Clear Creek occurred late in the season when likelihood of observing these species is reduced, the timing of these surveys may have influenced the lack of reptiles and amphibians observed at these sites.

3.3.3. Migratory Birds

Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

3.3.4. Raptors

Raptor species expected to occur in suitable habitats within the Powder River Basin include northern harrier, Cooper's hawk, northern goshawk, red-tailed hawk, Swainson's hawk, ferruginous hawk, rough-legged hawk, American kestrel, merlin, prairie falcon, short-eared owl, long-eared owl, burrowing owl, great horned owl, golden eagle, and bald eagle. Most raptor species nest in a variety of habitats, including but not limited to, native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities.

Thirty-two raptor nest sites were identified by ARCADIS in 2007 and 2008 (ARCADIS 2007b, 2008) and the BLM raptor database within 0.5 mile of the project area. Of these, one nest (5459) was active in 2008 and occupied by Swainson's hawks. Two nests (5227 and 885) were active in 2007. Both were occupied by ferruginous hawks. The pair at 5227 did not successfully fledge young. Productivity at 885 was undetermined due to access restrictions during the latter part of breeding season. Nest 860 was not checked in 2008, because the access road that travels within 0.5 miles of this nest was not added as a component of the Leavitt project by Coleman until late summer of 2008 and so was not checked prior to writing of this EA.

Table 1. Documented raptor nests within the Leavitt POD Project Area in 2008

BLM ID	UTMs	Legal	Sub-strate	Year	Status	Con-dition	Species
860	453614E 4830059W	T42N R73W S12	UNK	2004	Active	GOOD	GOEA
				1998	Active	GOOD	GOEA
863	453825E 4826219W	T42N R73W S25	CKB	2008	Gone	DNLO	
				2007	Gone	DNLO	
				1996	Good	INAC	
871	454246E 4827025W	T42N R73W S24	GHS	2008	Gone	DNLO	
				2007	Gone	DNLO	
				1996	Good	INAC	
876	454649E 4826623W	T42N R72W S19	GHS	2008	Gone	DNLO	
				2007	Gone	DNLO	

BLM ID	UTMs	Legal	Sub-strate	Year	Status	Con-dition	Species
				1996	Unknown	DNLO	
885	454996E 4824535W	T42N R72W S31	GHS	2008	Poor	INAC	
				2007	Excellent	ACTI	FEHA
				1996	Good	INAC	
886	455068E 4829858W	T42N R72W S7	GHS	2008	Gone	DNLO	
				2007	Gone	DNLO	
				1996	Good	UNK	
887	455075E 4824544W	T42N R72W S31	UNK	2008	Gone	DNLO	
				2007	Gone	DNLO	
				2007	Unknown	DNLO	
				1998	Good	INAC	
890	455870E 4828659W	T42N R72W S18	GHS	2008	Unknown	DNLO	
				2007	Gone	DNLO	
				2006	Fair	INAC	
				1996	Good	INAC	
2484	455731E 4829029W	T42N R72W S18	GHS	2008	Poor	INAC	
				2007	Good	INAC	
				2007	Poor	INAC	
				2004	Good	INAC	
2485	456438E 4829118W	T42N R72W S17	GHS	2008	Remnants	INAC	
				2007	Remnants	INAC	
				2004	Remnants	INAC	
				1998	Good	INAC	
2486	456555E 4828019W	T42N R72W S20	GHS	2008	Gone	DNLO	
				2007	Gone	DNLO	
				2006	Unknown	DNLO	
				2004	Remnants	INAC	
2494	455268E 4830304W	T42N R72W S7	CKB	2008	Fair	INAC	
				2007	Fair	INAC	
				2007	Good	INAC	
				2004	Good	INAC	
2495	456280E 4828469W	T42N R72W S17	GHS	2008	Remnants	INAC	
				2007	Remnants	INAC	
				2006	Poor	INAC	
				2004	Poor	INAC	
2496	456233E 4828267W	T42N R72W S17	GHS	2008	Remnants	INAC	
				2007	Poor	INAC	
				2006	Poor	INAC	
				2004	Remnants	INAC	

BLM ID	UTMs	Legal	Sub-strate	Year	Status	Con-dition	Species
				1996	Good	INAC	
4591	456020E 4828470W	T42N R72W S18	GHS	2008	Remnants	INAC	
				2007	Poor	INAC	
5175	456136E 4828293W	T42N R72W S17	GHS	2008	Remnants	INAC	
				2007	Poor	INAC	
5225	456084E 4832759W	T42N R72W S6	GHS	2008	Good	INAC	
				2007	Good	INAC	
5226	455943E 4832862W	T42N R72W S6	GHS	2008	Good	INAC	
				2007	Good	INAC	
5227	455011E 4829578W	T42N R72W S18	GHS	2008	Fair	INAC	
				2007	Excellent	ACTF	FEHA
5228	454646E 4826926W	T42N R72W S19	ROC	2008	Remnants	INAC	
				2007	Remnants	INAC	
5229	454576E 4826423W	T42N R72W S30	GHS	2008	Remnants	INAC	
				2007	Remnants	INAC	
5230	454294E 4826841W	T42N R73W S24	GHS	2008	Fair	INAC	
				2007	Good	INAC	
5231	454409E 4826889W	T42N R73W S24	GHS	2008	Remnants	INAC	
				2007	Remnants	INAC	
5232	454419E 4826297W	T42N R73W S25	GHS	2008	Remnants	INAC	
				2007	Remnants	INAC	
5233	455637E 4833425W	T43N R72W S31	GHS	2008	Poor	INAC	
				2007	Poor	INAC	
5234	456008E 4833659W	T43N R72W S31	GHS	2008	Remnants	INAC	
				2007	Poor	INAC	
5320	455979E 4832823W	T42N R72W S6	GHS	2008	Fair	INAC	
5321	455963E 4833241W	T43N R72W S31	GHS	2008	Fair	INAC	
5459	451817E 4832583W	T43N R73W S02	CTL	2008	Good	ACTI	SWHA
6290	455560E 4832674W	T42N R72W S06	GHS	2008	Fair	INAC	
6292	454706E 4826291W	T42N R72W S30	GHS	2008	Poor	INAC	
6293	454069E 4825813W	T42N R73W S25	GHS	2008	Poor	INAC	

Notes:
1 CKB = Creek bank; GHS = Ground/hillside; ROC = Rock cavity; UNK = Unknown
2 ACTF = Active failed; ACTI = Active; DNLO = Did not locate; INAC = Inactive; UNK = Unknown
3 GOEA = Golden Eagle; FEHA = Ferruginous hawk; SWHA = Swainson's Hawk

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

Within the BLM Buffalo Field Office there are two species listed as Threatened or Endangered under the Endangered Species Act: the black-footed ferret and the Ute ladies'-tresses orchid.

3.3.5.1.1. Black-footed Ferret

The US Fish and Wildlife Service (USFWS) listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 2004, WGFD identified seven prairie dog complexes (Arvada, Sheridan, Pleasantdale, Four Corners, Linch, Kaycee, and Thunder Basin National Grasslands) that are located partially or wholly within the BFO administrative area as potential black-footed ferret reintroduction sites (Grenier et al. 2004).

This nocturnal predator is closely associated with prairie dogs. The ferret depends almost entirely upon prairie dogs for food and uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1,000 acres, separated by no more than 1.5 km of black-tailed prairie dog colonies for survival (USFWS 1989).

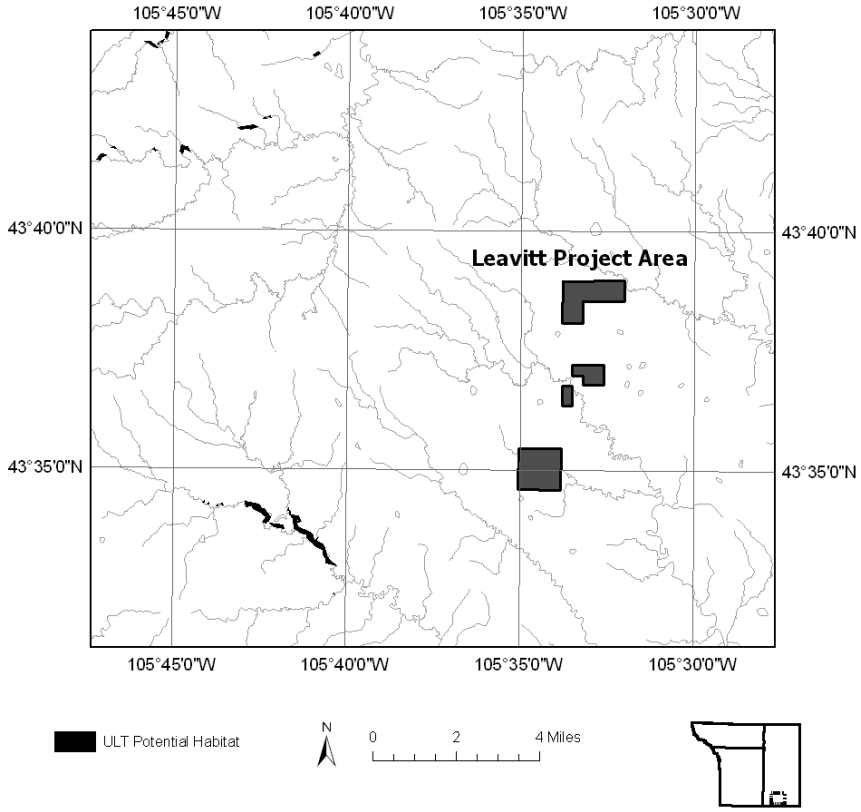
WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Bighorn Mountains (Grenier 2003). USFWS has also concluded that black-tailed prairie dog colonies within Wyoming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

Black-footed ferret habitat is not present within the Leavitt project area. Black-tailed prairie dog colonies, totaling 74 acres in size, were identified in the project area. These colonies were reported by ARCADIS (2007b) or were previously documented in the BLM prairie dog database and are located in SE1/4 S7 T43N R72W. They are not within 1.5 km of any other prairie dog colonies. The project area is located approximately 16 miles from the Ross prairie dog complex, a potential black-footed ferret reintroduction area identified by WGFD, and 20 miles from the Linch prairie dog complex, another potential reintroduction area.

3.3.5.1.2. Ute Ladies'-Tresses Orchid

Ute ladies'-tresses orchid (ULT) is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. In Wyoming, ULT blooms from early August to early September, with fruits produced in mid August to September (Fertig 2000).

Figure 1. Predicted Distribution of Ute Ladies'-tresses in the Vicinity of the Leavitt Project Area



Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an originally known location. Drainages with documented ULT populations include Wind Creek and Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. The lower North Fork of Wind Creek and Antelope Creek are the closest known populations to the project area and are located approximately 15 and 17 miles to the southwest, respectively.

A WYNDD model predicts that undocumented populations may be present in the BFO administrative area, particularly within southern Campbell County. The model predicted that about 184 acres along Bates Creek, North Bates Creek, and Mexican Springs, approximately 5.6 miles to the southwest of the Leavitt project area (S34-36 T42N R74W, S1 T41N R74W, S6 and S7 T41N R73W), are likely to support ULT (Figure 1). Several other locations 7-10 miles to the northwest were also predicted by the model to support ULT.

Suitable ULT habitat is present within the Leavitt project area. Based on an initial habitat evaluation by ARCADIS in the spring of 2007, segments of West Prong Spring Creek and Porcupine Creeks appeared to have the surface and subsurface hydrology necessary to support ULT (ARCADIS 2007b). Pedestrian surveys were conducted in late August, 2007, to document the presence or absence of ULT downstream of proposed discharges within these areas (ARCADIS 2007a). West Prong Creek was surveyed from the existing reservoir in NWNE S25 T42N R73W to the existing reservoir in NWSW S30 T42N R72W. Sparse bands of wetland vegetation were observed at points in the immediate channel and around depressions and reservoirs where standing water was present. These areas were dominated by rushes and

sedges. Evidence of livestock grazing was observed in both upland and wetland habitats. No orchids were observed. A lack of both surface water and only sparse bands of wetland vegetation suggested marginal suitability for ULT along this drainage.

Suitable habitat also exists in the Porcupine Creek drainage along an existing reservoir in the NENW S5 T42N R72W. A band of wetland vegetation dominated by sedges was observed adjacent to the depression where standing water occurred. ARCADIS did not observe ULT at this location.

3.3.5.2. Sensitive Species

BLM Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. Two habitat types – prairie dog colonies and sagebrush ecosystems – commonly occur in the Powder River Basin and contain components required in the life cycle of several sensitive species. Species associated with these ecosystems are described below in general terms. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are described in more detail later in this section. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.3.5.2.1. Prairie Dog Colony Obligates

Prairie dog colonies create habitat for many species of wildlife (King 1955, Reading et al. 1989). Agnew et al. (1986) found that bird species diversity and rodent abundance were higher on prairie dog towns than on mixed grass prairie sites. Several studies (Agnew et al. 1986, Clark et al. 1982, Campbell and Clark 1981, and Reading et al. 1989) suggest that species richness increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of prey species (Clark 1982, Agnew et al. 1986, Agnew 1988).

Forty percent of the wildlife taxa found in South Dakota, including 134 vertebrate species, are associated with prairie dog colonies (Agnew 1983, Apa 1985, McCracken et al. 1985, Agnew 1986, Uresk and Sharps 1986, Deisch et al. 1989). Of those species regularly associated with prairie dog colonies, six are on the Wyoming BLM sensitive species list: swift fox, mountain plover, ferruginous hawk, burrowing owl, loggerhead shrike, and long-billed curlew. The affected environment for loggerhead shrike and long-billed curlew is described in Section 3.3.3. The affected environments for the remaining four sensitive species are evaluated later in this section.

3.3.5.2.2. Sagebrush obligates

Sagebrush ecosystems support a variety of species. Sagebrush obligates require sagebrush for some part of their life cycle. They cannot survive without sagebrush and its associated perennial grasses and forbs. Shrubland and grassland birds are declining faster than any other group of species in North America (Knick et al. 2003).

Sagebrush obligates likely to occur in the Leavitt project area that are listed as sensitive species by BLM Wyoming include sage thrasher, Brewer's sparrow, and greater sage-grouse. Sage thrasher and Brewer's sparrow require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Brewer's sparrows are associated closely with sagebrush habitats having abundant scattered shrubs and short grass (Paige and Ritter 1999). Greater sage-grouse will be discussed in more detail later in this section.

3.3.5.2.3. Bald Eagle

The bald eagle was federally listed as Endangered on February 14, 1978, and was then removed from the

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

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

No bald eagles were observed within one mile of the project area, but bald eagles were observed foraging along Spring Creek and perched on the creek bank approximately two miles to the southwest. No mature stands of cottonwood trees occur within the project area, but some cottonwoods are located adjacent to the POD. Domestic sheep grazing occurs throughout the project area and may provide a source of carrion to wintering bald eagles. Bald eagles may thus be infrequent visitors to the project area.

3.3.5.2.4. Black-tailed Prairie Dog

The black-tailed prairie dog was added to the list of Candidate species for federal listing on February 4, 2000 but was then removed from the list on August 12, 2004. BLM Wyoming considers black-tailed prairie dogs a sensitive species and continues to afford this species the protections described in the PRB FEIS.

The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains. Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented and isolated (Miller 1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations, and other problems that affect long term population viability, such as landowner poisoning and disease (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994).

The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of Sylvatic plague and the extent of control efforts by landowners. Comparisons with 1994 aerial imagery indicated that black-tailed prairie dog acreage remained stable from 1994 through 2001. However, aerial surveys conducted in 2003 to determine the status of known colonies indicated that approximately 47% of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier et al. 2004).

Two black-tailed prairie dog colonies totaling 28 acres were identified during site visits by ARCADIS in 2007 and are located in SE1/4 S7 T43N R72W. Along with those documented in the BLM prairie dog database, approximately 74 acres in this section have been used historically by black-tailed prairie dogs.

3.3.5.2.5. Western Burrowing Owl

The western burrowing owl is listed as a sensitive species by the BLM throughout the west and by the US Forest Service. It has declined significantly throughout its North American range. Primary threats across

its range are habitat loss and fragmentation, mostly due to intensive agricultural and urban development, and habitat degradation, due to declines in populations of colonial burrowing mammals (Klute et al. 2003). Current population estimates for the United States are not well known, but trend data suggest significant declines (McDonald et al. 2004). The majority of the states within the owl's range have recognized that populations are declining. The last official population estimate placed them at less than 10,000 breeding pairs.

The burrowing owl is a small, long-legged owl found throughout open landscapes of North and South America. Burrowing owls can be found in grasslands, rangelands, agricultural areas, deserts, or any dry open area with low vegetation where abandoned burrows dug by mammals such as ground squirrels, prairie dogs, and badgers are available.

Burrowing owl nesting habitat consists of open areas with mammal burrows. Black-tailed prairie dog colonies provide the primary nesting and brood-rearing habitat for burrowing owls (Klute et al. 2003). Individual burrowing owls have moderate to high site fidelity to breeding areas and even to particular nest burrows (Klute et al. 2003). Burrow and nest sites are reused at a higher rate if the bird has reproduced successfully during the previous year. Favored nest burrows are those in relatively sandy sites (possibly for ease of modification and drainage), areas with low vegetation around the burrows (to facilitate the owl's view and hunting success), holes at the bottom of vertical cuts with a slight downward slope from the entrance, and slightly elevated locations. In Wyoming, egg laying begins in mid-April. Incubation is assumed to begin at the mid-point of the laying period and lasts for 26 days (Olenick 1990). Young permanently leave the primary nest burrow around 44 days from hatch (Landry 1979). Juveniles will continue to hunt with and associate with parents until migration, which typically occur from early September through early November (Haug 1985).

No burrowing owl nests were observed by ARCADIS, nor were there any reported by other consultants in the BLM raptor nest database, but the black-tailed prairie dog colonies listed in Section 3.3.5.2.4 provide suitable habitat for burrowing owls.

3.3.5.2.6. Grouse

3.3.5.2.6.1. Greater sage-grouse

The greater sage-grouse (sage-grouse) is listed as a sensitive species by BLM Wyoming. In recent years, several petitions have been submitted to USFWS to list sage-grouse as Threatened or Endangered. On January 12th, 2005, USFWS issued a decision that the listing of sage-grouse was not warranted following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse. In 2007, the U.S. District Court remanded that decision, stating that USFWS's decision-making process was flawed and ordered USFWS to conduct a new Status Review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

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

Suitable sage-grouse habitat is present throughout the project area. Sparse to moderately dense stands of sagebrush are present in patches throughout the project area. Sections 5 and 6 T42N R72W and S25 T42N R73W contain large stands of sagebrush on moderate topography. Riparian areas and draw bottoms along the tributaries of Porcupine and Spring Creeks contain a diverse mix of forbs that could support sage-grouse and their broods during summer and early fall. At the onsite, abundant sage-grouse sign was noted in SWSW S25 T42N R73W and NENE S25T42N R73W. BLM records show four sage-grouse leks within four miles of the project area. ARCADIS also twice observed males displaying in a new location in SWSE S35 T42N R73W on Little Bates Creek in 2008. This location is within four miles of the project area. The four-mile distance was recommended by the State wildlife agencies' ad hoc committee for

consideration of oil and gas development effects to nesting habitat (WGFD 2008). The four lek sites and the new strutting ground observed by ARCADIS (2008) are identified below (Table 2) with up to the most recent five years of peak male lek attendance. Where a year is not listed, no data were reported for that year.

Table 2. Sage-grouse leks within 4 miles of the Leavitt project area

Lek Name	Legal Location	Distance from Project Area (mi)	Year: Peak Males
Spring Creek	SWSW S6 T42N R72W	0	2008: 10* 2007: 12 2006: 16 2005: 18
Little Bates Creek (new)	SWSE S35 T42N R73W	1.0	2008: 0*
160 Acre	NESE S15 T42N R73W	1.8	2008: 19* 2007: 20 2006: 10
Porcupine Creek	NWSE S23 T43N R73W	2.7	2006: 24 2005: 12
59	NWSE S23 T42N R72W	3.8	2007: 0 2006: 0 2004: 0 2003: 0

Notes:
* Counts in 2008 are from the ARCADIS 2008 wildlife survey report. Buffalo BLM has not received WGFD sage-grouse database for 2008 as of the date this EA was written.

3.3.5.2.6.2. Sharp-tailed Grouse

Sharp-tailed grouse inhabit short and mixed-grass prairie, sagebrush shrublands, woodland edges, and river canyons. In Wyoming, this species is found where grasslands are intermixed with shrublands, especially wooded draws, shrubby riparian area, and wet meadows. Although grasslands dominate much of the landscape within the project area, livestock grazing and wildlife grazing have removed the mid to tall grasses within the POD and along Porcupine and Spring Creeks. Sharp-tailed grouse habitat is not present within the project area.

3.3.5.2.7. Mountain Plover

The mountain plover was proposed for listing as Threatened in 1999, but, in 2003, USFWS withdrew the proposal, stating that the population was larger than had been thought and was no longer declining. Mountain plovers are a BLM Wyoming sensitive species. Recent analysis of the USWFS Breeding Bird Survey (BBS) data suggests that mountain plover populations have declined at an annual rate of 3.7 % over the last 30 years which represents a cumulative decline of 63% during the last 25 years (Knopf and Rupert 1995).

Mountain plovers are typically associated with high, dry, short grass prairies (BLM 2003). Nesting habitat is often associated with heavily grazed areas such as prairie dog colonies and livestock pastures.

Suitable mountain plover habitat is present within the project area. The black-tailed prairie dog colonies in SE1/4 S7 T43N R72W, several playas, and linear pipeline corridors containing bare ground on even terrain all have the potential for plover use. ARCADIS did not observe any mountain plover individuals

or nests during their field visits in 2007 or 2008.

3.3.5.2.8. Swift Fox

The swift fox was removed from the Federal list of candidate species in January 2001 due to the implementation of the Swift Fox Conservation Plan. It remains a BLM sensitive species, and, as such, recommendations for mitigation contained within the Swift Fox Conservation Plan will be applied to the project in order to uphold the direction set forth in BLM Manual 6840.

The swift fox is native to the grassland prairies of North America. The original range of the species was influenced primarily by the extent of the shortgrass prairie and midgrass prairie ecosystems. The swift fox range primarily follows the distribution of the black-tailed prairie dog. Swift fox populations have been reduced to about 40% of their former range.

Swift foxes tend to have their dens on or within 0.8 kilometers of prairie dog colonies (Hillman and Sharps 1978). The swift fox diet consists mostly of prairie dogs (49%) and insects (27%) (Uresk and Sharps 1986). Breeding occurs from December to February depending on latitude (Kilgore 1969, Hines 1980, Covell 1992). Gestation is approximately 51 days (Kahn et al. 1997). Pups are reared in dens with den sites possibly being changed several times during the pup-rearing period (Kahn et al. 1997). Under certain circumstances, litters from different fox pairs might share the same natal dens. At four or five months, the young foxes are almost fully grown and difficult to distinguish from adults (Kahn et al. 1997). Though little is known about pup-dispersal, it begins during September and October (Kahn et al. 1997).

Suitable swift fox habitat exists throughout the project area and is associated with the prairie grasslands that occur in the middle and southern portions of the POD and the active prairie dog colonies listed in Section 3.3.5.2.4 (Black-tailed Prairie Dog). The project area is directly adjacent to portions of Thunder Basin National Grassland, which supports known populations of swift fox. ARCADIS did not survey for swift fox dens in their wildlife surveys for the Leavitt POD.

3.4. West Nile Virus

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

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

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

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3

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

*Wyoming Department of Health Records September 12, 2007.

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

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

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

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is not necessary to place the briquettes in the main water body because wave action prevents this environment from being optimum mosquito breeding habitat. Follow-up treatment of adult mosquitoes with malathion may be needed every 3 to 4 days to control adults following application of larvicide (Mooney, personal conversation). These treatment methods seem to be effective when focused on specific target areas, especially near communities, however they have not been applied over large areas nor have they been used to treat a wide range of potential mosquito breeding habitat such as that associated with CBNG development.

The WDEQ and the Wyoming Department of Health sent a letter to CBNG operators on June 30, 2004. The letter encouraged people employed in occupations that require extended periods of outdoor labor, be

provided educational material by their employers about WNv to reduce the risk of WNv transmission. The letter encouraged companies to contact either local Weed and Pest Districts or the Wyoming Department of Health for surface water treatment options.

3.5. Water Resources

The project area is within the Antelope Creek drainage. Proposed discharge points and impoundments are located in the Spring Creek drainage and in tributaries to Porcupine Creek. These two drainages are tributaries to Antelope Creek, which is a tributary to the Cheyenne River

3.5.1. Groundwater

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

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

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

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 14 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 100 to 352 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the Spring Creek and Porcupine Creek drainages which are tributary to the Antelope Creek. Most of the stream channels in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). Channels in the area range from well vegetated grassy swales without defined bed and banks to well formed channels with wide floodplains. There are some small tributaries to Spring Creek in the POD area that appear incised. In general, the topography is gentle and stream gradients have low to moderate slopes.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water

quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Antelope Creek, the EC ranges from 1,800 at maximum monthly flow to 2,354 at low monthly flow and the SAR ranges from 2.60 at maximum monthly flow to 2.82 at low monthly flow. These values were determined at the USGS station located at Riverview, WY (PRB FEIS page 3-49).

The operator has identified two natural spring within ½ mile of this POD boundary. Hardwater Spring at T42N, R72W, NWNW of Sec 18 and Maycock Spring at T42N, R72W, NWNW of Sec 29 . Water quality has not been obtained at the time of POD approval.

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

3.6. Cultural Resources

A Class III inventory was conducted for most of the Leavitt project prior to on-the-ground project work (BFO project # 70070134). Pronghorn Archaeological Services conducted the Class III inventory following the Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48FR190) for the proposed project. Clint Crago, BFO archaeologist, reviewed the report for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined it to be adequate. However, a portion of the proposed project area has not been inventoried at this time. A Condition of Approval for this project will be that the proposed two-track access road (T42N R73W Sections 2, 11, 13, 14, and 24; and T43N R73W Sections 25, 26, and 35) will not be approved, pending cultural resource inventory. The following resources are located within or near the Area of Potential Effect (APE).

Table 3.6 Cultural Resource Sites Identified within or near the Leavitt project area

Site Number	Site Type	Eligibility
48CA2080	Prehistoric Stone Circle Site	Not Eligible
48CA2081	Prehistoric Stone Circle and Campsite	Not Eligible
48CA2932	Prehistoric Lithic Scatter	Not Eligible
48CA5055	Historic Homestead	Not Eligible
48CA5297	Hay Creek & Porcupine Road	Not Eligible
48CA6574	Rock pile	Not Eligible
48CA6575	Prehistoric Stone Circle	Not Eligible
48CA6576	Historic Cairn	Not Eligible
48CA6577	Prehistoric Stone Circle	Not Eligible

3.7. Air Quality

Existing air quality throughout most of the Powder River Basin is in attainment with all ambient air quality standards. Although specific air quality monitoring is not conducted throughout most of the Powder River Basin, air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in

relatively low air pollutant concentrations.

Existing air pollutant emission sources within the region include the following:

- Exhaust emissions (primarily carbon monoxide [CO] and nitrogen oxides [NOx]) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;
- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;
- Transport of air pollutants from emission sources located outside the region;
- Dust (particulate matter) from coal mines;
- NOx, particulate matter, and other emissions from diesel trains and,
- SO2 and NOx from power plants.

For a complete description of the existing air quality conditions in the Powder River Basin, please refer to the PRB Final EIS Volume 1, Chapter 3, pages 3-291 through 3-299.

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action (Alternative B) resulted in development of Alternative C as the preferred alternative. The changes have reduced impacts to the environment which will result from this action. Under this alternative, 18 wells would be drilled at 18 locations to Federal minerals on 80 acre spacing. The wells have been sited so that construction will disturb a minimum area. There are some well locations and other areas along the access routes that cross highly erosive soils and will require expedient or extraordinary stabilization measures to reduce erosion potential. For the most part, the operator utilized existing primitive and improved roads as infrastructure for this POD. As a result of changes made at the pre-approval onsite, an additional 3.38 miles of existing non-corridored primitive roads were added to the project. This mileage increase is a result of efforts to reduce disturbance to documented raptors nest in the NENE of Sec. 25, and the SWSW of Sec. 19. The operator chose an existing two-track primitive road that starts at Cosner Rd, runs southeast through section 24, and then southwest into section 25 to the BBR Fed #31-25 well.

The environmental consequences of Alternative C are described below.

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 18 proposed well locations, all can be drilled without a well pad being constructed. As such, surface disturbance associated with the drilling of the wells would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 5 x 35 x 10 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 18 wells would involve approximately 0.2 acre/well for a total estimated disturbance of 3.6 acres.

Approximately 16.68 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.39 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	18	0.2/acre (100 x 100 feet)	3.6	Long Term
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0.0	Long Term
Impoundments	2		9.7	Long Term
On-channel	2	Site Specific	9.7	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	12	0.02 ac/WDP	0.24	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads	0.0	None proposed	0.0	Long Term
2-Track Roads	16.68		43.97	Long Term
No Corridor	9.90	12' Width or Site Specific	15.20	
With Corridor	6.78	35' Width or Site Specific	28.77	
Pipelines	1.39		5.92	Short Term
No Corridor	0.24	35' Width or Site Specific	1.04	
With Corridor	1.15		4.88	
Overhead Powerlines	0.28	30' Width	1.01	Long Term

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

4.2. Soils

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

- Mixing of horizons – occurs where construction on roads, pipelines or other activities take place. Mixing results in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Loss of soil vegetation cover, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography and cover.
- Soil productivity would be eliminated along improved roads and severely restricted along two track trails until successful final reclamation is achieved.
- Modification of hill slope hydrology.

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

Areas identified as having a low reclamation potential were identified at the onsite in sections 18 and 25 and avoided wherever possible. However, some areas of low reclamation potential will be affected by the proposed action. As a result, site specific mitigation measures will be applied in these areas to reduce susceptibility to degradation and enhance reclamation potential.

Soil disturbances other than permanent facilities would be short term with expedient, successful interim reclamation and site stabilization. In locations of highly erosive soils, the operator will be required to stabilize the disturbed surface within 30 days of the initial disturbance. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, wing ditches, culverts, rip-rap, etc) would ensure land productivity/stability is regained and maximized. In addition, the operator will adhere to COAs which limit the surface disturbance allowable for construction and improvements.

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). The Wyoming Reclamation Policy applies to all surface disturbing activities. Authorizations for surface disturbing actions are based upon the assumptions that an area can and ultimately will be successfully reclaimed. BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to or better than that which existed before it was disturbed. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.

4.3. Vegetation

The construction associated with this project will disturb a total of 64.44 acres. To insure expedient reclamation that conforms to the Wyoming Reclamation Plan objectives, native seed mixes are recommended for use on the different ecological sites. Seed mixes for the Leavitt Federal POD were

determined based on soil map unit types, the dominant ecological sites found within the project area, and the mixing of soil horizons in disturbed areas. A loamy, clayey, and sandy seed mix was created for the entire POD (see site specific COAs). These native species should adapt readily to each soil and ecological site in the POD area to ensure revegetation, with prompt and appropriate re-contouring and reclamation.

The construction of the access roads, pipelines and well locations will also disturb sagebrush. Wyoming big sagebrush has not been included in these mixes because direct seeding success has been marginal in the past. With expedient reclamation and re-spreading of the topsoil, sagebrush seed should be present in the seed base and should regenerate given proper environmental conditions.

4.3.1. Wetland/Riparian

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment. The addition of direct discharge into ephemeral and intermittent channels will have the same effect. Continuous high stream flows into wetlands and riparian areas would change the species composition. 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).

These effects may be applicable to this POD for a short reach of Spring Creek (approximately one stream mile downstream of Outfall 007) that does not currently convey constant CBNG discharge and tributaries to Porcupine Creek. There are no cottonwood stands observed on Spring Creek or the tributaries to Porcupine Creek, but they may exist downstream of the POD area. Because water flow rates are declining at downstream outfalls on Spring Creek, it is not likely that water produced from this POD will significantly increase current or recent past flow rates on Spring Creek.

4.3.2. Invasive Species

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

1. Provide information to field-going employees regarding noxious weed identification, prevention measures, management techniques, and impacts of weed invasion.

2. Implement prevention methods to deter the introduction of weed species that are not yet present within the project boundary. Weed prevention methods include:
    - Use of sanitary procedures for field equipment and vehicles
    - Recognition and elimination of new weed populations as they are identified
    - Identification and delineation of new weed infestations

3. The application of treatment methods for eradication and control of weed growth and infestations. Treatment methods include:
    - Mowing prior to seed formation on weeds of concern.

- Tillage of small infestations prior to seed formation
- Targeted grazing using domestic herbivores
- Application of appropriate herbicides

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

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

4.3.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Antelope Creek drainage, which is approximately 25% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into the Antelope Watershed.

No additional mitigation measures are required.

4.4. Wildlife (Alternative C – Environmentally Preferred)

4.4.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, yearlong range for pronghorn and mule deer would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarizes the proposed activities. Items identified as long term disturbance would cause direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they may provide some habitat value after they are reclaimed and native vegetation has been established.

In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 mile (Hiat and Baker 1981). WGFD indicates that a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral

facilities overlap, creating contiguous avoidance areas (WGFD 2004a). A multi-year study on the Pinedale Anticline suggests that, not only do mule deer avoid mineral activities, but, after three years of drilling activity, they had not become accustomed to the disturbance (Madson 2005).

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

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

Reclamation and seeding activities that occur within big game habitats during the spring will likely displace does and fawns due to the human presence in the area. This may cause reduced survival rate of does and fawns that must expend increased energies to avoid such activities.

4.4.1.1. Big Game Cumulative effects

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

4.4.2. Aquatics Direct and Indirect Effects

Produced water is to be discharged to channels in the Spring Creek and Porcupine Creek drainages. Water will be conveyed to the outfall structures in pipelines. Produced water may reach up to three reservoirs, two of which will be improved. If a reservoir were to discharge, it is unlikely that the produced water would reach a fish-bearing stream and that downstream species would be affected.

4.4.2.1. Aquatics Cumulative effects

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

4.4.3. Migratory Birds Direct and Indirect Effects

Disturbance of the habitat types within the project area is likely to impact migratory birds. Native habitats will be lost directly with the construction of wells, roads, and pipelines. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts.

Increased human activities are likely to displace migratory birds farther than simply the physical habitat disturbance. Habitat fragmentation results in more than just a quantitative loss in the total area of habitat available; the remaining habitat area is also qualitatively altered (Temple and Wilcox 1986). Ingelfinger (2004) identified that within 100 m of dirt roads within a natural gas field, the density of breeding Brewer's sparrows declined by 36%, and breeding sage sparrows declined by 57%. Effects occurred along roads with light traffic volume (<12 vehicles per day). The increasing density of roads constructed

in developing natural gas fields exacerbated the problem, creating substantial areas of impact where indirect habitat losses (displacement) were much greater than the direct physical habitat losses.

Those species that are edge-sensitive will be displaced further away from vegetative edges due to increased human activity, causing otherwise suitable habitat to be abandoned. If the interior habitat is at carrying capacity, then birds displaced from the edges will have no place to relocate. One consequence of habitat fragmentation is a geometric increase in the proportion of the remaining habitat that is near edges (Temple 1986). In severely fragmented habitats, all of the remaining habitat may be so close to edges that no interior habitat remains (Temple and Cary 1988). Over time, this will lead to a loss of interior habitat species in favor of edge habitat species.

Other migratory bird species that utilize the disturbed areas for nesting may be disrupted by the human activity, and nests may be destroyed by equipment. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003). Overhead power lines may affect migratory birds in several ways. Power poles provide raptors with perch sites and may increase predation on migratory birds. Power lines placed in flight corridors may result in collision mortalities. Some species may avoid suitable habitat near power lines in an effort to avoid predation.

Migratory bird species within the Powder River Basin nest in the spring and early summer and are vulnerable to the same effects as sage-grouse and raptor species. Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor nesting timing limitations are applied, nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable. CBNG activities that occur in the spring may also be detrimental to migratory bird survival, as the timing of these activities may directly impact breeding birds. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.4.3.1. Migratory Birds Cumulative Effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235. No additional mitigation measures are required.

4.4.4. Raptors Direct and Indirect Effects

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

The presence of overhead power lines may impact foraging raptors. Raptors forage opportunistically throughout the Powder River Basin. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span

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

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a 0.5 mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation to be located greater than 0.25 mile from occupied raptor nests.

Well 41-25 was moved to increase the distance to ferruginous hawk nests and limit visibility of the well from the nests. Well 32-18 was dropped because it was within 0.25 mile of nest 5227 and no suitable alternative location was found. This well was replaced by well 31-18, which was located 0.25 mile away from and out of line-of-sight of nest 5227. Well 21-18 was dropped due to its proximity to nest 2484. No suitable alternate location was found. Well 12-5 was relocated at least 0.25 mile away from and out of line-of-sight of nest 5225 and other nests in the vicinity. The pipeline corridor in S18 T42N R72W was rerouted to corridor with the existing unimproved road that travels north-south in the eastern half of the section in order to minimize disturbance to and fragmentation of raptor habitat in the area. Access to S25 T42N R73W was rerouted to minimize traffic disturbance to nests in SE S24, NE S25, SW S19 T42N R72W and NW S30 T42N R72W. The newly proposed access to S25 is from the road that travels NW – SE through S24 and then along the road that travels south into S25 from SESE S24.

Table 3. Infrastructure within 0.5 mile of documented raptor nests within the Leavitt project area surface-disturbing activities).

BLM ID	Amount and Type of Infrastructure	
	< 0.25 Mile	0.25 - 0.5 Mile
860		• 1 Existing unimproved road
871	• 1 Existing unimproved road	• 1 Well (31-25) • 2 Existing unimproved roads • 1 Pipeline corridor • 1 Outfall (010)
876	• 1 Existing unimproved road • 1 Outfall (010) • 1 Pipeline corridor	• 1 Well (31-25) • 2 Existing unimproved roads • 1 Pipeline corridor
885		• 1 Existing unimproved road
886		• 1 Well (31-18) • 1 New unimproved road (to well 31-18) • 1 Pipeline corridor (to well 31-18)
887		• 1 Existing unimproved road
890	• 1 Pipeline corridor • 1 New unimproved road • 1 Existing unimproved road	• 1 Pipeline corridor • 1 New unimproved road • 2 Existing unimproved roads
2484	• 1 Pipeline corridor • 1 New unimproved road	• 2 Wells (31-18, 41-18) • 1 New unimproved road • 1 Pipeline corridor • 2 Existing unimproved roads • 1 Outfall (006)

BLM ID	Amount and Type of Infrastructure	
	< 0.25 Mile	0.25 - 0.5 Mile
2485	• 1 Pipeline corridor • 1 New unimproved road	• 1 Well (41-18) • 1 Pipeline corridor • 1 New unimproved road • 1 Outfall (006)
2486		• 1 Pipeline corridor • 1 New unimproved road • 2 Existing unimproved roads
2494		• 1 Well (31-18) • 1 New unimproved road (to well 31-18) • 1 Pipeline corridor (to well 31-18) • 1 Existing unimproved road
2495	• 1 Pipeline corridor • 1 New unimproved road	• 1 Pipeline corridor • 1 New unimproved road • 2 Existing unimproved roads
2496	• 1 Pipeline corridor • 1 New unimproved road • 1 Existing unimproved road	• 1 Pipeline corridor • 1 New unimproved road • 2 Existing unimproved roads
4591	• 1 Pipeline corridor • 1 New unimproved road • 1 Existing unimproved road	• 1 Pipeline corridor • 1 New unimproved road • 2 Existing unimproved roads
5175	• 1 Pipeline corridor • 1 New unimproved road • 2 Existing unimproved roads	• 1 Pipeline corridor • 1 New unimproved road • 2 Existing unimproved roads
5225	• 2 Existing unimproved roads • 1 Pipeline corridor • 1 Outfall (002)	• 4 Wells (21-5, 12-5, 32-6, 31-6) • 3 Pipeline corridors • 3 Segments of new unimproved roads (to wells 21-5, 32-6, and 31-6) • 1 Potential rechannelization area • 1 segment of overhead power
5226	• 1 Existing unimproved road	• 4 wells (21-5, 12-5, 32-6, 31-6) • 3 Pipeline corridors • 3 Segments of new unimproved roads (to wells 21-5, 32-6, and 31-6) • 2 Outfalls (001, 002) • 1 Potential rechannelization area • 1 Segment of overhead power
5227		• 1 Well (31-18) • 1 New unimproved road (to well 31-18) • 1 Pipeline corridor (to well 31-18)
5228	• 1 Existing unimproved road • 1 Pipeline corridor	• 1 Well (31-25) • 2 Existing unimproved roads • 1 Pipeline corridor

BLM ID	Amount and Type of Infrastructure	
	< 0.25 Mile	0.25 - 0.5 Mile
5229	• 1 Existing unimproved road • 1 Outfall (010) • 1 Pipeline corridor	• 1 Well (31-25) • 2 Existing unimproved roads • 1 Pipeline corridor • 1 Outfall (090) • 2 Monitoring wells • 1 Existing reservoir w/ improvements
5230	• 1 Existing unimproved road • 1 Outfall (010) • 1 Pipeline corridor	• 1 Well (31-25) • 2 Existing unimproved roads • 1 Pipeline corridor • 1 Monitoring well • 1 Existing reservoir w/ improvements
5231	• 1 Existing unimproved road • 1 Outfall (010) • 1 Pipeline corridor	• 1 Well (31-25) • 2 Existing unimproved roads • 1 Pipeline corridor • 1 Monitoring well
5232	• 1 Existing unimproved road • 1 Outfall (010) • 1 Pipeline corridor	• 3 Wells (31-25, 43-25, 32-25) • 3 Pipeline corridor • 2 Existing unimproved roads • 2 New unimproved roads • 1 Outfall (090) • 3 Monitoring wells • 1 Existing reservoir w/ improvements
5233		• 1 Well (31-6) • 1 Existing unimproved road • 1 Segment new unimproved road (to well 31-6) • 1 Pipeline corridor • 1 Water road crossing (21-6) • 1 Potential rechannelization area
5234		• 1 Existing unimproved road
5320	• 2 Existing unimproved roads • 1 Pipeline corridor	• 4 wells (21-5, 12-5, 32-6, 31-6) • 3 Pipeline corridors • 3 segments of new unimproved roads (to wells 21-5, 32-6, and 31-6) • 2 Outfalls (001, 002) • 1 Potential rechannelization area
5321	• 1 Existing unimproved road	• 1 Well (31-6) • 1 Segment of new unimproved road (to well 31-6) • 2 Pipeline corridors • 1 Water road crossing (21-6) • 1 Potential rechannelization area
5459		• 1 Existing unimproved road

A pipeline corridor was proposed within 0.25 mile of nests 876, 5228, 5229, 5230, 5231, and 5232. At the onsite, this pipeline was rerouted to travel along natural contour lines and out of line-of-sight of as many nests as possible. This route was detemined to be the most preferable option for minimizing impacts to the nests in the area. Construction of the pipeline will take place outside of breeding season, and because it is along an existing road, it is unlikely that the additional disturbance along this corridor will cause raptors to abandon these nests.

The rerouted access road to S25 T42N R73W travels within 0.25 mile of nests 871, 5230, and 5231. This road is an existing road. It was determined in discussions with Coleman and the landowner that this route was their preferable route for providing access to the wells in that section. The landowner did not want Coleman to access the section from the east along an existing route that avoids these nests, due to his concern for potential impacts on his lambing operation. The only other access into the section travels within 0.25 mile of several more nests, and so the operator proposed access was selected. Increased travel along this access road may cause these nests to be abandoned.

Outfall 010 is proposed within 0.25 mile of nests 876, 5229, 5230, 5231, and 5232. Outfall 002 is proposed within 0.25 mile of nest 5225. Construction of the outfalls will occur outside the raptor breeding season. The presence of the outfall in close proximity to these nests may deter raptors from using the area, due to increased human activity associated with monitoring and maintenance of the outfall. It may enhance prey availability for raptors, as it may provide a water source for potential prey, but it may also attract nest predators such as skunks, fox, raccoons, or common ravens.

A pipeline and road corridor consisting of new and existing segments were proposed within 0.25 mile of nests 890, 2484, 2485, 2495, 2496, 4591, and 5175. The new segments of the road corridor are adjacent to an existing unimproved road. The pipeline corridor was rerouted to this location in order to reduce fragmentation and overall surface disturbance in this area. The corridor is out of line of sight of all but nests 890 and 4591. Increased travel along this road and pipeline corridor for access and maintenance may result in these nests being abandoned.

A pipeline was proposed within 0.25 mile of nest 5225. The pipeline corridor is adjacent to an existing unimproved road, which results in the least disturbance and fragmentation of the landscape in this area. Construction of the pipeline will occur outside the raptor breeding season timing limitation (April 15 – June 15) to minimize disturbance during that critical time. Increased travel along the road, which is also within 0.25 mile of nests 5226 and 5320, and another access road to the north, which is within 0.25 mile of these three nests and also nest 5321, may cause these four nests to be abandoned.

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

4.4.4.1. Raptors Cumulative effects

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

4.4.5. Threatened and Endangered and Sensitive Species

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

4.4.5.1. Threatened and Endangered Species

Table 4. Summary of Threatened and Endangered Species Habitat and Project Effects

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Habitat not of sufficient area.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	S	NLAA	Habitat suitable. Project close to known population.

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

Project Effects
LAA - Likely to adversely affect.
NE - No Effect.
NLAA - May Affect, not likely to adversely affect individuals or habitat.

4.4.5.1.1. Black-Footed Ferret Direct and Indirect Effects

Because the black-tailed prairie dog colonies within and adjacent to the Leavitt project area are of insufficient size for supporting ferrets and are isolated from other prairie dog complexes, implementation of the proposed development will have "***no effect***" on the black-footed ferret.

4.4.5.1.2. Ute Ladies'-Tresses Orchid Direct and Indirect Effects

ULT is threatened by energy developments, noxious weeds, and water developments. Prolonged idle conditions in the absence of disturbance (flooding, grazing, mowing) may be a threat just as repeated mowing and grazing during flowering may lead to decline (Hazlett 1996, 1997, Heidel 2007). Heavy equipment used in energy development construction could dig up plants. Invasive weeds transplanted by vehicle and foot traffic in habitat could outcompete this fragile species. Restricting work from areas of ULT habitat reduces these impacts.

Suitable habitat is present within the Leavitt project area. The two reservoirs that are likely to receive discharged water are located along West Prong Creek, a tributary of Upper Spring Creek. The portion of West Prong Creek between the two reservoirs currently provides marginally suitable habitat for supporting ULT. Reservoir seepage may create suitable habitat if the historically ephemeral drainage becomes perennial. The most suitable habitat for supporting ULT (around the reservoir in S05 T42N R72W) will not receive produced water and is likely to be unaffected by direct impacts from development of the Leavitt project. Two springs have been identified within the project area. Neither spring contains the habitat or soils to support ULT. Surveys for the presence of ULT were negative, but detection is difficult, as ULT does not bloom every year, the flowers are inconspicuous, the timing of blooming varies from year to year, and so ULT may be present but not detected in the one year of surveys. Due to the proximity of the project area to known populations, the presence of suitable habitat, but the lack of identification of any individual plants, the proposed project "***may affect, but is not likely to adversely affect***" ULT.

4.4.5.2. Sensitive Species Direct and Indirect Effects

BLM will take necessary actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22A states: "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary."

4.4.5.2.1. Prairie Dog Colony Obligates

Increased traffic along roads associated with energy development within prairie dog colonies may result in direct loss of species associated with prairie dog colonies. Loss of prairie dog habitat and fragmentation of active prairie dog towns will result in the decline of numerous sensitive species in the short grass prairie ecosystem.

4.4.5.2.2. Sagebrush Obligates

Construction and maintenance activities associated with development of the Leavitt project are likely to cause a decline in sagebrush obligate species. In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats or by creating soil conditions facilitating the spread of invasive species (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100 m of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001). Increased numbers of corvids and raptors associated with powerlines (Steenhof et al. 1993, Knight and Kawashima 1993, Vander Haegen et al. 2002) increases the potential predation impact on sage-grouse and other sagebrush-breeding birds (Knick et al. 2003).

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as remnants surrounded by unusable environments (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Sagebrush-obligate species decline because areas of suitable habitat decrease (Temple & Cary 1988), because of lower reproduction, and/or because of higher mortality in remaining habitats (Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe has the further potential to affect the conservation of sagebrush-obligate species because of the permanence of disturbance (Knick and Rotenberry 1995). Several decades are required to reestablish ecologically functioning mature sagebrush communities. Due to this, sagebrush obligate species may not return for many years after reclamation activities are completed.

Table 5. Summary of Sensitive Species Habitat and Project Effects.

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (*Amphispiza billneata*)	Basin-prairie shrub, mountain-foothill shrub	NS	MIIH	Sagebrush cover will be affected.
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Trumpeter swan (*Cygnus buccinator*)	Lakes, ponds, rivers	S	MIIH	Reservoirs may provide migratory habitat.
White-faced ibis (*Plegadis chihi*)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (*Coccyzus americanus*)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present.
Fish				
Yellowstone cutthroat trout (*Oncoryhynchus clarki bouvieri*)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (*Cynomys ludovicianus*)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIIH	Prairie dog towns will be affected.
Fringed myotis (*Myotis thysanodes*)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (*Myotis evotis*)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat (*Euderma maculatum*)	Cliffs over perennial water.	NP	NI	Habitat not present.
Swift fox (*Vulpes velox*)	Grasslands	S	MIIH	Grasslands will be affected.
Townsend's big-eared bat (*Corynorhinus townsendii*)	Caves and mines.	NP	NI	Habitat not present.
Plants				
Porter's sagebrush (*Artemisia porteri*)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
William's wafer parsnip (*Cymopterus williamsii*)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

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

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

4.4.5.2.3. Bald Eagle Direct and Indirect Effects

Based on the raptor nesting and bald eagle winter roost surveys and lack of suitable habitat, it is unlikely bald eagles nest or roost within the Leavitt project area. The proposed project should not affect bald eagle nesting or winter roosting.

No overhead three-phase distribution lines are currently installed within the project area. A total of 6.9 miles of overhead powerlines will be installed for Coleman's fee, federal and State CBNG development in the general area, 0.28 miles of which, fall within the POD boundary. The presence of overhead power lines may impact foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

There are currently no improved roads within the project area, and none are proposed. All existing and proposed roads will be two-track roads. Typically, two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported. Bald and golden eagles were observed feeding on 16 of the reported road-side carcasses (<4%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging, it is unlikely that leads CBNG project roads will affect bald eagles.

Produced water will be stored in two existing reservoirs, which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to benefit bald eagles by increasing their food supply or adversely affect them, from an increase in potential contaminants or by increasing collisions because of proximity to roads or powerlines. Eagle use of reservoirs should be reported to determine the need for any future management.

4.4.5.2.4. Black-tailed Prairie Dog Direct and Indirect Effects

Coleman proposes to use an existing two-track road that travels through the prairie dog colonies listed in Section 3.3.5.2.4 (Black-tailed Prairie Dog). Increased traffic along this road may result in direct mortalities of black-tailed prairie dogs. Well houses and power poles provide habitats for mammalian and avian predators that may cause an increase in prairie dog predation. Constant noise and movement of equipment puts considerable stress on the animals and may cause an increase in prairie dog mortalities.

4.4.5.2.5. Western Burrowing Owl Direct and Indirect Effects

Use of roads and pipeline corridors may increase owl vulnerability to vehicle collision. Overhead power lines provide perch sites for larger raptors that could potentially result in increased burrowing owl predation. CBNG infrastructure such as roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. No nests were located by ARCADIS (2007b, 2008), but suitable nesting habitat is present.

The USFS Thunder Basin National Grasslands (TBNG) in Campbell County, WY, who cooperated with the BLM in the creation of the 2003 PRB EIS, recommends a 0.25 mile timing restriction buffer zone for burrowing nest locations during their nesting season (April 15 to August 31). Instruction Memorandum No. 2006-197, directs the field offices to "use the least restrictive stipulations that effectively accomplish the resource objectives or uses." Alteration of the general raptor nest timing limitation (Feb 1 to July 31) to a more specific burrowing owl nesting season timing limitation will effectively reduce the vulnerability of owls to collision while shortening the timing restriction period to four and one half months (See Chapter 3 for breeding, nesting, and migration chronology) from six and one half months and from 0.5 mile to 0.25 mile.

4.4.5.2.6. Grouse

4.4.5.2.6.1. Greater Sage-grouse Direct and Indirect Effects

According to WGFD sage-grouse lek database, four sage-grouse leks are located within four miles of the Leavitt project area boundary. The proposed action will adversely impact breeding, nesting, brood rearing, and late summer habitat. Proposed project elements that are anticipated to negatively impact grouse include: 18 CBNG wells on 18 locations, 4.8 miles of new roads, 8.3 miles of new pipelines, 0.3 miles of overhead power, and increased vehicle traffic on established roads. Using 0.6 miles as avoidance buffer (Holloran et al. 2007, Aldridge and Boyce 2007), effective sage-grouse habitat loss will be 8,282 acres from roads, pipelines, and overhead power, and 10,125 acres from well locations. These numbers are not additive since the buffered area overlaps between these infrastructure types.

Based on the best available science, which is summarized below, the proposed action will most likely contribute to the extirpation of the local grouse population and reduction of attendance at the four leks within four miles of the project area.

Several changes were made at the onsite to reduce fragmentation of and disturbance to sage-grouse habitat. Wells 32-25 and 43-25 were moved closer to main access roads and towards the perimeter of sagebrush stands. Coleman agreed to place drilling equipment and infrastructure for well 43-25 out of the sagebrush and away from a nearby drainage to reduce impacts. Well 12-25 was moved out of sagebrush to a grass pocket, and Coleman agreed to place drilling equipment and infrastructure so as to minimize disturbance to the surrounding sagebrush. The access road and utility corridor for this well were moved and narrowed to minimize disturbance to sagebrush. The access road and utility corridor for well 14-25 were moved and narrowed to minimize disturbance to sagebrush. The utility corridor for well 23-6 was moved along an existing two-track road to minimize disturbance to sagebrush. Well 21-6, and its associated access road and utility corridor were moved to reduce fragmentation of sage-grouse nesting and brood-rearing habitat.

4.4.5.2.6.2. Greater Sage-grouse Cumulative Effects

In addition to the direct impacts to sage-grouse habitat that will be created by the federal wells and infrastructure associated with the Leavitt project, the surrounding area contains existing fee, state, and federal fluid mineral development. The sage-grouse cumulative impact assessment area for this project encompasses a four mile radius from the four sage-grouse leks that intersect the project area. As of September 9, 2008, there were approximately 625 existing wells and associated infrastructure within four miles of the four leks - an area of 138 square miles. The existing well density is approximately 4.5 wells per square mile. Due to this level of development there is a strong potential that the populations breeding at these leks may become severely reduced or extirpated without the federal development.

There are 220 proposed wells (18 from this project) within four miles of the four leks. With the addition of the 202 proposed wells that are not associated with this proposed action, the well density within four miles of the leks increases to 6.0 wells/section. With approval of alternative C (18 proposed well locations) the well density increases to 6.1 wells/section.

CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County. By May 2003 there were 26,718 CBNG wells permitted within the BFO area (WGFD 2004). The PRB FEIS estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BLM 2003).

The PRB FEIS (BLM 2003) concluded that "Activities associated with the proposed project would affect sage-grouse in several ways. These effects may include: (1) increased direct mortality (including legal hunting, poaching, and collision with power lines and vehicles); (2) the introduction of new perches for raptors and thus the potential change in rate of predation; (3) direct loss or degradation of habitats; (4) indirect disturbance resulting from human activity (including harassment, displacement, and noise); (5) habitat fragmentation (particularly through construction of roads); and (6) changes in population (pg. 4-257)." The FEIS goes on to state that "implementation of several mitigation measures would reduce the extent of each impact addressed by those measures. Despite these measures, the synergistic effect of several impacts would likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its federal listing. Local populations may be extirpated in areas of concentrated development, but viability across the Project Area (Powder River Basin) or the entire range of the species is not likely to be compromised (pg. 4-270)."

The Powder River Basin Oil and Gas Project Record of Decision (PRB ROD) (BLM 2003) included a Mitigation Monitoring and Reporting Plan (MMRP). The uncertainties as to where and at what level development was to proceed as well as the uncertainties associated with the assumptions that were used to predict impacts suggests that one-time determination of impacts that is included in the EIS may not occur as projected. The MMRP helps to continually assess the effects of the project and the adequacy of the mitigation. Such a plan/process provides a mechanism to continuously modify management practices in order to allow development while continuing to protect the environment (E-1)." In other words, development pace and patterns may not occur as predicted, and so the BLM may use the adaptive management process provided for in the BFO Resource Management Plan (BLM 2001).

Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (WGFD 2004). Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, powerlines, reservoirs and other infrastructure in the Powder River Basin (WGFD 2005, WGFD 2004). Sage-grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. In southwestern Wyoming, yearling female greater sage-grouse avoid nesting in areas within 0.6 miles of producing well pads (Holloran et al. 2007), and in southern Alberta, brood-rearing females avoid areas within 0.6 miles of producing wells (Aldridge and Boyce 2007). Doherty et al. (2008) demonstrated that sage-grouse in the Powder River Basin avoided otherwise suitable wintering habitats once they had been developed for energy production, even after timing and lek buffer stipulations had been applied. WGFD feels a well density of eight wells per section creates a high level of impact for sage-grouse and that sage-grouse avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). As interpreted by a coordinated effort among state fish and wildlife agencies from Montana, Colorado, Utah, South Dakota, North Dakota and Wyoming, (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008), research indicates that oil or gas development exceeding approximately 1 well pad per square mile with the associated infrastructure, results in calculable impacts on breeding populations, as measured by the number of male sage-grouse attending leks (Holloran et al. 2005, Walker et al. 2007)

Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). In a study of greater sage-grouse population response to natural gas field development in western Wyoming, Holloran et al. (2005) concluded that increased noise intensity, associated with active drilling rigs within 5 km (3.1 miles) of leks, negatively influenced male lek attendance. In 2002, Braun et al. documented approximately 200 CBNG facilities within one mile of sage-grouse leks. Sage-grouse

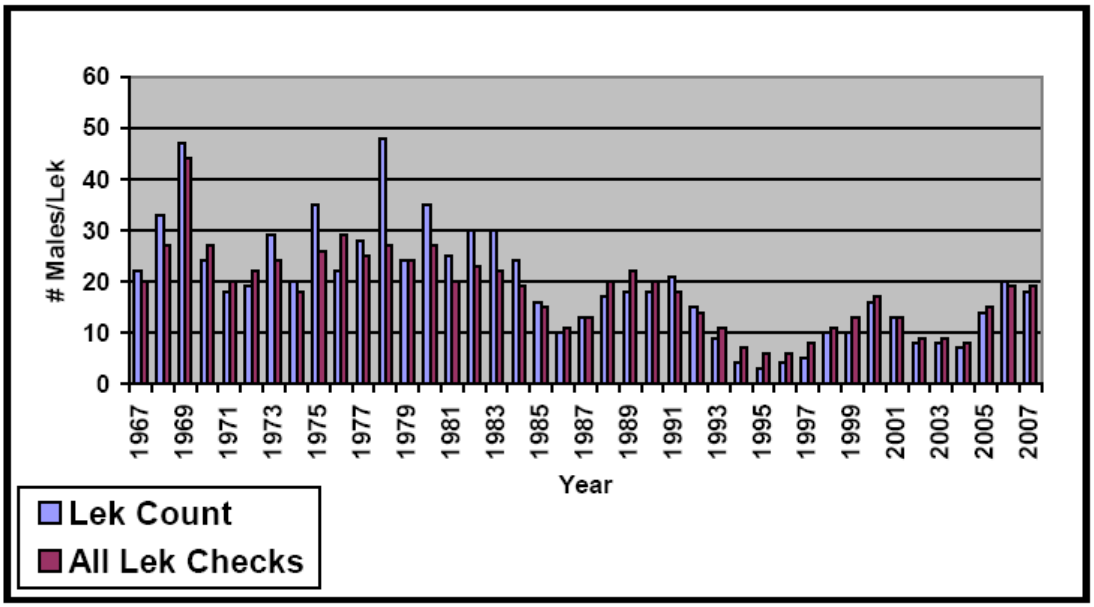
numbers were found to be consistently lower for these leks than for leks without this disturbance. Direct habitat losses from the facilities themselves, roads and traffic, and the associated noise were found to be the likely reason for this finding.

Vegetation communities within the Powder River Basin are naturally fragmented, as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of the sage-grouse range. A sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within the Powder River Basin to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). This represents a decrease of more than 63% in the past forty years, from an average patch size of 820 acres and an overall coverage of 41% in 1964 (Rowland et al. 2005). The existing development within the cumulative impacts assessment area has further fragmented the sage-grouse habitat. Disturbance created by this project will contribute to additional fragmentation.

Another concern with CBNG development is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (WGFD 2004). West Nile virus represents a significant new stressor, which in 2003 reduced late summer survival of sage-grouse an average of 25% within four populations including the Powder River Basin (Naugle et al. 2004). In northeastern Wyoming and southeastern Montana, West Nile virus-related mortality during the summer resulted in an average decline in annual female survival of 5% from 2003 to 2006 (Walker et al. 2007). Powder River Basin sage-grouse losses during 2004 and 2005 were not as severe. Summer 2003 was warm and dry, more conducive to West Nile virus replication and transmission than the cooler summers of 2004 and 2005 (Cornish pers. comm.).

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

Figure 2. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2007.



The BFO RMP and the PRB ROD include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies

(WAFWA) (BLM 2004). BLM Wyoming adopted the two-mile recommendation in 1990. The two-mile recommendation was based on early research which indicated between 59% and 87% of sage-grouse nests were located within two miles of a lek (BLM 2004). These studies were conducted within prime, contiguous sage-grouse habitat, such as Idaho's Snake River plain.

Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the breeding lek (BLM 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage-grouse hens nested within 3 km (1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found only 36% of their grouse nesting within 3 km of the capture lek. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush being the dominant shrub species (Moynahan et al. 2007). Habitat conditions and sage-grouse biology within the BFO administrative area are more similar to Moynahan's north-central Montana study area than the Upper Green River area.

A two-mile timing limitation, given the long-term population decline and that less than 50% of sage-grouse are expected to nest within the limitation area, is insufficient to reverse the population decline. Moynahan and Lindberg (2004) and WAFWA (Connelly et al. 2000), recommend increasing the protective distance around sage-grouse leks. The BLM and University of Montana are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development. Thus far, this research suggests that impacts to leks from energy development are discernable out to a minimum of four miles, and that some leks within this radius have been extirpated as a direct result of energy development (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008). Even with a timing limitation on construction activities, sage-grouse may avoid nesting within CBNG fields because of the activities associated with operation and production. In a typical landscape in the Powder River Basin, energy development within two miles of leks is projected to reduce the average probability of lek persistence from 87% to 5% percent (Walker et al. 2007).

Walker et al. (2007) indicate the size of a no-development buffer sufficient to protect leks would depend on the amount of suitable habitat around the lek and the population impact deemed acceptable. Also, rather than limiting mitigation to only timing restrictions, research suggests more effective mitigation strategies include, at a minimum, burying power lines (Connelly et al. 2000); minimizing road and well pad construction, vehicle traffic, and industrial noise (Lyon and Anderson 2003, Holloran et al. 2005); and managing produced water to prevent the spread of mosquitoes with the potential to vector West Nile Virus in sage grouse habitat (Walker et al 2007).

The multi-state recommendations presented to WGFD for identification of core sage grouse areas acknowledges there may be times when development in important sage grouse breeding, summer, and winter habitats cannot be avoided. In those instances they recommend, "…infrastructure should be minimized and the area should be managed in a manner that effectively conserves sagebrush habitats (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008).

4.4.5.2.7. Sharp-tailed grouse Direct and Indirect Effects

Sharp-tailed grouse habitat does not exist within the project area; therefore, development of the Leavitt project is not expected to affect this species.

4.4.5.2.8. Mountain Plover Direct and Indirect Effects

Suitable mountain plover habitat is present within the project area. Development of the Leavitt project may impact mountain plovers. Playas, linear pipeline corridors, and the black-tailed prairie dog colonies described in Section 3.3.5.2.4 (Black-tailed Prairie Dog) may provide suitable mountain plover habitat in some years, depending on precipitation. None of the areas reported by ARCADIS that qualify as mountain plover habitat will be subject to surface-disturbing activities.

Mineral development has mixed effects on mountain plovers. Disturbed ground, such as buried pipeline corridors and roads, may be attractive to plovers, while human activities within one-quarter mile may be disruptive. Use of roads and pipeline corridors by mountain plovers may increase their vulnerability to vehicle collision. Limiting travel speed to 25mph provides drivers an opportunity to notice and avoid mountain plovers and allows mountain plovers sufficient time to escape from approaching vehicles. Even if a nesting plover flushes in time, the nest would likely still be destroyed. Overhead power lines provide perch sites for raptors that could result in increased mountain plover predation. CBNG infrastructure such as well houses and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. Displace mountain plovers choose to nest in poor quality habitat when loss or alteration of their natural breeding habitat (predominently prairie dog colonies) occurs, such as heavily grazed land, burned fields, fallow agriculture lands, roads, oil and gas well pads, and pipelines. These areas could become reproductive sinks. Adult mountain plovers may breed there, lay eggs and hatch chicks; however, the young may not reach fledging age due to the poor quality of the habitat. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

To reduce impacts to nesting mountain plovers, the BLM BFO requires a 0.25 mile timing limitation for potential nesting habitat prior to nest survey completion and a 0.25 mile timing limitation for all occupied nesting habitat for the entire nesting season. Because no plovers were observed by ARCADIS during surveys in 2007 and 2008, this timing limit stipulation will not be applied unless incidental observations occur during future wildlife surveys within the POD boundary.

4.4.5.2.9. Swift Fox Direct and Indirect Effects

Suitable swift fox habitat is present within the project area. The project may impact swift foxes or their habitat. The construction of well pads, roads, pipelines and reservoirs causes direct habitat loss in areas used by swift fox. During construction of these facilities, swift foxes may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows puts considerable stress on the animals and is likely to cause an increase in swift fox mortalities. During the construction of these facilities individuals are exposed more frequently to predators and have less protective cover. Mineral related traffic on the adjacent roads may result in swift fox road mortalities.

The BLM BFO has very little data regarding the effects oil and gas development in the Powder River Basin has on swift fox occurrence. TBNG in Campbell County, WY who cooperated with the BLM in the creation of the 2003 PRB FEIS, applies a standard condition to oil and gas activities in association with swift fox dens. Therefore, in order to adequately protect the species, the BLM BFO incorporated the following condition from the TBNG Land Resource Management Plan into this project: “To reduce disturbances to swift fox during the breeding and whelping seasons, prohibit the following activities within 0.25 mile of their dens from March 1 to August 31: Construction (e.g. roads, water impoundments, oil and gas facilities), reclamation, gravel mining operations, drilling of water wells, and oil and gas drilling.” This timing restriction, based on the best available science, will reduce direct impacts to swift foxes within the project area. Because of the close proximity of the Leavitt project area to the TBNG, surveys for swift fox dens will be required prior to initiation of surface-disturbing activities in the project.

4.4.5.3. Sensitive Species Cumulative effects

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

4.5. West Nile Virus Direct and Indirect Effects

This project is likely to result in standing surface water which may potentially increase mosquito breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health

Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNv species and its effects in Wyoming.

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

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

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

4.6. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Antelope Creek watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies. Water from this POD will be directly discharged into Spring Creek or tributaries of Porcupine Creek with a portion projected to be stored in two existing reservoirs.

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

The maximum water production is predicted to be 15 gpm per well or 270 gpm (0.6 cfs or 435 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBNG Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Antelope Creek drainage, the projected volume produced within the watershed area was 12,613 acre-feet in 2008 (maximum production is estimated in 2004 at 17,685 acre-feet). As such, the volume of water resulting from the production of these wells is 3.4% of the total volume projected for 2008. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.6.1. Groundwater

The PRB FEIS predicts an infiltration rate of 28% to 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 75.6 gpm will infiltrate at or near the discharge points, downstream wetted reaches and impoundments (122 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 100 to 352 feet compared to 900 feet to 1200 feet for the Wyodak coal zone in the area. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

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

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

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

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

The BLM has installed shallow groundwater monitoring wells at five impoundment locations in the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. Water quality data has been sampled from these wells on a regular basis. Preliminary data from three sites show increasing TDS level as water infiltrates while two sites are not.

As of April, 2008, approximately 1774 impoundment sites have been investigated. These sites had more than 1988 borings. Of those impoundments, 259 met the criteria to provide compliance monitoring data if constructed and used for CBNG water containment. Only 109 monitored impoundments are currently in use. As of the 1st quarter of 2008, only 16 monitored impoundments exceeded groundwater class of use limits (Fischer, 2008). The BLM requires that operators comply with the DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.6.1.1. Groundwater Cumulative Effects:

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

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

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

4.6.2. Surface Water

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

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

Predicted Values	**TDS,** mg/l	**SAR**	**EC,** µmhos/cm
Most Restrictive Proposed Limit –		10	2,000
Least Restrictive Proposed Limit		10	2,500
Antelope Creek near Teckla, WY, USGS Gauging Station 06364700			
Historic Data Average at Maximum Flow		2.82	2,354
Historic Data Average at Minimum Flow		2.60	1,800
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 WYPDES Permit # WY0054186			
At all Leavitt discharge points	5,000	10	2,000
Predicted Produced Water Quality			
Wyodak Coal Zone	488	6.7	794

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 488 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS).

The quality for the water produced from the Wyodak target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 15.0 gallons per minute (gpm) is projected is to be produced from these 18 wells for a total of 270 gpm for the POD. See Table 4.5.

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

There are 12 discharge points proposed for this project. They have been appropriately sited and utilize

appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

Most of the water will be directly discharged to area streams, but 2 existing impoundments (45.24 acre-feet) would potentially be upgraded within the project area to manage a portion of the produced water. These impoundments will disturb approximately 9.7 acres including the dam structures. Both of these water impoundments are on-channel reservoirs disturbing. Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Direct discharge will potentially allow for streambed enhancement at new outfall locations through wetland-riparian species establishment.

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 mainstem of the Antelope Creek of 12 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 18 wells is anticipated to be a total of 270 gpm or 0.6 cfs to impoundments. Assuming that all water is directly discharged a maximum 0.6 cfs may be added to the Antelope Creek flows, or 5% of the predicted total CBNG produced water contribution.

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area. Based on the area of the Spring Creek watershed above the POD (30 square milies) and an assumed density of one wells per location 80 acres, the potential exists for the development of 240 wells which could produce a maximum flow rate of 3,600 gpm (8.03 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 8.03 cfs, is much less than the runoff rate estimated from the 2-year storm event at 196 cfs for Spring Creek of the drainage.

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

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

Permit effluent limits were set at (WYPDES Permit WY0054186 page 2):

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 9.0
TDS	5000 mg/l max
Specific Conductance	2000 micromhos/cm
Sodium Adsorption Ratio	10
Sulfates	3000 mg/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
Chlorides	46 mg/l

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

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

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

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

In-channel downstream impacts are addressed in the WMP for the Leavitt POD prepared by WWC Engineering for Coleman Oil & Gas, Inc.

4.6.2.1. Surface Water Cumulative Effects

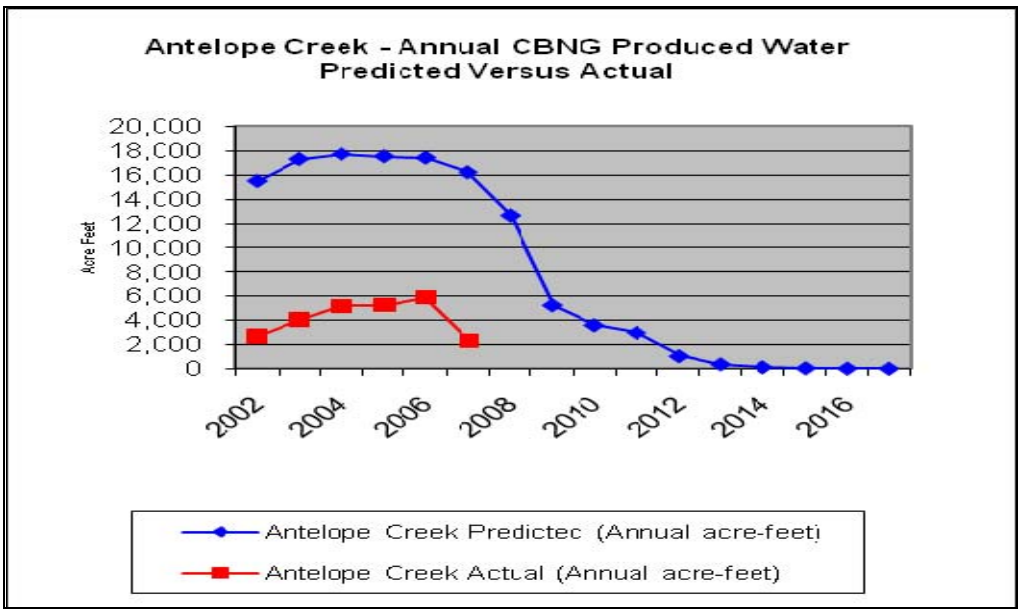
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Antelope Creek watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2007, all producing CBNG wells in the Antelope Creek watershed have discharged a cumulative volume of 25,321 acre-ft of water compared to the predicted 101,484 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 25 % of the total predicted produced water analyzed in the PRB FEIS for the Antelope Creek watershed.

Table 4.6 Actual vs. predicted water production in the Antelope Creek watershed 2007 *Data Update 3-08-08*

Year	Antelope Creek Predicted (Annual acre-feet)	Antelope Creek Predicted (Cumulative acre-feet from 2002)	Antelope Creek Actual (Annual acre-feet)		Antelope Creek Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	15,460	15,460	2,668	17.3	2,668	17.3
2003	17,271	32,731	4,042	23.4	6,710	20.5
2004	17,685	50,416	5,181	29.3	11,891	23.6
2005	17,503	67,919	5,234	29.9	17,125	25.2
2006	17,385	85,304	5,869	33.8	22,994	27.0
2007	16,180	101,484	2,327	14.4	25,321	25.0
2008	12,613	114,097				
2009	5,226	119,323				
2010	3,574	122,897				
2011	2,956	125,853				
2012	1,041	126,894				
2013	363	127,257				
2014	124	127,381				
2015	40	127,421				
2016	13	127,434				
2017	3	127,437				
Total	**127,437**		**25,321**			

Figure 4.1 Actual vs predicted water production in the Antelope Creek watershed



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

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

1. They are proportional to the actual amount of cumulatively produced water in the Antelope Creek drainage, which is approximately 25% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

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

4.7. Cultural Resources

No known historic properties will be impacted by the project as proposed, within the culturally inventoried areas. The un-inventoried areas will not be authorized for project activities, until a cultural inventory can be conducted. On 9/30/08, the Bureau will electronically notify the Wyoming State Historic Preservation Office (SHPO), following section VI(A)(1) of the Wyoming State Protocol, of a finding of no effect to historic properties for the proposed project.

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

4.8. Air Quality

In the project area, air quality impacts would occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including non-CBNG well production equipment, booster and pipeline compression engine exhaust). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Air quality impacts modeled in the PRB FEIS concluded that projected oil & gas development would not violate any local, state, tribal or federal air quality standards.

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Mary Hopkins	Interim WY SHPO	WY State Historic Preservation Office	No
Brad Rogers	Wildlife Biologist	US Fish & Wildlife Service	No

6. OTHER PERMITS REQUIRED

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

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