

# Appendix A

## Hydrology

A Water Management Plan (WMP) will be required for all CBNG projects (exploration as well as production). These plans must account for all water anticipated to be produced by the project. Determination of the most appropriate method for managing produced water will be left up to operators; however the operators must show that the methods chosen are feasible at that location, that the rates of water management anticipated are reasonable and that the proposed methods will not cause undue environmental degradation. Operators may be requested to change the proposed water management methods if the BLM decides that a more environmentally responsible method of water management is feasible for a particular project. All surface discharges must be properly permitted by MDEQ and all discharges into impoundments must be in compliance with the MDEQ General Discharge Permit for CBNG Produced Waters or Onshore Order No. 7. The operator must also specify the length of time an exploratory water management plan will be required.

### 1. Water Management Plan Requirements

Include the following:

- A USGS topographic map at 1:24000 scale (or legible copy) showing the actual discharge points, impoundments, production wells, injection wells, access routes, pipeline routes, erosion control and stabilization measures and any other associated water management facilities. (Refer to Map Requirements section on page xx).
- Before any produced water is removed from the well site, all applicable permits and authorizations must be obtained from such agencies as MDEQ, COE and BLM. BLM will not authorize discharge of produced water into State waters without a copy of the required permits issued by MDEQ. The BLM will review the WMP based upon copies of applications for permits, however final approval of the WMP and therefore the APD(s) will not be granted until the permits have been approved. Management of produced water from federal wells must comply with Onshore Order No. 7.
- The applicant shall submit a chemical water quality analysis from a location representative of the quality of water being proposed to be produced. The sample must be collected from the closest available existing source and must be collected within 6 miles of the proposed site. This sample must be collected from the same coal formation and from approximately the same depth as the proposed production. All analysis must be conducted in accordance with approved EPA test procedures (40 CFR 136 or 40 CFR 436.5) and must include, at a minimum, those parameters listed in Table XX below.

**TABLE XX  
REQUIRED PRODUCED WATER  
QUALITY PARAMETERS**

Parameter	Units
Total Dissolved Solids (TDS)	mg/L
Electrical Conductivity	μS/cm
pH	Standard
Calcium	mg/L
Magnesium	mg/L
Sodium	mg/L
Potassium	mg/L
Total Alkalinity, (as CaCO <sub>3</sub> )	mg/L
Bicarbonate	mg/L
Sulfate	mg/L
Nitrate+nitrite (NO <sub>3</sub> +NO <sub>2</sub> ) as N	mg/L
Radium 226 228	picocuries/L
Radon 222	picocuries/L
Arsenic, total recoverable	mg/L
Beryllium, total recoverable	mg/L
Selenium, total recoverable	mg/L
Iron	mg/L
Barium	mg/L
Boron	mg/L
Sodium Adsorption Ratio (SAR, calculated)	N/A

Specific criteria have been developed by the MDEQ and BLM for surface discharge and impoundment of CBNG produced waters. These criteria are discussed in detail below, however this should not be considered an endorsement of these water management methods over any other methods.

**Surface Discharge**

Current MDEQ policy would allow little to no discharge of CBNG waters into intermittent or ephemeral drainages, since no dilution of the produced water would occur in such drainages during low flow periods and undiluted CBNG waters are unlikely to meet surface water quality standards. If flow based discharges are adopted for CBNG discharges, some produced water may be allowed to be discharged during high stream flows (typically in the spring). There is also potential for produced water to be discharged into perennial streams. If a WMP proposes to discharge produced water to the waters of the state the following BLM requirements would need to be met prior to the approval of the WMP.

- Discharge points must be located in low gradient existing channels (below any active or potentially active head cuts) and not be located on hilltops or upland areas.
- Cumulative discharge must not exceed the naturally occurring mean annual peak flow of the receiving channel.
- Water energy dissipation measures must be designed and constructed at discharge points and at any unstable downstream sections (minor head cuts, eroding channel sections, etc.).

- Plans for and/or designs of, erosion control and stabilization measures must be provided. Any in-channel measures must be designed to accommodate existing planned and potential discharge in addition to naturally occurring flow and specified storm event. The “existing, planned and potential discharge” can be roughly calculated by determining the watershed area, dividing by the minimum well spacing (currently 80 acres), multiplying by the number of seams to be developed and multiplying this by the average discharge rate.
- A copy of the approved MDEQ discharge permits will be required prior to final BLM approval of the WMP.
- A table listing and describing the culverts (existing or proposed) located in drainages that would be affected by CBNG discharges. This listing should include the location, size (diameter and length), area of in-channel disturbance, drainage area above the culvert, condition of existing culverts and the anticipated maximum flow, including CBNG discharge, through the culvert based on a 10-year storm event.
- A table listing and describing the low water crossings (existing or proposed) located in drainages that would be affected by CBNG discharges. This listing should include the location, area of in-channel disturbance, drainage area above the crossing and the anticipated maximum flow, including CBNG discharge, through the crossing based on a 10-year storm event.
- A table listing and describing the CBNG water discharge points (existing and proposed), including location, all wells contributing to discharge at each point, estimated maximum flows, a NPDES number as available and the energy dissipation measures that will be used at each discharge point.

### **Discharge to Impoundments**

The MDEQ General Discharge Permit for Coalbed Natural Gas Produced Water allows for the discharge of produced waters into impoundments. The BLM will not approve a water management plan that includes the use of impoundments unless all the requirements of this permit are met. Please refer to this permit for complete requirement details. The BLM has also developed siting criteria for impoundments (See “Siting Guidelines for CBNG Produced Water Impoundments in the Powder River Basin, Montana” BLM-MCFO, January 2003, later in this appendix). These requirements include the following:

- Depth to water table is greater than 50 feet below ground surface.
- Site is not located within 500 feet of an ephemeral, intermittent or perennial drainage channel. Drainages are those identified by a blue line on 7.5 minute USGS Topographic Maps.
- Site is not located within one-quarter mile of the alluvial deposits underlying flood plains or terraces.
- The site is not located on clinker, or within 500 feet uphill of clinker.

- The site will not be located on, or within one-quarter mile uphill, of any spring.
- The site is not located within one-quarter mile of a water supply well including, but not limited to, stock, irrigation, domestic or industrial wells.
- A stratigraphic profile down to 50' below ground level at the site of the infiltration impoundment must be included.
- The site must be located where a sub-surface investigation shows that the infiltrated water will recharge bedrock aquifers and not reach local surface waters or alluvial groundwaters. (Such an investigation must include an evaluation of the site-specific hydrogeology, depth to groundwater and the distance to outcrop.)
- Monitoring wells will be required down gradient from impoundment locations unless it has been demonstrated that there is no hydrologic connection to surface waters.
- A soil survey and map for all areas disturbed by the impoundment will be required.
- A water monitoring plan for the watershed in which the impoundment is located will be required unless a sampling program already exists for that watershed which meets this requirement.

All impoundments must be properly designed and located to fulfill the purpose. A schematic diagram of the impoundment must be included. A description of the lining used in a containment impoundment must be included.

Any impoundments constructed on BLM surface must meet BLM design and location criteria. The required design depends on the size of the impoundment (25-year, 6-hour storm event, or 100-year, 24-hour storm event). Copies of approved MDEQ and/or US Army Corps of Engineers permits must be submitted prior to final BLM approval. The BLM will review the WMP based upon copies of applications for permits, however final approval of the WMP and therefore the Project POD, will not be granted until copies of the approved permits have been submitted to BLM. Water production rates (for each discharge point) must be disclosed, including discharge schedule (initial, intermediate and final rates and duration) and maximum, mean and minimum anticipated rates.

A hydrologic watershed analysis based on field reconnaissance (using the attached "Hydrologic Watershed Field Analysis Summary Form") will be required for all WMPs covering each watershed in which CBNG activities are planned. These analysis must include the following:

- Watershed Area
- Average watershed slope
- Existing channel (average slope, width, depth, condition, etc.) calculation of mean/annual runoff
- Peak flow analysis (2-,10- and 25-year return interval at minimum)
- Destination (i.e., tributary to the Tongue River)
- Description of the existing watershed including:
  - existing wells (location, depth, water level, use, condition)

- existing impoundments (location, size, volume, use, condition, description of outlet works and spillway)
- road crossings (crossing type – culvert size: BLM minimum is 18- inch diameter, low water crossing, bridge, etc. and condition)
- water related uses (flood irrigated/subirrigated crops, livestock, etc.)
- potential down stream concerns (on channel impoundments, native hay meadows, crops, coal mine reclamation and sediment structures, unimproved channel crossings, etc.) and plans to mitigate impacts.

## 2. Water Management Monitoring Plans

Include the following:

- Schedule for inspection of discharge points by Operator’s representative. Inspections must be conducted at least once a month during the first year of operation and at least quarterly there after during the life of operations. Inspectors will note the condition of each discharge point, check for evidence of erosion and schedule any remedial work if required. Inspections must be documented and a copy of the inspection report must be submitted to BLM and MDEQ.
- Schedule for inspection of erosion control measures and drainage channel downstream from discharge points. Inspections must be conducted after major storm events and at least once a month during the first year of operation and at least quarterly thereafter during the life operations. Inspectors will note the condition of the erosion control measure and channel, check for evidence of erosion and schedule any remedial work if required. Inspections must be documented and a copy of the inspection report must be made available to the BLM upon request.
- A water monitoring plan for each watershed in which CBNG discharge is proposed will be required unless a sampling program already exists for that watershed, in which case a copy of that program must be submitted. This monitoring plan will need to address the sampling of produced water, impoundments and stream sampling locations, sampling frequency and the parameters to be analyzed.

All water management plans submitted after receipt of an APD or Project POD must include a Lessee’s or Operator’s Representative signature and Certification as follows:

*I hereby certify that I, or persons under my direct supervision, have inspected the watershed area(s) affected by our Coalbed Natural Gas drilling and production plans; that I am familiar with the conditions which currently exist; that the statements made in this plans are, to the best of my knowledge, true and correct; and that the work associated with operations proposed herein, including construction, monitoring and reclamation, will be performed by \_\_\_\_\_ and its contractors and subcontractors in conformity with this plan and the terms and conditions under which it is approved. This statement is subject to the provisions of 18 U.S.C. 1001 for the filing of a false statement.*

*Date* \_\_\_\_\_

*Name and Title* \_\_\_\_\_

NOTE: If the water management plan is included as part of the Project POD Master Surface Use Plan or APD Surface Use Plan, then the Certification Statement already required under APD Item 13 of the Surface Use Plan will suffice.

**Example Water Management Plan**  
**Deadman Gulch CBNG Project**

*This fictional example has been developed to help CBNG operators develop an acceptable plan. It should be used as a guide to illustrate the elements that need to be addressed in an actual water management plan.*

**Project Area – Geographic Setting**

The ABC Coalbed Natural Gas Corporation has proposed to develop the Deadman Gulch Project as previously outlined in this application. The Project area is composed of sections 17,18,19,20,29,30,31 and 32, T. 7 S., R. 42 E. in Rosebud County, Montana. The project area is approximately 10 miles southwest of Birney, Montana and 1 to 4 miles east of the Tongue River (See Maps WMP-1, WMP-2 and WMP-3).

**Project Area – Geology**

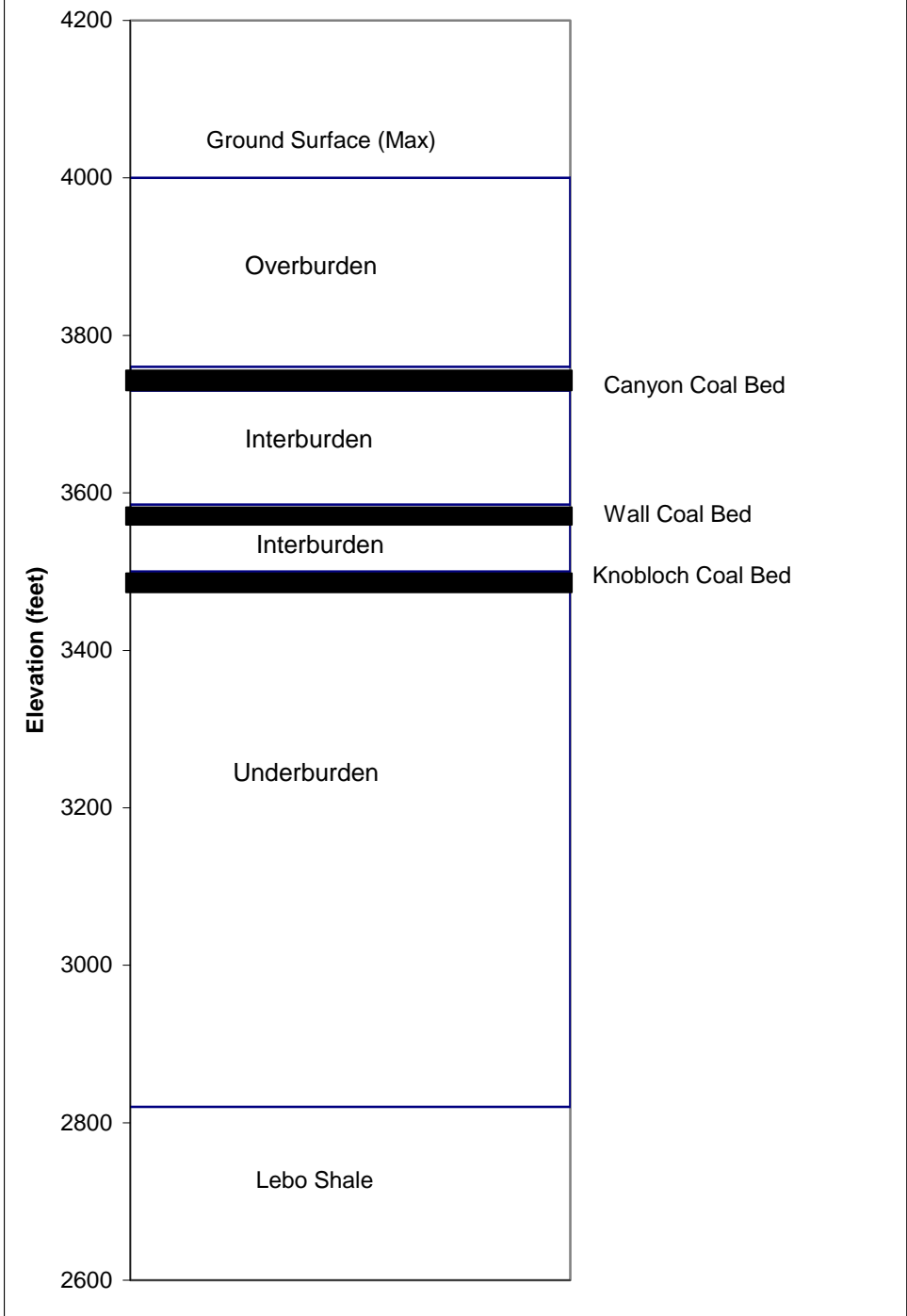
The surficial formations in the project area are the Tertiary Tongue River Member of the Fort Union Formation and Quaternary Alluvium. The near surface stratigraphy of the Project Area, from the surface down, includes the Tongue River Member of the Fort Union Formation, the Lebo Shale Member of the Fort Union Formation, the Tullock Member of the Fort Union Formation, the Hell Creek Formation and the Fox Hills Sandstone. These units are underlain by the Pierre Shale, which forms a regional aquitard. The coal beds to be developed in this area include the Wall, the Canyon and the Knobloch. These three coal beds are part of the Tongue River Member of the Fort Union Formation (See Map WMP-4 and Figure WMP-1). The overburden, interburden and underburden associated with these coal beds is composed of sands, shales and thin coal stringers. It has been shown that the vertical hydrologic conductivity of these units is quite low due to the presence of common shale stringers. The ridge tops in this area are generally covered with porcellanite, which forms as a result of shale being baked by burning coal seams. This porcellanite is commonly referred to as “clinker” or “scoria”. This baking process results in a unit that has very low primary permeability, but very high secondary permeability (due to fractures). Water that infiltrates into the “clinker” does not significantly react with the “clinker” as it flows through it, due to the high rate at which the water is moving (as a result of the high secondary permeability), the low primary permeability of these rocks and the non-reactive nature of these units which results from being siliceous rocks and having been baked/melted.

**Project Area – Oil and Gas Wells/Potential**

The Montana Board of Oil and Gas Conservation (MBOGC) has established 80 acre well spacing for CBNG wells in the Deadman Gulch Project Area. The 80 acre spacing is per coal seam which means that up to 24 wells could be located in each section if all three coal seams are developed. Since the Project Area consists of 8 sections, a total of up to 192 wells could be installed in this project area. The anticipated locations of these wells, along with associated planned roads and facilities, are shown on Maps WMP-2 and WMP-3. Three production wells and one injection well will be located on each pad marked on these maps, therefore a total of 64 Well Sites are shown.

The Project Area does not include any producing oil or gas wells. The Project Area includes one injection well and two abandoned oil wells.

**Figure WMP-1  
General Site Stratigraphy  
for the Proposed Deadman Gulch  
CBM Project Area**





**Project Area – Water Resources**

According to the MBMG Groundwater Information Center (GWIC) database (<http://mbmggwic.mtech.edu/>) and the USGS 7.5 minute topographic quads for this area (Spring Gulch and Lacey Gulch quads), the Project Area includes one research well, seven springs and one reservoir. Additionally, one well, eight springs and five reservoirs are located within one mile of the project area. These water resources are shown on Table WMP-1 and Maps WMP-5 and WMP-6.

**Table WMP-1: Water Resources in and Adjacent to the Proposed Deadman Gulch CBNG Project Area**

Name	Resource Type	Yield (gpm)	Static Water Level (ft amsl)
<b>Resources in the Project Area</b>			
Deadman Creek	Well	15	3447
Hole in Rock	Spring	3	---
Richards Place Dugout	Spring	4	---
Upper Camp	Spring	2	---
Dugout North Fork Harris Creek	Spring	6	---
Hefer Pasture	Spring	7	---
Lower Tank North Fork Harris Creek	Spring	3	---
Steer Pasture	Spring	2	---
No Name Reservoir #1	Reservoir	---	---
<b>Resources within 1 mile of the Project Area</b>			
Gayon Creek Cattle	Well	20	3375
Haywood	Spring	0.5	---
Foot Rot	Spring	0.2	---
Bens	Spring	3	---
Cow Alley	Spring	5	---
Deadman	Spring	1	---
Farmer	Spring	2	---
North Fork Harris Creek Tank	Spring	4	---
No Name Spring #1	Spring	6	---
No Name Reservoir #2	Reservoir	---	---
No Name Reservoir #3	Reservoir	---	---
No Name Reservoir #4	Reservoir	---	---
No Name Reservoir #5	Reservoir	---	---
No Name Reservoir #6	Reservoir	---	---

Wells and Springs from MBMG's GWIC database

Reservoirs from USGS 1:24,000 Scale (7 1/2 minute) Topographic Maps

Yields and Static Water Levels were measured on 12/30/02.

**Watershed Delineation**

Watershed boundaries were determined for Deadman Gulch, Harris Creek, Wall Creek and the unnamed tributaries of the Tongue River that are present in the Project Area. These watersheds, are shown on Map WMP-7 and a summary of their areas is provided on Table WMP-2.

**Table WMP-2: Summary of Watershed Areas and Potential CBNG Water Production**

Watershed Name	Total Area (acres)	Project Area (acres)	Potential CBNG Wells*	Project CBNG Wells	Anticipated Initial Rate of Water Production Per Well (gpm)	Potential CBNG Water Production (gpm)	Project Water Production (gpm)
Deadman Gulch	6,172	3,248	232	123	15	3,480	1,845
Unnamed TR Trib	2,935	300	111	15	15	1,665	225
Harris Creek	11,280	1,518	423	51	15	6,345	765
Wall Creek	4,933	54	185	3	15	2,775	45
TOTAL	25,320	5,120	951	192	15	14,265	2,880

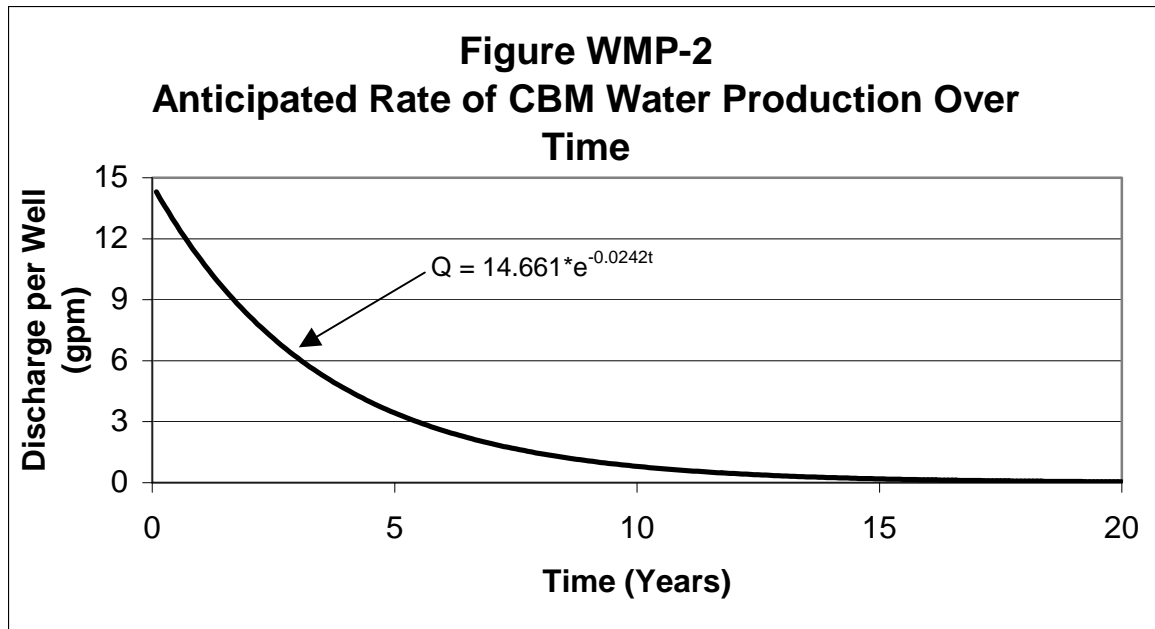
\* Assumes a 80 acre well spacing and 3 coal seams.

**Produced Water – Project Related**

CBNG wells finished within the coal seams to be produced in this project are expected to have initial water production rates on the order of 14 gpm per well. Production rates are anticipated to taper off to near zero over time. Production data from the CX field near Decker, MT shows a decreasing trend that is estimated by the following equation:

$$Q = 14.661 * e^{-0.0242t}$$

Where Q is discharge in gallons per minute (gpm) and t is time in months. This relationship results in the graph shown in Figure WMP-2 below. As shown, by the end of the life of a well very little water is produced, while approximately 14.3 gpm is anticipated to be produced per well initially. At 14.3 gpm per well, with the 192 wells anticipated for this project, a total project discharge of 2,748 gpm is anticipated to be produced during the first month. Predicted production rates are tabulated in Appendix WMP-C: Water Management Framework by Month.

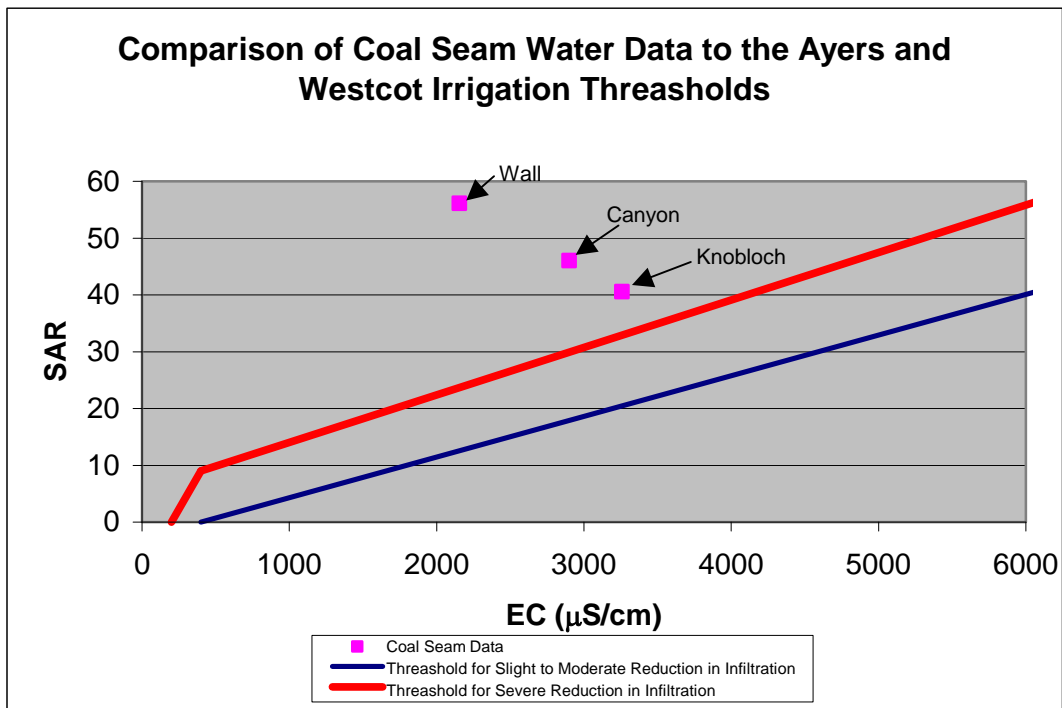


Water quality analysis were conducted for samples obtained from CBNG exploration wells in the project area. One sample was collected in each of the coal seams to be developed. Copies of the

laboratory water analysis sheets from XYZ Labs are attached (Appendix WMP-A) and these data are summarized in Table WMP-3. These analyses were conducted in accordance with approved EPA test procedures (40 CFR 136). These analyses indicate that the water is suitable for livestock and wildlife watering, however it is unlikely to be useful for irrigation uses without treatment or dilution. Figure WMP-3 compares these water qualities to the irrigation threshold of Ayers and Westcot (1985).

**Table WMF-3: Summary of CBNG Water Qualities from Exploration Wells**

Well Field Number	Township	Range	Section	Elevation (ft)	Depth	Aquifer Elevation (ft)	EC $\mu\text{S/cm}$	SAR	Interpreted Coal Bed
E-1	7S	42E	17	4150	420	3730	2900	46	Canyon
E-2	7S	42E	29	3740	171	3569	2155	56	Wall
E-3	7S	42E	30	3755	274	3481	3258	41	Knobloch



**Produced Water – Non Project Related**

**A. Existing Wells.**

The Project Area does not include any producing oil or gas, including CBNG wells.

**B. Potential Development**

It is anticipated that adjacent leases held by other companies will be developed in the near future. A maximum development scenario for the portion of the Deadman Creek upstream of this project was compiled based on an 80 acre well spacing. This analysis shows that a total watershed discharge of 3,480 gpm would be anticipated during initial production in this watershed, with 1,830 gpm of the production resulting from this project. Potential development in the Wall Creek and Harris Creek watersheds are not addressed here since that production would occur down

stream from this project and would not effect the design of the water management structures needed for this project, however, their estimated potential is included in Table WMP-2.

### **Water Management Facilities**

As per the MDEQ general discharge permit for CBNG produced waters, no impoundment structures will be constructed in drainages, in alluvium, or in clinker areas (since clinker presents a direct hydrologic connection to surface waters). All wells will be manifolded such that the water from any well can discharge into any water management facility. The total project initial rate of water production is 2,748 gpm. As the volume of water is predicted to decrease over time, the water management framework must also change with time. A water management strategy per month for the first 6 years of production is presented in Appendix D: Water Management Framework by Month. This framework is discussed below.

### Beneficial Use

Water produced from the Deadman Gulch Coalbed Natural Gas Project is suitable to be used for different types of beneficial uses. Produced water will be used beneficially to water livestock, wildlife and provide dust suppression on project roads.

The Project area is located on the MNO Ranch. The MNO Ranch is a cattle ranch that covers a total of 17 sections (10,880 acres). As produced water is planned to be pumped through pipelines to all portions of this ranch, this total area is used to calculate the potential beneficial use of the water. It is assumed that 60 acres are needed per head per year (5 acres per AUM) and that each head will consume, on average, 20 gallons of water per day. Thus a total of 181 head are assumed for this ranch. This number corresponds well with estimates made by MNO Ranch, which indicated that on average they run approximately 180 head. A total of 3,620 gallons of water would be consumed by cattle per day (2.5 gpm). All water tanks will be built such that they are accessible to wildlife (tank height less than 20" above ground surface per BLM Tech Note 347, December, 1980) and bird ladders will be installed in each tank. Stock tanks will be equipped with float valves to ensure that water does not overflow onto the ground surface. It is assumed that deer will be the major wildlife water users in this area. According to MT-FWP the average deer density in this area (Censes area 7.08) is 5 deer per section. Assuming a 5 gallon per day consumption per deer, a total of 425 gallons per day is estimated to be consumed by wildlife (0.3 gpm).

There are 14 miles of all weather road proposed for this project. These roads would be watered daily during warm weather for dust control. It is estimated that 1 gallon per foot per day will be needed for dust control, thus a total of 73,920 gallons of water would be used for dust control per day. This results in an average rate of 25.7 gpm used for dust control.

### Surface Discharge

The MDEQ has approved a MPDES permit to discharge to the Tongue River. This permit allows for 1,000 gpm to be discharged from this project. A copy of the approved MPDES permit is attached (Appendix WMP-B: Permits). There is one discharge point associated with this permit. It is located in section 5 of T7S, R42E (See map WMP-8). Water will be discharged at this point through a vertical discharge pipe with 12-inch rip-rap to dissipate energies. The pipeline to this location will run alongside the existing road. It is anticipated that due to the predicted decrease in water production rates as this project matures, this discharge point will only be needed for approximately 2 years. After that time this permit may be modified for discharge from another location/project and the discharge site for this project will be reclaimed.

### Shallow (Tullock) Injection Wells

A total of 64 shallow injection wells are planned for this project (one per pad). The approved UIC permits are attached (Appendix WMP-B: Permits). These wells will inject into a sand rich unit in the Tullock Member of the Fort Union Formation (~2,200 feet above mean sea level). The water in this sand is of similar quality to the CBNG produced water. These wells are anticipated to inject at a rate of 25 gpm, for a total rate of injection of 1,600 gpm. Given the expected rate of decline in water production, these injection wells will manage all of the produced water except that used for beneficial uses after the project is approximately 2 years old.

### Off Channel Impoundment

The remaining produced water will be managed through the use of an off channel impoundment. This impoundment will be located out of drainages, alluvium and clinker areas. The location of this impoundment was also chosen to avoid clayey soils. This off channel containment structure will be designed in such a manner that no surface runoff will be allowed to enter the pond. It is located in relatively flat, level topography, greater than ¼ mile alluvial channels and more than 500 feet from any cut, bank to bank channels. No scoria outcrops are present in the area. This impoundment will dispose of water through both infiltration and evaporation. The vertical hydraulic conductivity of the Tongue River Member of the Fort Union Formation has been estimated at  $1 \times 10^{-3}$  ft/day (Wheaton and Metesh, 2002). This basin will be designed to maintain a head of 10 feet. This results in a rate of infiltration of approximately  $1 \times 10^{-2}$  ft/day, which corresponds to a rate of 2.2 gpm per acre. The mean annual precipitation in the project area is 12.8 inches and the mean annual potential evaporation (Penmen Method) is 43 inches (data from Montana State University's Montana Agricultural Potentials System (MAPS) at <http://www.montana.edu/places/maps/>). Therefore there is an excess of 30.2 inches per year of evaporation, which corresponds to 1.6 gpm per acre. The combined total rate of water loss from the proposed basins is estimated to be 3.8 gpm per acre. As shown in the water management framework (Appendix D), the maximum volume of water predicted to be stored in this basin is 19.8 acre-feet. Since detailed water production data is not available for this project area the basin will be built to store 30 acre feet (3 acres at 10 feet deep). The proposed location for this impoundment is shown on Map WMP-3. Since this impoundment is less than 50 acre feet it does not need to be reviewed by the State Engineer's office. Under the water management framework this basin is anticipated to receive water for only 2 months and to completely infiltrate/evaporate that water in 16 months. Once CBNG produced water rates decline and the storage provided by this basin is no longer needed, the water will be rerouted to other water management facilities and the structure will be reclaimed. Any contaminated soils will be removed and disposed of at a licensed and approved disposal site. The structure will then be filled and brought back to approximate original contours and revegetated as outlined in the surface use plan.

The physical flow of water as it infiltrates from this basin has been modeled using the USGS variably saturated two dimensional interactive flow model of Hsieh et al. (VS2DI). This model was obtained from the USGS website at <http://water.usgs.gov/software/vs2di.html>. The lithologies observed during the installation of exploration wells in the project area and interpreted through gamma logs, were used in this model. This model shows that the volume of water proposed to be infiltrated in these basins should recharge the bedrock aquifer and not flow to the surface as seeps. Details concerning this modeling are presented in Appendix WMP-D: VS2DI Model for Infiltration Basin. The validity of this result will be monitored through the use of two monitoring wells in line with the modeled cross sections and topographically downgradient from the basin (See Map WMP-9). Two monitoring wells will be finished in each of these locations. One well will be finished immediately above the first shale layer encountered (whether or not water is encountered) and the other in the first water bearing unit encountered. If these turn out to be the same unit, only one well will be installed. If monitoring shows that infiltrated waters are

flowing toward the surface (horizontally) rather than recharging bedrock the management of this basin will be altered to assure that seeps do not form as a result of this basin. Mitigation measures may include, among other possibilities, not discharging any more water into the basin, or pumping water out of the basin.

### **Facilities Monitoring**

Each discharge point will be monitored on a monthly basis for the first year of operation. Inspectors will note the condition of the discharge point, check for evidence of erosion and schedule any remedial work if required.

The channel below the project will be inspected for signs of accelerated erosion due to the continuous flow of produced water.

After the first year of operation, inspections will only occur annually, unless specific sites have required remedial action.

**Water Monitoring** (the locations of these sampling/gauging points are shown on Map WMP-10): A water monitoring report will be submitted to the BLM quarterly in both electronic and paper form. This report will include the following information along with interpretations and any proposed changes in water management practices. All monitoring that is conducted during a quarter will be included in that quarters report. All analysis will be conducted in accordance with EPA approved procedures (40 CFR 136 or 40 CFR 436.5).

Surface Water (SWs) Sampling Points: These locations will be monitored monthly. During each monitoring event discharge will be determined and water samples will be obtained (provided that there is flow). Parameters analyzed will include at a minimum those shown on Table WMP-6. These results will be tabulated and graphed with historical data.

Coal Aquifer Monitoring: A water quality analysis will be supplied to BLM from the first well drilled in each section in each coal seam exploited. That well will also be designed in such a manner to allow additional water quality samples to be collected from the wellhead and for pumped water levels to be measured. These wells will be gauged monthly and sampled annually. Parameters analyzed will include, at a minimum those shown on Table WMP-7. These results will be tabulated and graphed with historical data.

Basin Monitoring Wells (BMW's): These monitoring wells will be gauged monthly and sampled quarterly. Parameters analyzed will include, at a minimum those shown on Table WMP-7. These results will be tabulated and graphed with historical data.

Water Resources: The water resources identified on Table WMP-1 will be inventoried annually, with static water levels and yields being measured. These results will be tabulated and graphed with historical data.

Other: Water discharged into the Tongue River and into basins is required to be sampled by the MDEQ under the MPDES permit system and under the general discharge permit for CBNG produced water. The results of all sampling conducted for these permits will be included in the quarterly monitoring report submitted to the BLM.

**Table WMP-6 - Surface Water Quality  
Parameters**

<b>Parameter</b>	<b>Units</b>
Water Temperature	°C
pH	Standard
Electrical Conductivity (field)	µS/cm
Stream Discharge	cfs
Total Dissolved Solids (TDS)	mg/L
Total Suspended Solids (TSS)	mg/L
Electrical Conductivity (lab)	µS/cm
Calcium	mg/L
Magnesium	mg/L
Sodium	mg/L
Potassium	mg/L
Total Alkalinity, (as CaCO <sub>3</sub> )	mg/L
CO <sub>3</sub>	mg/L
HCO <sub>3</sub>	mg/L
Sulfate	mg/L
Chlorine	mg/L
Sodium Adsorption Ratio (SAR, calculated)	N/A

**Table WMP-7 - Basin Monitoring Well  
Parameters**

<b>Parameter</b>	<b>Units</b>
Water Temperature	°C
pH	Standard
Electrical Conductivity (field)	µS/cm
Water Elevation	ft amsl*
Total Dissolved Solids (TDS)	mg/L
Electrical Conductivity (lab)	µS/cm
Calcium	mg/L
Magnesium	mg/L
Sodium	mg/L
Potassium	mg/L
Total Alkalinity, (as CaCO <sub>3</sub> )	mg/L
Sulfate	mg/L
Chlorine	mg/L
Sodium Adsorption Ratio (SAR, calculated)	N/A

\*ft amsl = Feet Above Mean Sealevel

**Lessee's or Operator's Representative and Certification**

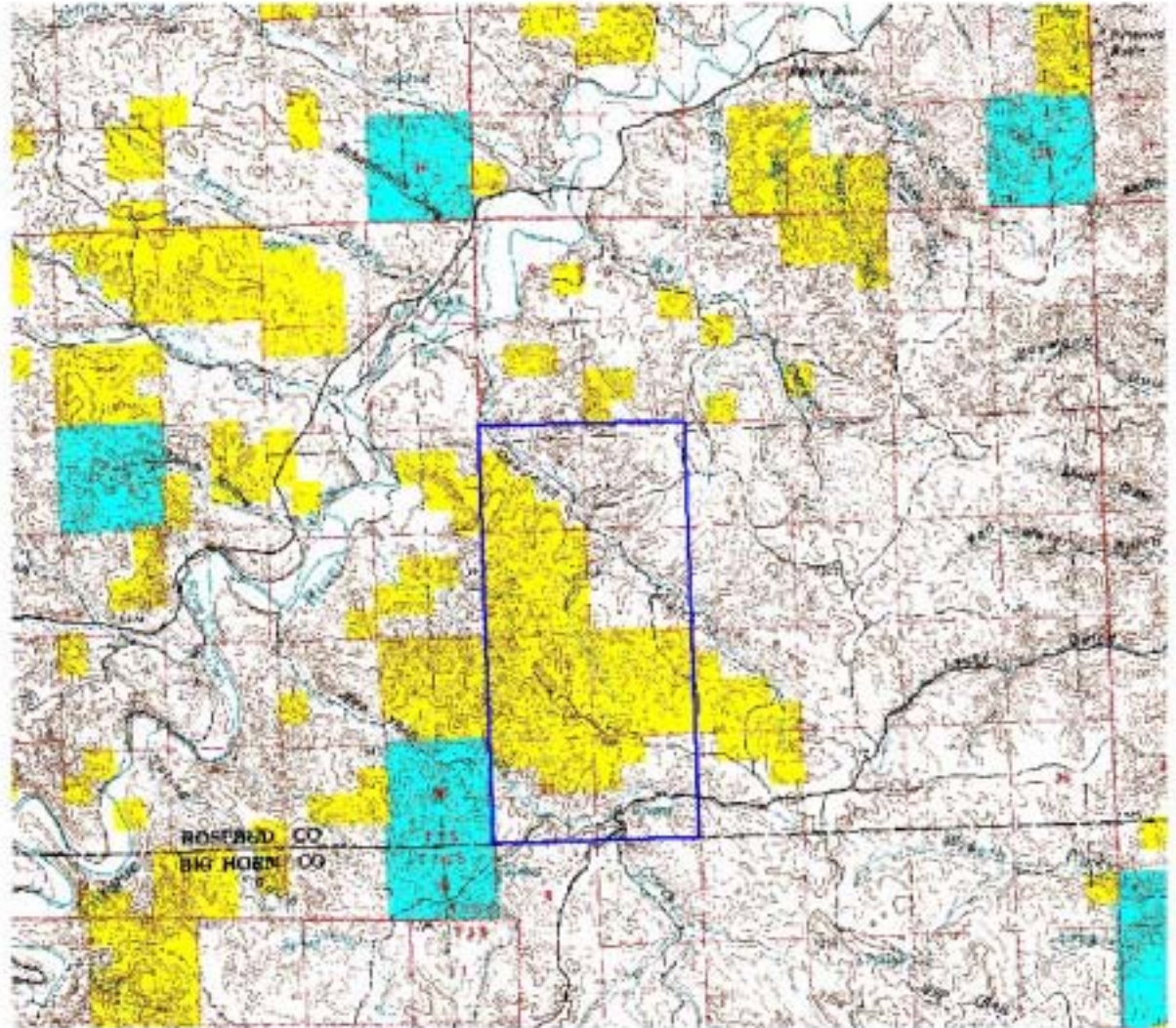
*I hereby certify that I, or persons under my direct supervision, have inspected the watershed area(s) affected by our Coalbed Natural Gas drilling and production plans; that I am familiar with the conditions which currently exist; that the statements made in this plan are, to the best of my knowledge, true and correct; and that the work associated with operations proposed herein will be performed by ABC Coalbed Natural Gas Company and its contractors and subcontractors in conformity with this plan and the terms and conditions under which it is approved. This statement is subject to the provisions of 18 U.S.C. 1001 for the filing of a false statement.*

Date \_\_\_\_\_

Name and Title \_\_\_\_\_



# Map WMP-1 Proposed Deadman Gulch CBM Project Area

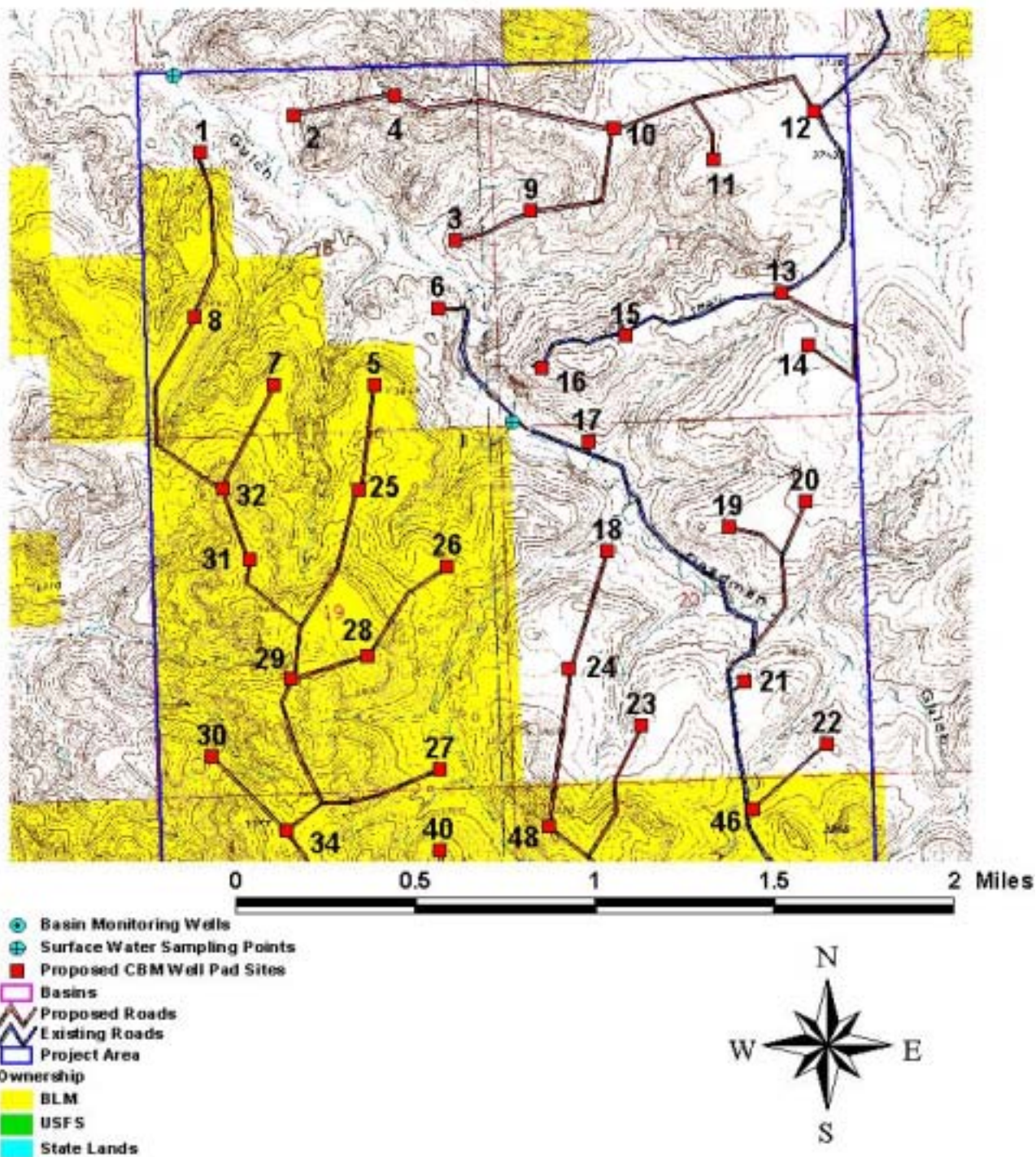


- Project Area
- Ownership
- BLM
  - USFS
  - State Lands



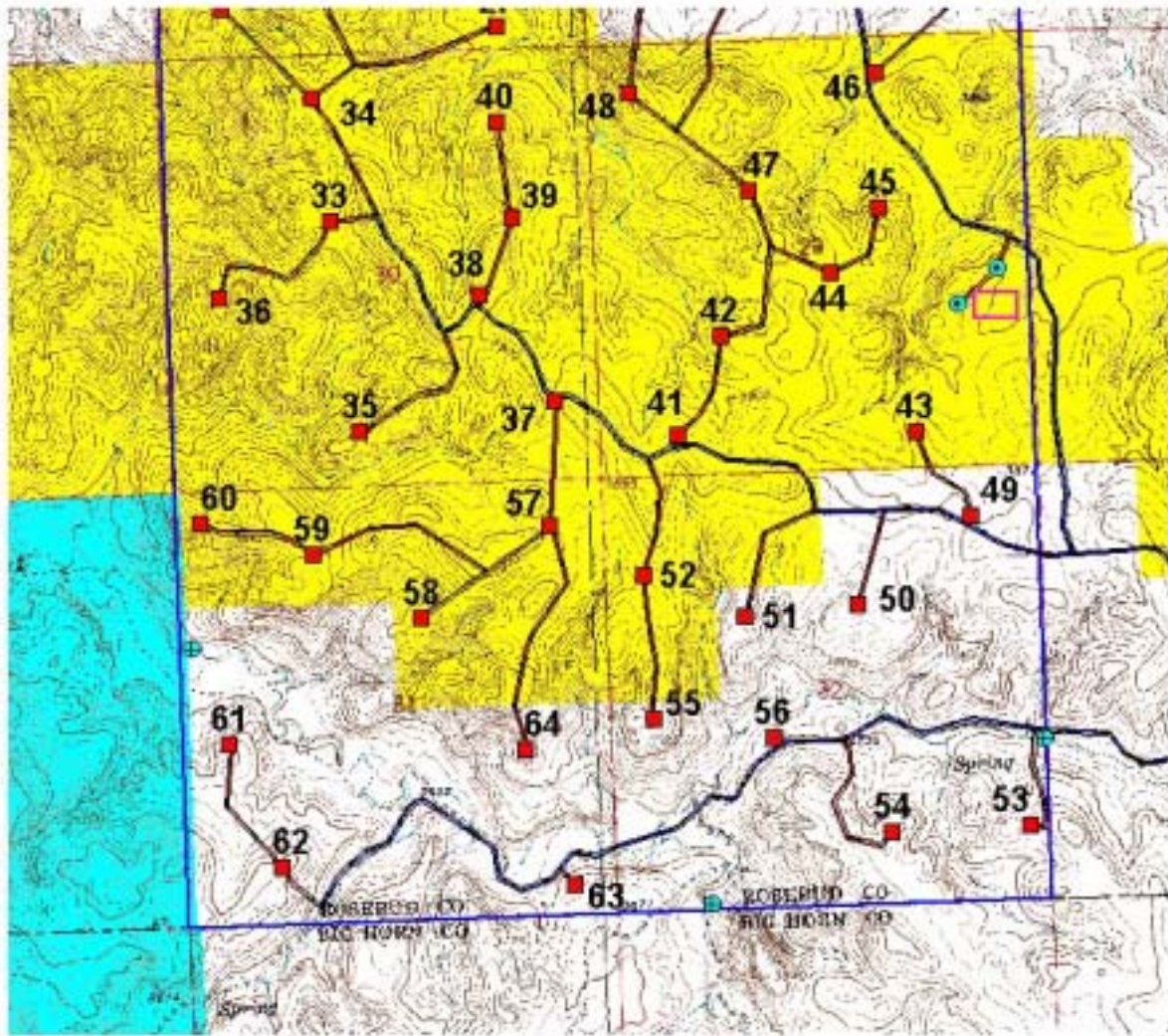


# Map WMP-2 North Portion of the Proposed Deadman Gulch CBM Project Area





# Map WMP-3 South Portion of the Proposed Deadman Gulch CBM Project Area

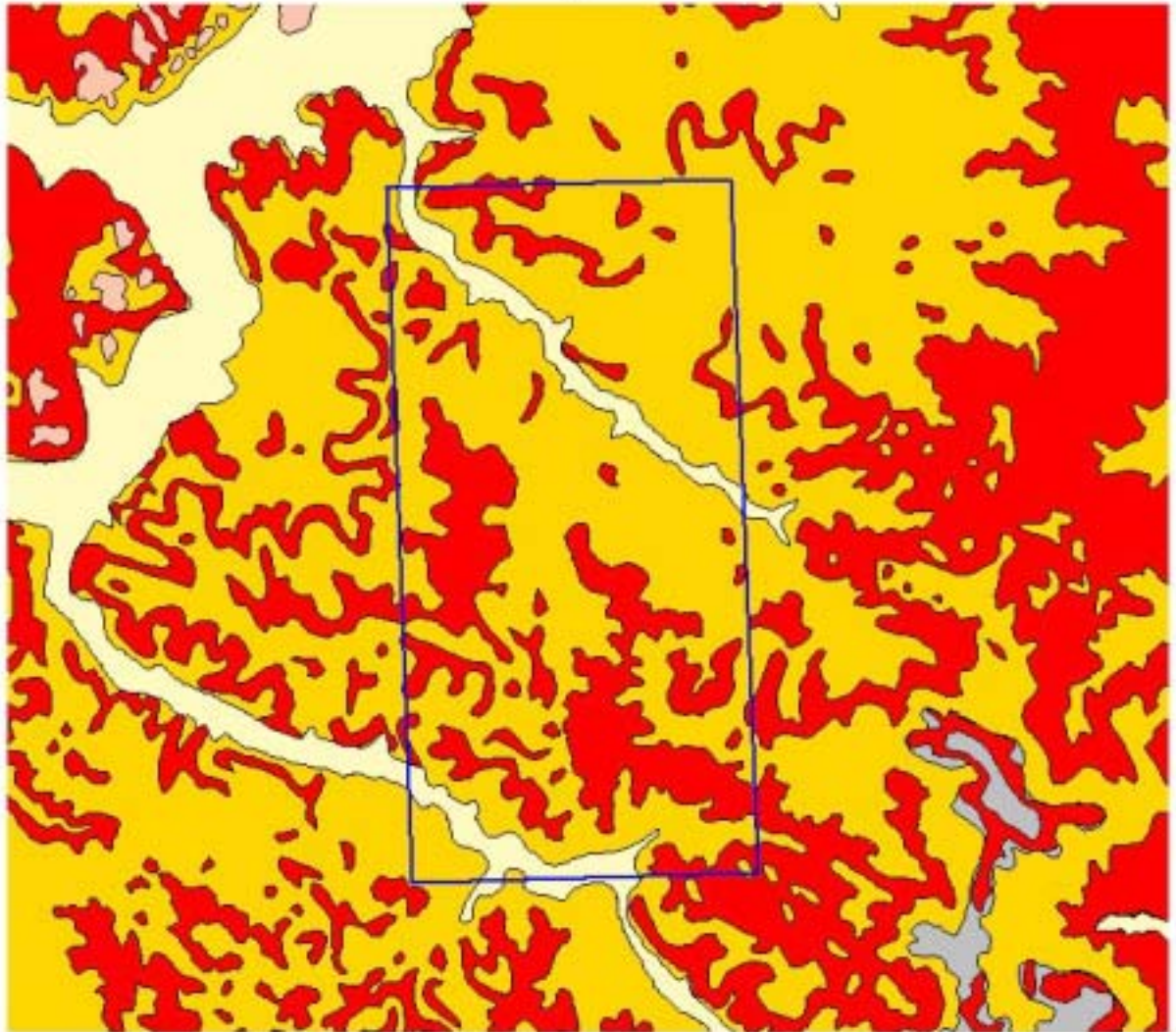


- ⊕ Basin Monitoring Wells
- ⊕ Surface Water Sampling Points
- Proposed CBM Well Pad Sites
- Basins
- Proposed Roads
- Existing Roads
- Project Area
- Ownership**
- BLM
- USFS
- State Lands



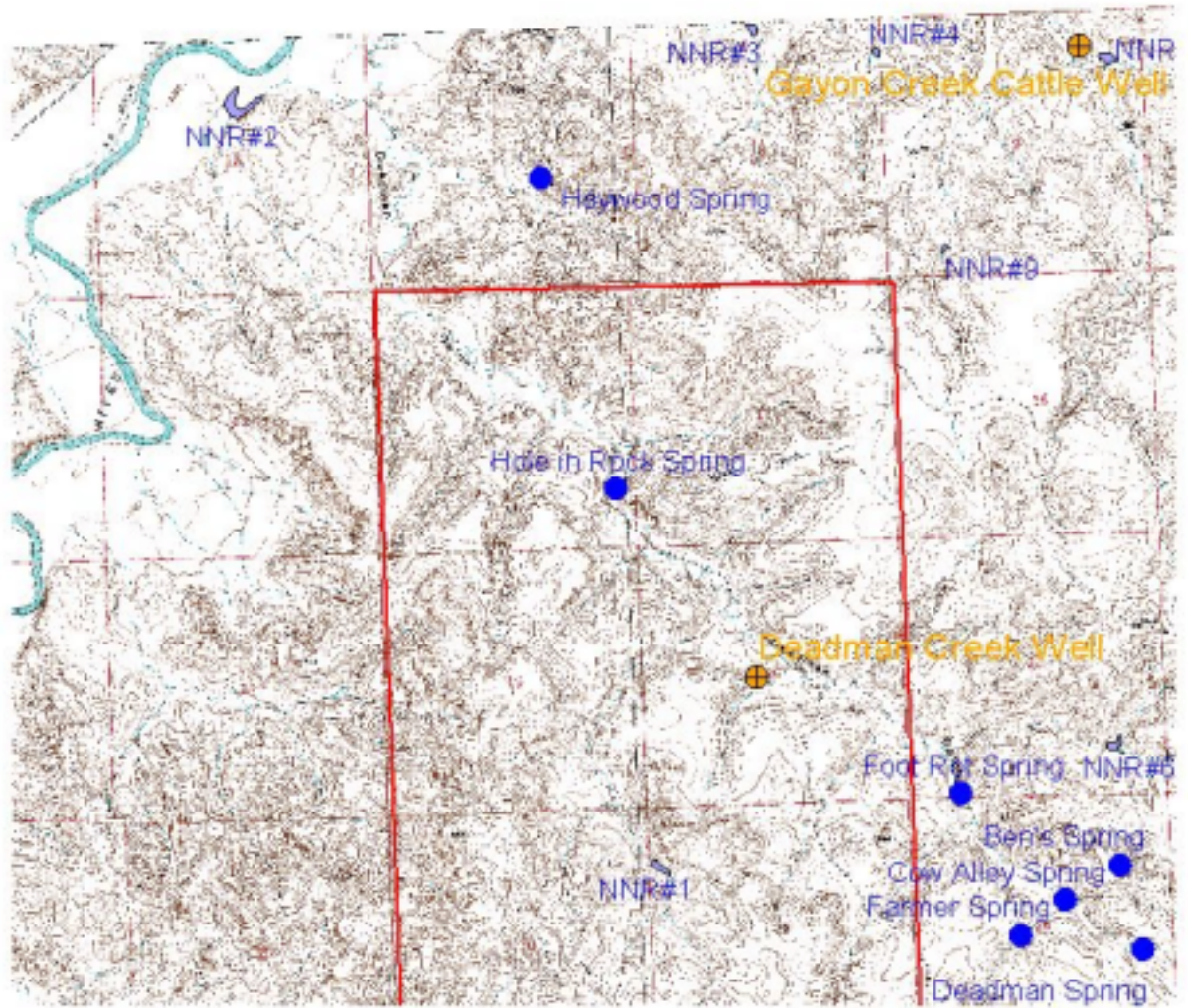


# Map WMP-4 Geology of the Proposed Deadman Gulch CBM Project Area



- Project Area
- Clinker
- Geology
  - Quaternary Alluvium
  - Quaternary Terrace Deposits
  - Wasatch Formation
  - Tongue River Member of the FU
  - Lebo Shale Member of the FU

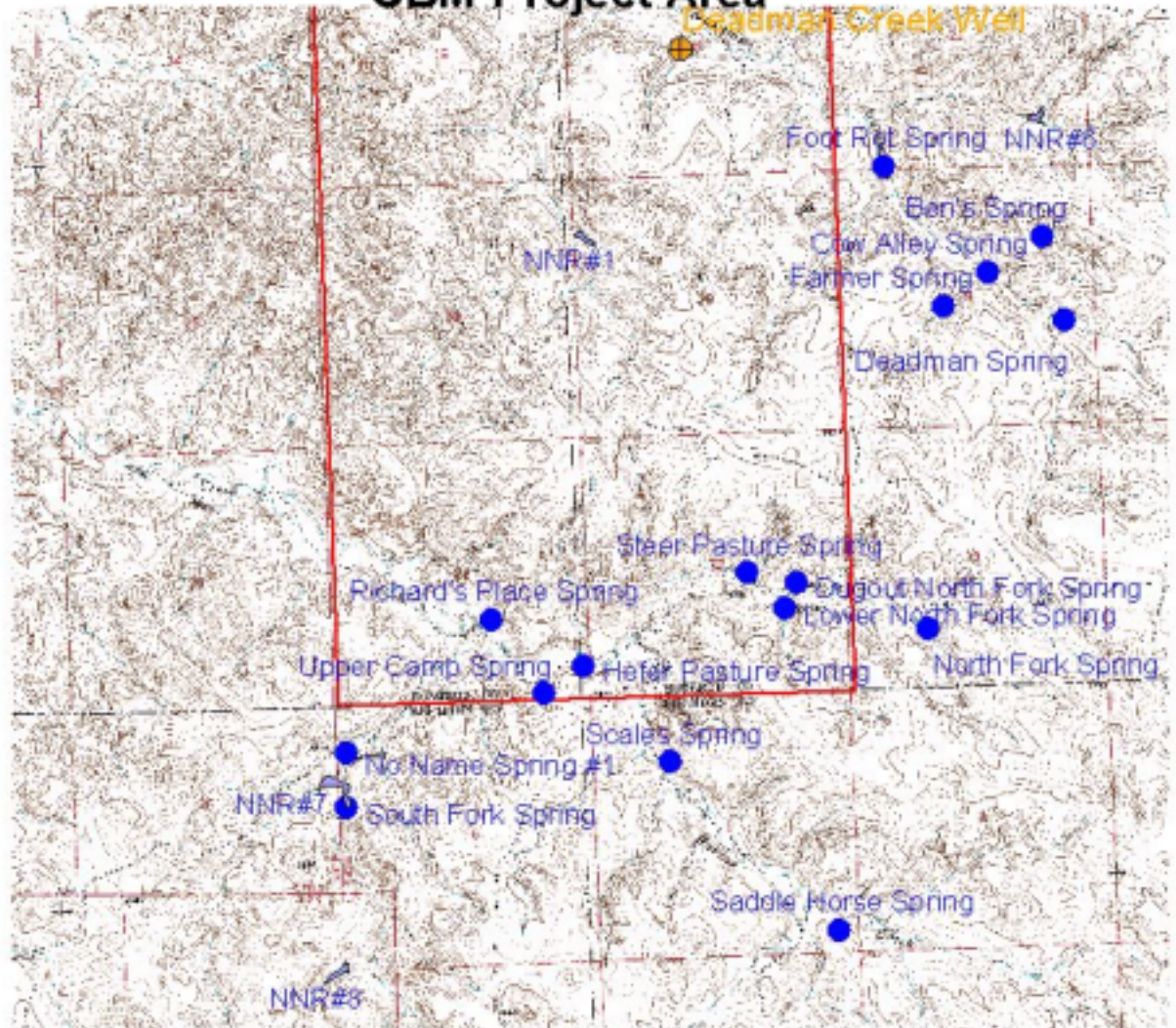
# Map WMP-5 Water Resources in the Northern Portion of the Proposed Deadman Gulch CBM Project Area



- Reservoirs
- Wells
- Springs
- Project Area



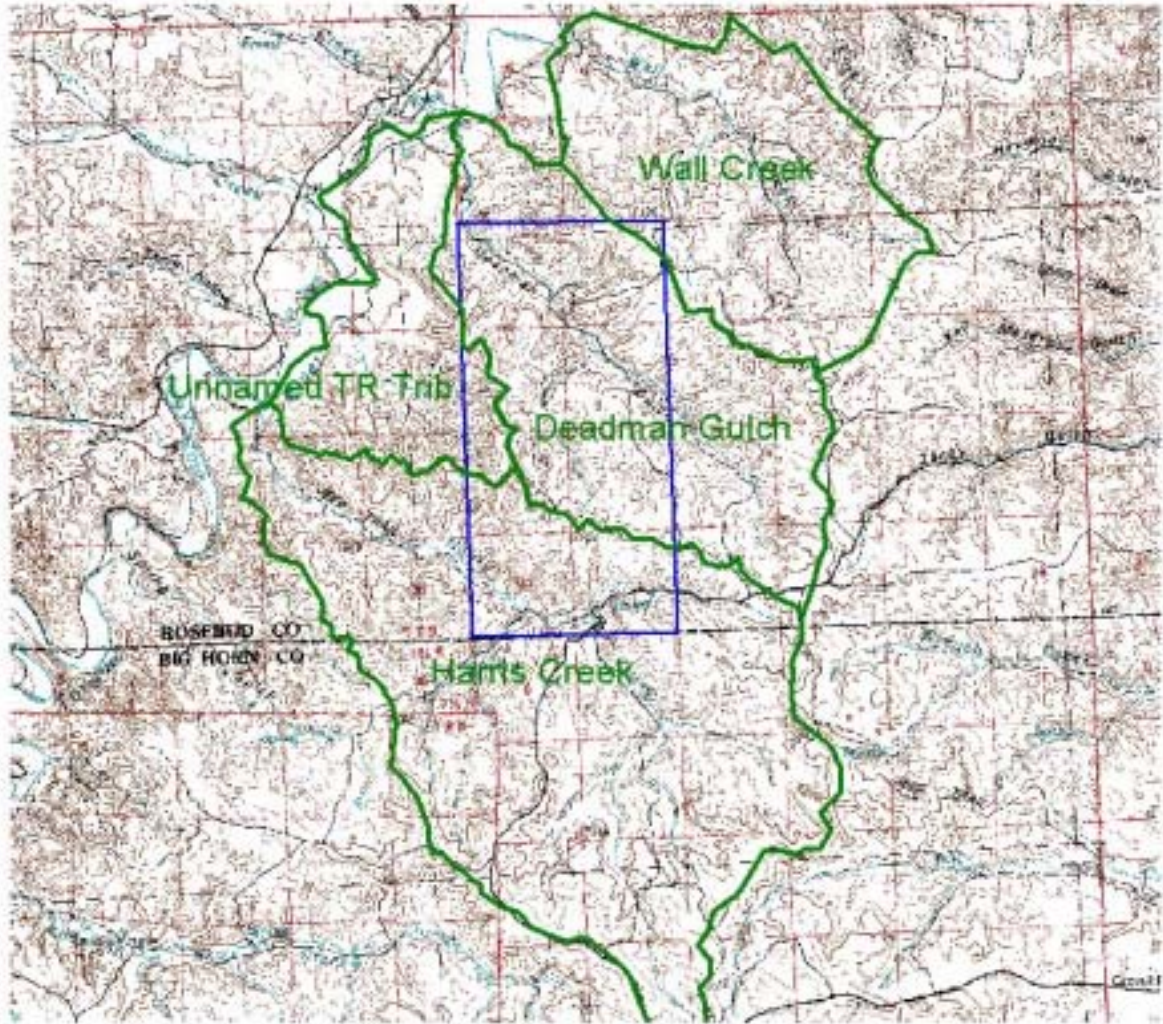
# Map WMP-6 Water Resources in the Southern Portion of the Proposed Deadman Gulch CBM Project Area



- Reservoirs
- Wells
- Springs
- Project Area



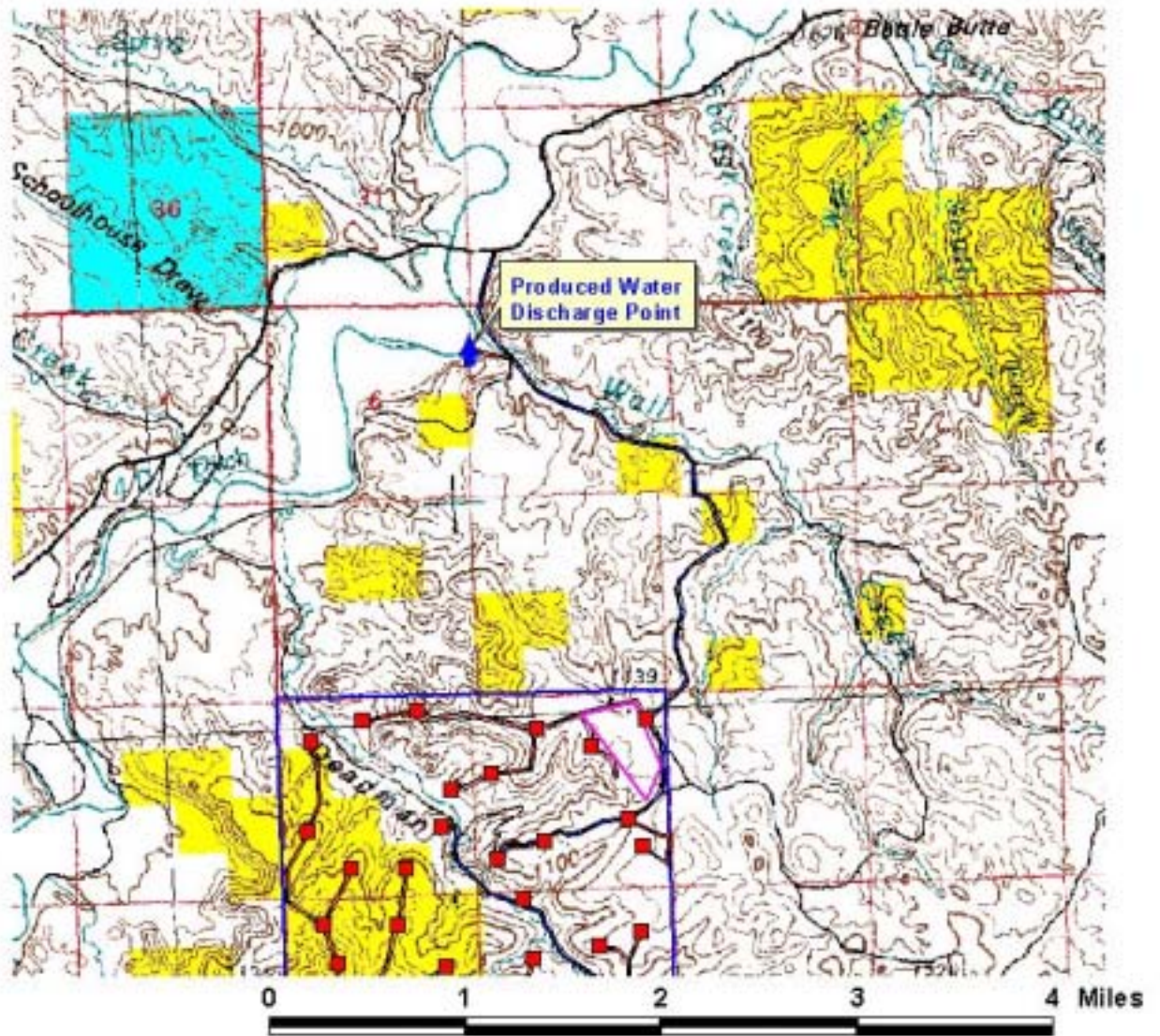
**Map WMP-7  
Watersheds of the  
Proposed Deadman Gulch  
CBM Project Area**



-  Watersheds
-  Project Area



# Map WMP-8 Produced Water Discharge Point for the Deadman Gulch CBM Project

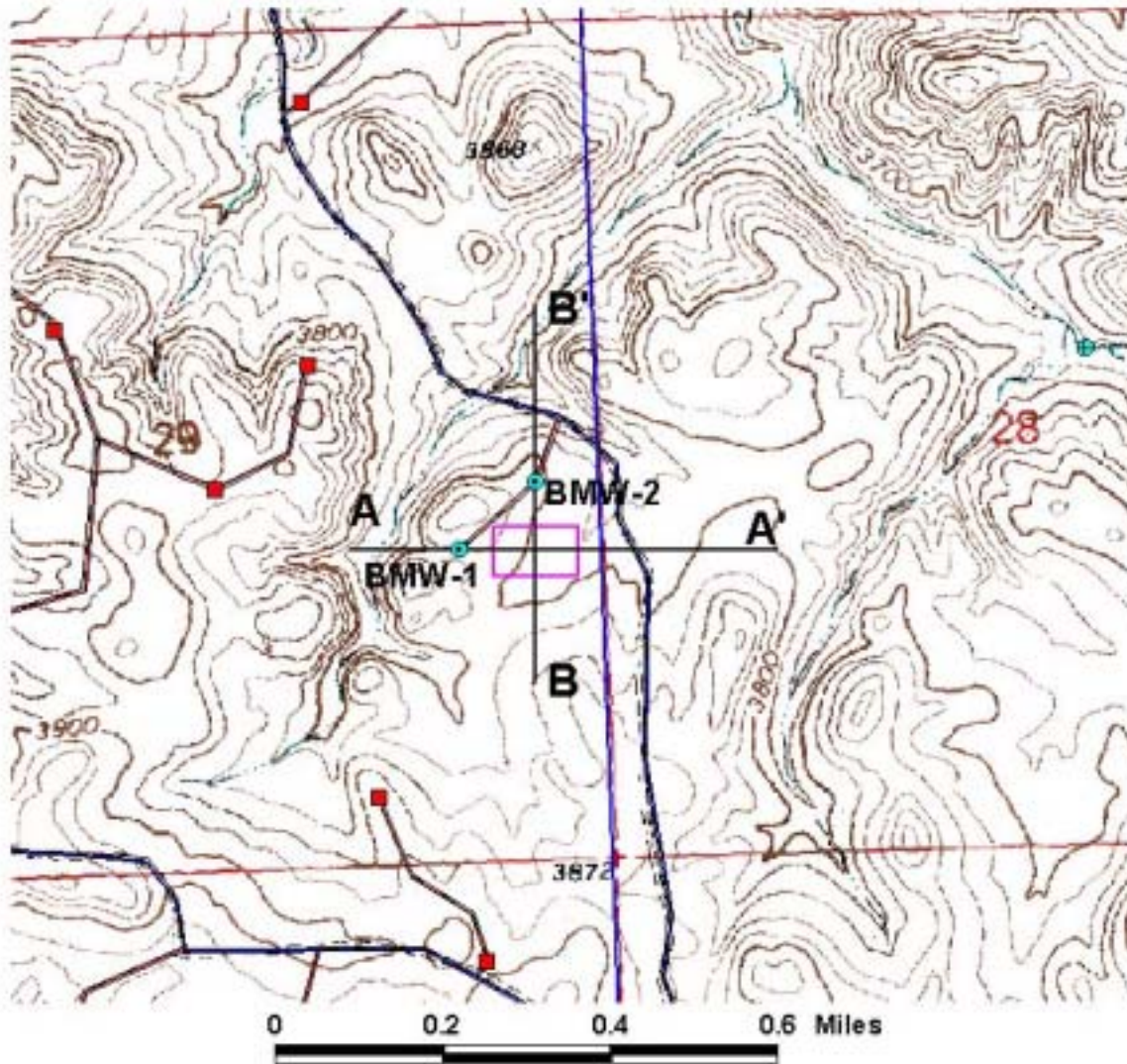


- Proposed CBM Well Pad Sites
- Basins
- Proposed Roads
- Existing Roads
- Project Area
- Ownership
- BLM
- USFS
- State Lands





# Map WMP-9 Cross Sections Modeled Using VS2DI for the Deadman CBM Project



- Coal Monitoring Wells (Original Exploration Wells)
- Basin Monitoring Wells
- ▲ Modified 1-sec. dip
- Surface Water Sampling Points
- Proposed CBM Well Pad Sites
- Basins
- ▲ Proposed Roads
- ▲ Existing Roads
- ▭ Proposed Lane



**Siting Guidelines for CBNG  
Produced Water Impoundments  
Montana**  
May 1, 2003

Developed by:  
Bureau of Land Management  
Miles City Field Office

**Background and Objectives:**

The following criteria have been developed to guide the siting of CBNG related basins in the Powder River Basin of Montana. These criteria are based on the “Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming” developed by the WDEQ, the “General Discharge Permit Coalbed Natural Gas Produced Water” issued by the MDEQ and the professional knowledge of the BLM staff. As such these criteria represent the current level of knowledge on infiltration basins. Since research continues to be conducted in this area it should be expected that these criteria will be refined and updated as our understanding of these systems increase. These criteria are intended only as an outline of what will be required of CBNG operators. Operators are responsible for ensuring that impoundments meet all local, state and federal requirements.

The hydrologic system of the coal seams in the Tongue River Member of the Fort Union formation in the Powder River Basin of Montana is characterized by waters flowing from recharge areas on the edges of the basin to the dissected outcrop areas in the center of the basin. When the basin center outcrop is reached the water is released from the coal seam as a spring. This spring water mixes with precipitation to form the surface waters of the basin. The removal of water from a coal seam between the recharge areas and the outcrop represents a disruption of the natural hydrologic system. This disruption could cause the produced water to be introduced to the surface systems over a much shorter period of time and at different locations, than would be the case under natural conditions. The removal of this water can also cause impacts to wells and springs that derive their water from coal seams as groundwater levels are drawn down.

Infiltration basins attempt to place produced water back into the hydrologic system in a manner that will cause the water to return into the natural system with a minimal disruption of that system. The goal is to infiltrate the water into a sand rich unit that is currently unsaturated and then allow the water to flow slowly to the outcrop to be discharged at rates similar to those experienced naturally. This goal can only be accomplished by properly siting the basins in hydrogeologically suitable areas.

These guidelines have been developed to assist in evaluating how effectively a particular site will meet the following key objectives:

1. Minimize impacts to surface water resources from the changes in timing and location of the release of coal bed waters.
2. Maintain accessibility to the coal water resource.
3. Minimize impacts to wells and springs due to the management of CBNG produced water.
4. Minimize the dissolution and oxidation of minerals in the unsaturated zone and their subsequent introduction to local surface waters.
5. Minimize the disruption of the natural hydrologic balance on a regional scale.
6. Provide an economically viable option for the management of CBNG waters.

### **Siting Criteria for CBNG Infiltration/Evaporation Basins:**

Successful candidate sites must meet all of the following:

1. Depth to water table is greater than 50 feet below ground surface.
2. Site is not located within 500 feet of an ephemeral, intermittent or perennial drainage channel.
3. Site is not located within one-quarter mile of the alluvial deposits underlying flood plains or terraces. (Exception: An exemption from this criteria may be granted if a site specific investigation shows no hydrologic connection between the proposed site and surface waters of the State or associated alluvial ground water.)
4. The site is not located on clinker, or within 500 feet uphill of clinker.
5. The site will not be located on, or within one-quarter mile uphill, of any spring.
6. The site is not located within one-quarter mile of a water supply well including, but not limited to, stock, irrigation, domestic or industrial wells. (Exceptions: An exemption from this criteria may be granted if it can be shown that no deterioration of the beneficial uses of the water supply will occur as a result of infiltration from the impoundment. Such investigations may address resultant water quality (including chemical reactions along the flow path), relative positions along the flow paths (i.e. cross gradient or upgradient/downgradient positions of well and impoundment) and hydrogeologic flow barriers.)
7. The site must be located where a sub-surface investigation shows that the infiltrated water will recharge bedrock aquifers and not reach local surface waters or alluvial groundwaters. (Such an investigation must include an evaluation of the site-specific hydrogeology, depth to groundwater and the distance to outcrop.)

# Appendix B

## Example Soils Report

### General Soils Description

Soils have developed in alluvium and residuum derived from the Tongue River Member of the Tertiary Fort Union Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with coal seams. In many areas, the coal seams have burned, baking the surrounding rock, producing red, hard fragments. Differences in lithology have produced the topographic and geomorphic variations seen in the area. Higher ridges and hills are often protected by an erosion resistant cap of clinker, porcellanite or sandstone. Soils have 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. There are normally no sodium salts present in large enough amounts to effect plant growth and productivity. Slopes may be as much as 75 percent though are generally are 12 to 15 percent.

### See attached Soil Maps:

### Nontechnical Soils Description (selected soils - incomplete listing)

#### Map Unit: 7 - Armells-cabbart complex, 25 to 70 percent slopes

Armells channery loam is more than 60 inches deep with a lighter colored surface layer and slopes of 25-70percent. Landform: hills; frost free days: 115-130; available water capacity in inches: 3.8-5.1; major considerations: slope; land use may include: rangeland.

Cabbart loam is 10-20 inches deep with a lighter colored surface layer and slopes of 25-70 percent. Landform: hills; frost free days: 115-130; available water capacity in inches: 2.3-2.9; major considerations: slope, depth to soft rock; land use may include: rangeland.

#### Map Unit: 17 - Birney-cabbart complex, moist, 25 to 70 percent slopes

Birney channery loam is more than 60 inches deep with a lighter colored surface layer and slopes of 25-70 percent. Landform: hills; frost free days: 115-130; available water capacity in inches: 3.8-4.6; major considerations: slope; land use may include: woodland.

#### Map Unit: 38 - Brunelda-gerdrum complex, 1 to 8 percent slopes

Brunelda silty clay is more than 60 inches deep with a lighter colored surface layer and slopes of 1-8 percent. Landform: sedimentary plains; frost free days: 115-120; available water capacity in inches: 2.4-3.3;

Major considerations: salinity, sodicity; land use may include: rangeland.

Gerdrum clay loam is more than 60 inches deep with a lighter colored surface layer and slopes of 1-4 percent. Landform: sedimentary plains; frost free days: 115-120; available water capacity in inches: 5.5-6.9; major considerations: salinity, sodicity; land use may include: cropland, rangeland.

#### Map Unit: 142 - Neldore-abor silty clays, 8 to 25 percent slopes

Neldore silty clay is 10-20 inches deep with a lighter colored surface layer and slopes of 8-25 percent. Landform: hills; frost free days: 115-130; available water capacity in inches: 1.9-2.5; major considerations: slope, depth to soft rock; land use may include: rangeland.

**Abor silty clay is 20-40 inches deep with a lighter colored surface layer and slopes of 8-25 percent. Landform: hills; frost free days: 115-130; available water capacity in inches: 5.0-5.8; major considerations: slope, depth to soft rock; land use may include: cropland, rangeland.**

**Soils Data (selected soils – incomplete listing)**

MAP UNIT SYMBOL	MAP UNIT NAME	ACRES	PERCENT OF MAP UNIT	ECOLOGICAL SITE	pH	SALINITY MMHOS/CM	SAR	RAPID DISPOSAL OF WASTE WATER	CONSTRUCTION LIMITATIONS FOR ROADS	POTENTIAL EROSION HAZARD	SOIL RUTTING HAZARD
7	Armells-cabbart complex, 25 to 70 percent slopes	114									
	Armells		50	Thin Silty, 10 To 14 Inch Ppt Zone, Sedimentary Plains, East	7.9 - 8.4	0.0-2.0	---	Very limited - slope, restricted permeability	Severe - slope	Severe - slope/erodability	Slight - strength
	Cabbart		25	Shallow, 10 To 14 Inch Ppt Zone, Sedimentary Plains, East	7.4 - 9.0	0.0-4.0	1-5	Very limited - slope, depth to bedrock, restricted permeability	Severe - slope, strength	Very severe - slope/erodability	Severe - strength
17	Birney-cabbart complex, moist, 25 to 70 percent slopes	85									
	Birney		50	Thin Silty, 10 To 14 Inch Ppt Zone, Sedimentary Plains, East	7.9 - 9.0	0.0-4.0	---	Very limited - slope, restricted permeability	Severe - slope	Severe - slope/erodability	Severe - strength
	Cabbart		30	Shallow, 10 To 14 Inch Ppt Zone, Sedimentary Plains, East	7.4 - 9.0	0.0-4.0	1-5	Very limited - slope, depth to bedrock, restricted permeability	Severe - slope, strength	Very severe - slope/erodability	Severe - strength
38	Brunelda-gerdrum complex, 1 to 8 percent slopes	27									
	Brunelda		40	Clayey, 10 To 14 Inch Ppt Zone, Sedimentary Plains, East	7.4 - 9.0	16.0-30.0	25-45	Very limited - restricted permeability	Moderate - strength, stickiness, slope	Slight - slope, erodibility	Severe - strength

	Gerdrum		40	Clay Pan, 10 To 14 Inch Ppt Zone, Pierre Shale Plains	7.9 - 9.0	8.0-16.0	13-30	Very limited - restricted permeability	Moderate - strength, stickiness, slope	Slight - slope, erodibility	Severe - strength
142	Neldore-abor silty clays, 8 to 25 percent slopes	78									
	Neldore		50	Shallow Clay, 10 To 14 Inch Ppt Zone, Pierre Shale Plains	5.6 - 7.8	0.0-4.0	---	Very limited - restricted permeability, depth to bedrock, slope	Moderate - slope stickines, slope	Moderate - slope, stability	Severe - strength
	Abor		40	Thin Clayey, 10 To 14 Inch Ppt Zone, Pierre Shale Plains	7.4 - 9.0	0.0-4.0	---	Very limited - restricted permeability, depth to bedrock, slope	Moderate - slope stickines, slope	Moderate - slope, stability	Severe - strength



# NRCS Soils Data for the Northern Portion of the Proposed Deadman Gulch CBM Project Area

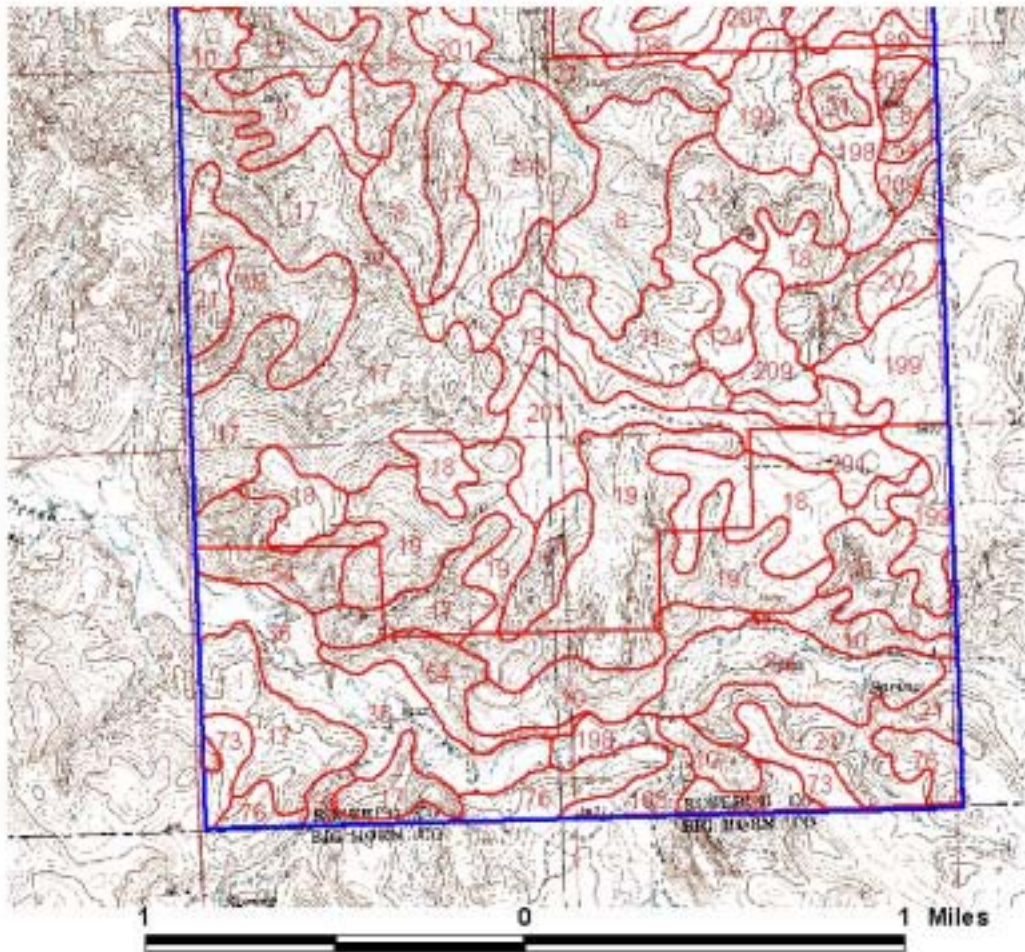


Project Area  
Project Soils by Owner



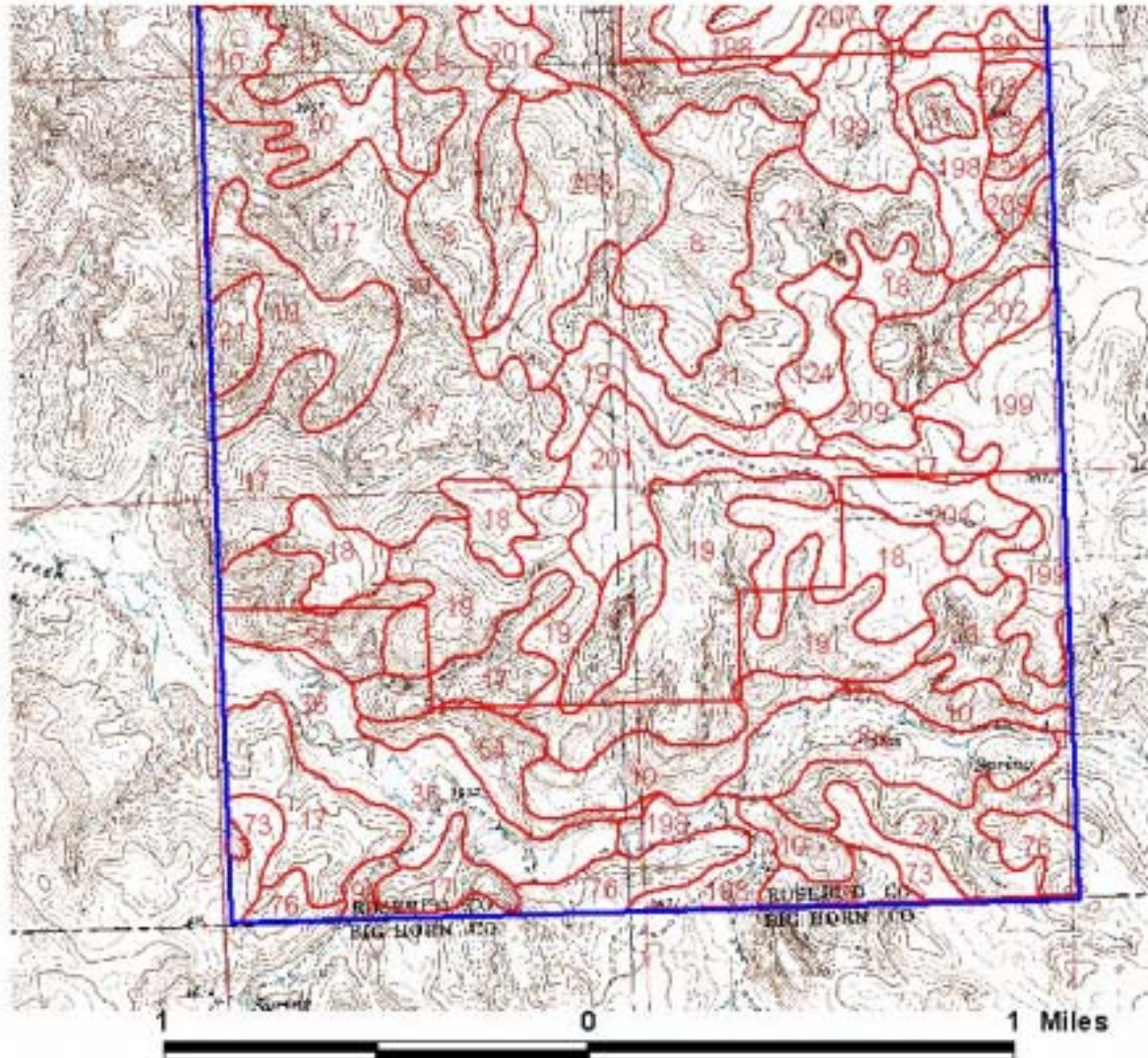


# NRCS Soils Data for the Southern Portion of the Proposed Deadman Gulch CBM Project Area



Project Area  
Project Soils by Owner

# NRCS Soils Data for the Southern Portion of the Proposed Deadman Gulch CBM Project Area





## Appendix C

### EXAMPLE CBNG DRILLING PLAN

We often refer to this part of a complete APD as the 8-point program due to Onshore Order #1 listing eight points that are to be covered in a complete program. The following fictional example has the necessary information for a typical individual Coalbed Natural Gas well application. A master drilling plan, covering more than one CBNG well, would require the same information pertinent to all wells. The italicized portions do not have to be repeated in the APD but are used here as guidelines.

---

#### Drilling Plan

ABC Coalbed Natural Gas Corporation  
Federal 44-30 SE1/4SE1/4, Section 30,T7S,R42E

- (1) *Estimated tops of important geologic markers.*

Formation	Depth
Wasatch	Surface
Carney Coal	800
Anderson Coal	1150
TD	1200

- (2) *Estimated depths at which the top and the bottom of anticipated water (particularly fresh water), oil, gas or other mineral-bearing formations are expected to be encountered and the lessee's or operator's plans for protecting such resources.*

Carney Coal	800'-820'	Fresh water/natural gas possible
Fort Union Sand	1100'-1150'	Fresh Water
Anderson Coal	1150'-1175'	Natural gas - primary objective

Shallow surface sands from the surface to TD may contain fresh water. Any shallow water zones encountered will be protected by bringing production casing cement to surface.

- (3) *An operator's minimum specifications for pressure control equipment to be used and a schematic diagram thereof showing sizes, pressure ratings (or API series) and the testing procedures and testing frequency.*

Once the 10 3/4" casing has been set and cemented into place, we will install a diverter. This is a request for a variance to the requirements of Onshore Order #2 to permit the use of a diverter as the pressure control device used while drilling this well. Because of the low anticipated bottom hole pressure and the depth of the surface casing, a diverter will adequately control pressures while drilling this well. Before drilling out the pressure, integrity of the diverter will be tested by closing the diverter line and pressuring the hole to 200psi. During the drilling operation, we will divert the flow to a blooie pit located 30' from the well bore.

- (4) *Any supplementary information more completely describing the drilling equipment and casing program.*

### **Casing Program**

The operator proposes to test the potential of the Fort Union coals between 1150' and the total depth for natural gas production. We will drill a 13" hole to 140' and 10 3/4" (J-55 40.5#/ft) casing will be run and cemented to surface. After sufficient W.O.C. time, a 9 7/8" hole will be drilled to top of coal. Casing 7" P-110 (LS-50 20#/ft) will then be run and cemented to surface. After sufficient W.O.C. time, a 6" production hole will be drilled from 1200' to total depth and then underreamed to an 11" hole with an open hole completion expected in a coal. All casing is new.

Hole Size	Casing Size	Wt/Ft	Grade	Joint	Depth set
13"	10 3/4"	40.5	J-55	STC	140
9 7/8"	7"	20	LS-50	STC	1150

### **Cementing Program**

The 13" surface casing will be set with approximately 150 sx Class G cement with 2% CA C12 mixed at 15.6 ppg (yield=1.18 ft<sup>3</sup>/sx). The cement will be circulated back to surface with 100% excess.

The 7" production casing will be set with approximately 350 sx Class G cement at 15.7 ppg.

The above cement volumes are approximate and are calculated under the assumption that a gauge hole will be achieved. Actual cement volumes may vary due to variations in the actual hole gauge and will be determined by running a caliper log on a drilled hole.

The casing strings will have centralizers on the bottom 3 joints of the casing (a minimum of one centralizer per joint). The casing shoe will not be drilled out until a minimum 500 psi compressive strength is achieved.

- (5) *Type and characteristics of the proposed circulating medium or mediums to be employed in drilling, the quantities and types of mud and weighing material to be maintained and the monitoring equipment to be used in the mud system.*

### **Mud Program**

Visual monitoring from the surface to TD. Sufficient mud materials to maintain mud properties will be available at the well site during drilling operations. The mud material will consist of bentonite, polymer and drilling soap.

Interval	Mud Type	Weight	Viscosity	Fluid Loss
0-1200	Fresh Water	8.0-9.0	26-30	No Control
1200-TD	Air/Mist	---	---	---

(6) *The anticipated type and amount of testing, logging and coring.*

Logs:

Gamma Ray TD to surface  
Drillers Log TD to surface

DST's: None planned

Cores: None planned

Samples: 20' samples to 300', 10' samples 300' to TD

(7) *The expected bottom hole pressure and any anticipated abnormal pressures or temperatures or potential hazards, such as hydrogen sulfide, expected to be encountered, along with contingency plans for mitigation such identified hazards.*

Normal pressures and temperatures are anticipated to TD. The surface sands and the Fort Union Coal are potential zones of lost circulation. This potential problem will be alleviated by using compressed air in the drilling fluid. Maximum anticipated bottom hole pressure equals approximately 520 psi and maximum anticipated surface pressure equals approximately 240 psi.

No H<sub>2</sub>S is anticipated to be encountered. Maximum bottom hole temperature is anticipated to be 82 degrees.

(8) *Any other facets of the proposed operation which the lessee or operator wishes to point out for BLM's consideration of the application.*

Anticipated starting date: May 1, 2003  
Drilling Days: 2 days  
Completion Days: 2 days

The possibility of directional drilling wells in this Project POD will be addressed in each individual well file. The shallowest formations (less than 700 feet) will not allow directional drilling and formations over 700 feet in depth would only allow directional drilling in certain special situations.

A statement must be made on Indian resources, such as

1) "Formations in this Project POD are not present or are separated by faulting from the Indian minerals therefore there will be no effect on the Indian resources (see geologic map)."

2) "The producing coal formation will draw down the hydrostatic pressure on the offsetting Indian mineral lease by 100 psi (see engineering data) and this formation requires 200 psi reduction before gas is desorbed (see desorbtion data) from the coal therefore no gas resource will be removed from the Indian lease."

3) "The producing coal formation will drawdown the hydrostatic pressure on the Indian mineral lease by 200 psi (see engineering data) and this formation requires 150 psi to desorb gas from the coal therefore the Indian mineral lease could be affected. A well will be drilled on our lease directly offsetting the Indian lease and the hydrostatic pressure will be monitored in this well. If it does begin to fall as anticipated, we will place produced water in the monitoring well to maintain the hydrostatic pressure equal to the original pressure in the coal at that point."

4) Some other description of effects and protective measures, if needed.

## Appendix D

### MASTER SURFACE USE PLAN

#### 1. Existing Roads

Take Highway 314 north from Decker six miles, turn west on Coal Road for four miles. Turn left, proceed on crowned and ditched road for three miles to end of crowned and ditched road. At this point, road splits into 2 two-track roads in the west half of Sec. 15. Take road to right for one mile to Project POD boundary. There are several two-track roads located inside of Project POD, which are all located on Project POD map. Surface ownership within Project POD area consists of both BLM and private property.

#### 2. Proposed Access Roads

There are 3.2 miles of proposed two-track roads (1 mile existing, 2.2 miles new) to individual wells in the Project POD, with four areas that have been identified as needing spot upgrading. All two-track roads will be upgraded to meet BLM Temporary Road standards, including the clearing of brush, prior to accessing the project for construction and drilling. Spot-upgrade areas (SP) have been identified on the Project POD map and staked on the ground, showing where construction begins and ends on each area. All spot-upgrade areas (described below) will be surfaced with 4 inches of either scoria or gravel.

On the map, engineering designs for two spot-upgrade areas marked as SP-B and SP-E have been submitted. Both of these areas involve significant dirt work in rough, steep topography. The designs are enclosed as Exhibits SP-B & SP-E. These areas have been slope-staked in the field.

The section marked SP-C is 510 feet long. This section of road traverses down a steep hillside. The section starts at a 10% grade, develops into a 12% grade and transitions back to an 8% grade. Cross sections of this section were conducted every 50 feet perpendicular to the proposed roadway with a hand level and rod at 0', 35', 75' and 100' across the cut section. Using the attached typical road section (Exhibit II) as a template, the approximate volume generated from the average-end area method is 255 cubic yards (cy) of cut and 255 cy of fill.

SP-D is 525 feet long. This section of road traverses down a steep hillside. The section starts at a 9% grade, develops into a 13% grade and transitions back to an 8% grade. Cross sections of this section were conducted every 50 feet perpendicular to the proposed roadway with a hand level and rod at 0', 35', 75' and 100' across the cut section. Using the attached typical road section as a template, the approximate volume generated from the average-end area method is 263 cy of cut and 263 cy of fill. E1 to E2 is 1200 feet long. This area traverses a hillside where the grade of the hill varies between 12% and 20%. We are proposing to construct a bench cut across this hillside with a 2% inslope. A typical bench cut diagram is enclosed. This area has been staked in the field.

There are 3 miles of proposed new improved roads to the CDPs (Central Delivery Points) in the project. The access roads to the CDPs as shown on the map will be built to BLM Resource Road minimum standards prior to access for construction or drilling. Road width of the running surface of these roads will not exceed 16 feet. A typical cross section of a crowned and ditched road is attached

as Exhibit II. One section of this road labeled A1 to A2 traverses a very steep hill and an engineering design was needed. This section of road is 700 feet long. The design is attached as Exhibit I-B.

The Master Map depicts where culverts, along with size, are located along the road, as well as one low-water crossing. An engineering design is provided for the low water crossing as Exhibit LWC. Typical culvert installation is attached as Exhibit III. There will be one cattleguard required for this Project POD development, located 1.2 miles west of Project POD. A typical cattleguard installation is attached as Exhibit IV. Two miles west of the Project POD, there is an existing bridge across Coyote Creek that will be utilized. The bridge will support expected loads and traffic and will not require any upgrading.

All roads in the Project POD have been centerline flagged and will not exceed 8% grade, except for short pitch-grades as noted. Running surface for the proposed two-track roads will not exceed 12 feet. Two swinging gates will be required at fence crossings along these roads and are depicted on the map as G-1 and G-2. Road width of the running surface of the crowned and ditched roads will not exceed 16 feet. The crowned and ditched roads will have a minimum of 4 inches of surfacing, either scoria or gravel.

All available topsoil will be removed and stockpiled before surface disturbing activities take place. Topsoil stockpiled for an extended period of time will be seeded with a cover crop.

To minimize surface disturbance, only equipment that is appropriate to the scope and scale of the work that needs to be done will be utilized.

Work will be suspended when excessive rutting or resource damage would occur.

Soil material and overburden will not be pushed over side slopes or into drainages. All soil material disturbed will be placed in an area where it can be retrieved and where it doesn't impede watershed and drainage flows.

The roads depicted on the map will be serving as corridors for the installation of pipelines and powerlines. This infrastructure has all been clearly labeled on the Project POD map.

If wells are drilled during the fire season (June-October), all necessary precautions shall be instituted to ensure that fire hazard is minimized, including, but not limited to, mowing vegetation on the access routes & well locations and keeping fire fighting equipment readily available while drilling the wells.

If any cultural values are observed during operations conducted under this plan, they will be left intact and the Miles City Field Manager will be notified immediately. Any potential impacts to archaeological sites will be disclosed to the appropriate surface owners by the company prior to surface disturbance.

If any paleontological resources are discovered during construction, the Miles City Field Manager will be notified immediately.

### 3. Location of Existing Wells Within A One-Mile Radius Of Any Well Within This Project Plan Of Development.

There are two existing wells within one mile of the proposed wells within this Project POD.



SENW Sec. 23      Dry Hole (Conventional)  
SWNW Sec. 13      Water Well

4. Location of Existing and/or Proposed Facilities if Well is Productive.

A.      On Well Pad

The Project POD map that is attached shows the location of all production facilities and lines to be installed if the wells in this Plan of Development are successfully completed for production.

Exhibit V shows a typical wellhead hookup. All wellhead facilities will be contained inside of a 48" fiberglass enclosure. All permanent above-the-ground structures will be painted desert brown (Munsell standard color No. 10YR 6/3) or another environmentally acceptable color approved by BLM.

Prior to installation of any well production equipment which has the potential to emit air contaminants, the company or operator of the equipment will notify the Montana Department of Environmental Quality, Air Quality Division to determine permit requirements.

B.      Off Well Pad

If a well is completed as a producer, a 3" or 4" poly pipeline of SDR 21 or heavier will be laid to the well to transport natural gas from the well. A 2" or 3" poly pipeline of SDR 21 or heavier will be laid to the well to transport water to an appropriate discharge point. A ditch witch or wheel trencher will be used to construct pipelines. They will be buried a minimum of six feet deep.

Pipeline construction will not block or change the natural course of any drainage and trenches will be compacted during backfilling. Pipeline trenches will be maintained in order to correct settlement and erosion.

A power line, raptor proof, will be installed to the CDPs and from there it will be buried to each well. The location of the power lines are shown on the Project POD map.

Two CDPs have been proposed for this Project POD. They will require an area of approximately 20'X30', where gas from each individual well will be metered. Exhibit III shows a diagram of a typical central gathering/metering building (CDP) layout. Area of disturbance for a CDP should not exceed 100'X100'. Topsoil will be stripped off of this area before construction starts and stockpiled for use in final reclamation.

All of the above-described facilities (existing or proposed) are clearly identified on the project map. Corridors were used wherever possible and are also depicted on the map. Water management control structures are addressed in the Water Management Plan and are also shown on the map.

5. Location and Type of Water Supply

Water for drilling operations has been purchased from a private ranch 3 miles west of Project POD in the SW<sup>1</sup>/<sub>4</sub> of Sec. 20. It is anticipated that two loads of water will be required to drill each well. Water will be hauled to drilling rigs by truck.

6. Construction Materials

No construction materials will be needed for well pad construction. Surfacing for improved roads will be either scoria or gravel and will be purchased from a local supplier having a permitted source of material in the area. Rock used in the low-water crossing will be good quality pit run gravel (3-inch diameter minimum). Clinker or scoria will not be used.

7. Methods for Handling Waste Disposal

The reserve pit will be constructed to prevent the collection of surface runoff. Drilling fluids, drilling muds, cuttings, rigwash, excess cement and completion and stimulation fluids will be contained in the reserve pit. Liquid hydrocarbons are not anticipated to be encountered during drilling.

No unauthorized waste such as spent hydraulic fluids, used engine oil, used oil filters, empty cement, drilling mud, or other product sacks, empty paint, pipe dope, chemical or other product containers, or excess chemicals or chemical rinsate will be put into the reserve pit.

Produced water will be addressed in the Water Management Plan, which is submitted as a part of this Project POD.

No trash will be placed in the reserve pit. A covered trash container will be on site during all drilling/completion operations to contain trash and this will be hauled whenever full to an approved landfill.

After drilling rig and completion rig has moved off location, all debris and waste material will be cleaned up and placed in trash containers. This container will be hauled to an approved landfill.

A portable, self-contained chemical toilet will be provided for human waste disposal during drilling and completion operations. Upon completion of operations, or as required, the toilet holding tank will be pumped and the contents disposed of in an approved sewage disposal facility.

ABC Coalbed Natural Gas Co. and its contractors shall ensure that all use, production, storage, transport and disposal of hazardous and extremely hazardous materials associated with the drilling, completion and production of wells and project operations will be in accordance with all applicable existing or hereafter promulgated federal, state and local government rules, regulations and guidelines.

All project-related activities involving hazardous materials will be conducted in a manner to minimize potential environmental impacts. A file will be maintained containing current material safety data sheets (MSDS) for all chemicals, compounds and/or substances which are used in the course of construction, drilling, completion and production operations. This file will be kept in the drilling rigs on location at all times and in our field office in Decker, MT when drilling rig has left location.

8. Ancillary Facilities

None anticipated.

9. Well Site Layout

All wells have been center staked with a steel fence post. The footages, section, township, range and name of each well are written on the steel posts.

No constructed well pads will be required for drilling the proposed wells except for BLM 14-31-2255. For all of the wells not needing pad construction, pits are center staked and there are two 100-foot directional stakes. For the BLM 14-31-2255, a well site layout diagram is provided (see Exhibit).

Reserve pit dimensions have been calculated based on well depths and expected fluid, mud and cuttings volumes, while allowing for 1-foot of freeboard and ensuring at least 3-foot burial depth of pit contents. Pit size, with minor variations, will generally be 10-feet wide x 6-feet wide x 8-feet deep. All pits are located downhill from the well stakes (at least 30-feet), are completely in cut and will be unlined. Topsoil removed from reserve pits will be segregated from spoil and stockpiled away from reserve pit area. Some of spoil material will be used to construct berm along lower side of pit to eliminate any overspray during drilling and completion operations. Only freshwater, polymer, bio-degradable soap and bentonite are to be used in the mud system.

Construction will not start when surface of ground is frozen or during periods when the soil material is saturated or when watershed damage is likely to occur. Construction related traffic will be restricted to approved routes.

A minimum of 20-feet of undisturbed vegetative border will be maintained between the location/reserve pit and the edge of adjacent drainages.

Pit will be fenced with sheep fence during and after drilling and completion operations until pit is reclaimed so as to effectively keep out wildlife and livestock. Three sides will be fenced during drilling operations, the fourth side fenced immediately once drilling and/or completion rigs have moved off location.

If completion does not occur immediately subsequent to drilling operations, the fourth side will be fenced upon release of drill rig.

No permanent or temporary living facilities are planned. During drilling operations, only daylight activities will be involved. The wells will be completed within 30 days after drilling operations. If more time is needed due to unforeseen circumstances, an extension will be requested of the BLM Authorized Officer.

The reserve pit will be allowed to dry before backfilling. Pit fluids will not be squeezed in order to expedite closure.

10. Plans for Surface Reclamation

Drill cuttings will remain in the reserve pit until dry. Reserve pit will be closed as soon as pit is dry, but no later than 90 days from time drilling rig moves off unless extension is given by BLM authorized officer. Reserve pits will not be squeezed. Mud and cuttings left in pit will be buried

at least 3 feet below recontoured grade. Any subsidence in pit area will be corrected after reserve pit has been covered.

All disturbed lands associated with this project, including well locations, pipelines and access roads, will be expediently reclaimed and reseeded. Areas not needed for production operations will be reshaped to approximate contour of surface prior to construction taking place. Topsoil will be spread over reclaimed areas and re-seeded with either BLM seed mix or private landowner seed mix if provided.

On slopes too steep for machinery to operate, twice the specified amount of seed will be broadcast and raked by hand.

Areas with high erosion potential will have special measures applied to assure reclamation takes place. This will include erosion fabric, hydro seeding, water barring, or other such measures required by the BLM.

Seeding will take place in the fall after September 15 and prior to ground frost, or in the spring after the frost has left the ground, prior to May 15.

All soil material that will be stockpiled for ten (10) months or longer will be signed and stabilized with vegetation. The stockpiles will be seeded with annual ryegrass at a rate of ten (10) pounds per acre.

During reclamation, the fill material will be pushed back into the cuts and up over the back slope. No depressions will be left to trap water or form ponds. Topsoil will be distributed evenly over the entire area and the seedbed will be prepared by disking to a depth of four to six inches. This work will not be done using frozen or wet soil.

A Notice of Intent to Abandon will be filed with the BLM for recommendation for final surface reclamation if any well is determined to be unproductive.

## 11. Surface Ownership

The surface ownership of the entire Project POD area and associated access roads are public property and managed by the BLM.

## 12. Other Information

- A. Water Management Plan is attached.
- B. Water Mitigation Agreement/Certification

ABC Coalbed Natural Gas Co. hereby certifies that all landowners within the proposed CBNG well's circle of influence were offered a Water Well Mitigation Agreement. If a water well mitigation agreement is not reached with the landowner, the company agrees to mitigate the impacts of the coalbed natural gas well in accordance with Montana State Water Laws.

- C. Additional Environmental Information

A biological assessment has been conducted for this project. The report has been sent to the BLM Wildlife Biologists.

A Class III Cultural Resource Block Inventory has been performed on this project. Report was reviewed for completeness before it was sent to the BLM Office. All proposed areas of disturbance in this project have been inventoried.

Project POD area contains three federal leases. These leases were combined into a federal unit to make it much easier to operate in this area. This has eliminated the need to secure Rights-of-Way when crossing lease lines with roads and pipelines, has made it much easier to move well locations without securing exception location approval and has enabled us avoid the steep topography associated with this project.

Lease stipulations did not allow for surface disturbance on slopes greater than 30%. There is no surface disturbance on steep slopes in project area.

Land is currently being leased for grazing by the Cattle Grazing Co. The Water Management Plan developed for this project should have some very beneficial uses for this grazing allotment.

A. Surface Data Summary Form is supplied in Appendix G.

13. Lessee's or Operator's Representative and Certification

I hereby certify that I, or persons under my direct supervision, have inspected the drill sites and access routes, that I am familiar with the conditions which currently exist; that the statements made in this plan are, to the best of my knowledge, true and correct; and the work associated with operations proposed herein will be performed by Coalbed Natural Gas Co. and its contractors and subcontractors in conformity with this plan and the terms and conditions under which it is approved. This statement is subject to the provisions of 18 U.S.C. 1001 for the filing of a false statement.

Date \_\_\_\_\_

Name and Title \_\_\_\_\_

## Appendix E

### CULTURAL RESOURCES

All companies submitting APDs and Project PODs for CBNG projects must meet the cultural resource requirements prior to approval. An APD is not considered complete until a cultural resource report has been submitted to the Miles City or Billings BLM Field office's as appropriate. BLM will determine if a Class III Cultural Resource inventory is needed. The Operator is responsible for hiring a qualified archaeologist who holds a permit with Montana BLM to conduct the necessary field work. A list of permitted archaeological consultants can be obtained from the Miles City or Billings BLM offices. Information useful to contract archaeologists can be found in BLM handbook H-8110: Guidelines for identifying cultural resources. Consultants working in Montana will need to refer to the version created for the BLM Montana/Dakotas Field Offices. Copies of the Handbook are available from the Miles City and Billings Field Office's and the Montana/Dakota BLM State Office.

Each report is reviewed by BLM cultural resource staff to ensure that all portions of the CBNG project have been adequately covered regarding cultural and historical resources. The report should address access roads, pipelines, water discharge lines, electrical lines, well locations, facility buildings and all other operations involving surface disturbance.

#### **Inventory Requirements:**

The minimal BLM Class III survey standard is as follows:

- Well pads are to be surveyed in 10-acre minimum units, unless a block survey strategy is in place for the project. The corners of the 10 acre block must be recorded with a GPS unit. This is to ensure that the survey can be replicated by BLM Cultural Resource Personnel, if necessary.
- Unimproved two-tracks (both existing and proposed) and new improved, all-season access roads will be inventoried using a minimum of a single inventory transect (100-foot centerline, e.g., 50' on both sides from the center of disturbance.)
- Central gathering/metering facilities should be inventoried in 10-acre survey blocks, though they can be appended or attached to other well pad surveys. Corners of these facilities should be recorded the same as 10 acre well inventories.
- Federal project pipelines must be surveyed to the point where they connect to an existing fee pipeline and/or road corridor, fee central gathering/metering facility, or other previously disturbed area. Water pipelines will be surveyed from the well to the discharge point or disposal facility. BLM requires that all buried infrastructure serving federal wells within a Project POD be inventoried. Third-party pipelines, which are constructed and operated by someone other than the federal leaseholder(s) and do not link federal wells within the Project POD, are not federal undertakings and therefore do not require cultural survey unless federal surface is crossed. Cultural clearance is required for rights-of-way across federal surface. A 100 foot centerline survey is required.
- New overhead and buried power line routes serving federal wells within a Project Area must be inventoried for cultural resources.

- Water discharge points and a BLM defined 10 acre area must be surveyed for cultural resources. Where the lines are not covered by a block inventory, the minimum corridor to be inventoried is 100 feet. BLM may require additional areas to be inventoried depending on the size of the powerline.
- New reservoirs constructed as part of the CBNG project will have a minimum of 10 acres surveyed including dam site, the water impoundment area, the fill or borrow area and the overflow channels and immediate downstream drainage. Cultural resource information will be reviewed for existing reservoirs and an inventory covering the proposed action would be required if necessary. If the size of an existing reservoir is to be greatly expanded, it will be regarded as new construction and require cultural resource inventory as previously stated.

BLM strongly recommends that the operator have their cultural contractor consult the Northern Cheyenne Tribal Report that is available on the BLM Miles City Website. The cultural resource contractor will need to consult the homestead appendix and spring appendix. This is to ensure that previously identified culturally sensitive springs and Northern Cheyenne Homesteads are not in the project “Area of Potential Effect”.

Cultural Resource Consultants are required to obtain a Fieldwork Authorization prior to conducting fieldwork. Failure to do so will result in project delays. The fieldwork authorization number should be displayed on the cover of the report.

## **Report Requirements**

Reports for a Class III cultural resource inventory must meet federal standards and guidelines, the State Protocol Agreement between the Montana BLM State Director and Montana State Historic Preservation Officer, the Secretary of the Interior’s Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716) and BLM Manual 8110.

A report for a CBNG Project POD must consider the entire project area, even if portions of the project area have been previously surveyed for cultural resources. These areas must be addressed in the file-search for the project and identified on the cultural report map.

If any area within the project boundary is not surveyed due to existing disturbance, such as upgraded roads or existing pipelines, then the report needs to identify those areas.

The report must include a map of the undertaking. The map must identify the entire “footprint” of the undertaking and correspond with the map submitted to the BLM by the project proponent. The footprint of the undertaking is considered the proposed well locations, facilities, pipelines, water discharge points, water control structures, access roads and power lines.

Existing improved roads must be distinguished from unimproved or proposed roads. Two-tracks within the project area proposed for use must be distinguished from those not proposed for use. The undertaking map should be combined with the map of existing and new inventory at a Class III survey standard. In addition, sites and isolated finds identified during the inventory must be identified on the map in the cultural report.

All sites found within the area of potential effect must be evaluated and recommendations made to BLM for National Register eligibility. This must include a reasonable rationale and justification under National Register criteria (36CFR60.4). For guidance, refer to National Register Bulletins How to Apply the National Register Criteria for Evaluation [Bulletin 15], How to Complete the National Register Registration Form [Bulletin 16A], How to Complete the National Register Multiple Property Documentation Form [Bulletin 16B], Evaluating and Registering Archaeological Properties (Bulletin 36 Draft) and Researching a Historic Property [Bulletin 39]. Evaluation of Effects: Provide a discussion of the effects of the proposed action on all sites (both eligible and non-eligible sites) identified within the area of potential effect. Describe any methods of treatment, which could mitigate direct and/or indirect adverse effects on significant historic properties. Provide recommended alternatives for reducing or avoiding potential adverse effects to historic properties, which may result from implementation of the undertaking.

Eligibility Criteria for Cultural Properties according to the National Register of Historic Places

- **Criterion “a” is associated with an important event or pattern of events to the past.**
- **Criterion “b” is associated with an important person.**
- **Criterion “c” is associated with architecture that embodied distinctive characteristics of a type, period, method of construction, the work of a master or holds high artistic value.**
- **Criterion “d” is associated with the ability to yield or have yielded information important to prehistory or history.**

It is important to note that cultural properties which might be eligible under criteria “a”, “b” or “c” may require a company to hire a qualified historian. Cultural properties that have religious or cultural importance to Indian Tribes with association to the area may require consultation in order to determine if the property is eligible for inclusion in the National Register as a Traditional Cultural Property.

If the report does not meet the aforementioned criteria, it will not meet BLM standards and must therefore be rejected, causing delay of the project until the problems are addressed.

All cultural resource reports must have a completed Montana Cultural Resource Annotated Bibliography System (CRABS Form) attached to the report.

### **BLM’s Responsibilities**

In order for the BLM to meet its legal responsibilities under NHPA, NEPA and FLPMA, the effects to historic properties within the CBNG project must be considered. Once a cultural resource inventory is received it is the BLM’s responsibility to:

- Review each report for technical accuracy.
- Conduct a comparative review of the Project POD and the cultural inventory in order to verify that the report covers the entire undertaking and addresses all sites and potential impacts associated with the proposed undertaking.
- Verify that the report meets federal standards and guidelines according to the State Protocol Agreement between the Montana BLM State Director and Montana State Historic Preservation



Officer, the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716) and BLM's 8100 Manual Series.

- Make eligibility determinations on those cultural properties located in the project area.
  - Categorize the property.
  - Determine the historical context(s) the property represents.
  - Evaluate significance under National Register criteria a-d (see section D).
  - Apply criteria considerations.
  - Determine if property retains sufficient integrity to convey its significance.
- Consult with the Montana State Historic Preservation Office (SHPO) under the State Protocol Agreement between the Montana BLM State Director and the Montana State Historic Preservation Officer.
- Consult, with Native American Indian Tribes and all other necessary parties regarding the impact to historic properties.

These responsibilities must be met prior to the approval of the POD/APD. This list of criteria must be completed for every cultural report that is submitted to the Miles City or Billings Field Office's. The aforementioned federal responsibilities can only be met upon the receipt and approval of an adequate report addressing the entire undertaking.

### **Important Information, Reminders, Suggestions and Check List**

Copies of the cultural report should not be attached to the POD/APD or faxed to the Miles City or Billings Field Offices.

- Two original copies of the cultural report need to be sent to the Miles City or Billings Field offices immediately as appropriate concurrent with the filing of the APD/POD. BLM will not do any work or review on the APD/POD until it is complete, which includes the cultural report.
- Of the two copies received, one remains at the Miles City or Billings Field Offices, while the second is sent to the SPHO.
- Project maps submitted with a POD book or APD should not include archaeological site information. The location of archaeological sites is considered confidential information.
- The map required as part of the cultural report must correspond accurately with the APD/POD project map(s).

### **Reminders & Suggestions**

Reports that are submitted to the BLM that do not address the entire undertaking, list sites within the project area or meet BLM standards will be returned to the proponent for modification.

It is recommended that you use the expertise of the cultural contractor during all planning phases of the project. This will help to ensure that all cultural resource requirements are met for the POD and approval will not be pending additional cultural inventory or site evaluation.

The cultural contractor must have access to the most current project maps in order to properly address the undertaking in the cultural report.

If artifacts are collected on BLM-administered surface during the cultural resource inventory, they must be curated to BLM Standards. Curation Requirements are given in Appendix 2 of the BLM Montana/Dakotas H-8110 Handbook. Artifacts are not to be collected on private surface.

It is recommended that the permitting agent or company review the report to assure that:

**Check List**

- All areas of the proposed project have been adequately surveyed.**
- Report standards have been met.**
- All sites within the POD boundary, including sites previously identified have been addressed within the current report.**

The cultural resource permittee is responsible for ensuring cultural resource inventory, testing and monitoring reports are submitted to the BLM within 60 days of completing fieldwork. If a report is likely to be submitted late, e-mail the BLM field office at least two days before the due date, explain the reason for the delay and provide a date when the report will be submitted. The BLM will acknowledge receipt of the message. Granting additional time for reporting is at the BLM's discretion, based on the reason for the delay. Acceptable reasons for delay include such circumstances as reporting an unusually complex project, awaiting the arrival of carbon 14 dating results or other necessary information. A pattern of late reporting may result in permit suspension or revocation.

For clarification or further questions regarding cultural resource survey requirements, please contact the Miles City or Billings BLM Archaeologists (Doug Melton (406) 233-2847 or Will Hubbell (406) 233-2848 in Miles City or Glen Hadden (406) 896-5234 in Billings).

## **Appendix F**

### **CBNG Programmatic Wildlife Monitoring and Protection Plan**

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*Table 1. Summary of General Wildlife Reporting, Inventory and Monitoring, CBNG Development; Powder River and Billings Resource Management Plans, CBNG Amendment (2002)* F-21

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***Table 2. Summary of APD/ROW Survey and Protection Measures, CBNG Development within the Powder River and Billings Resource Management Plans \_\_\_\_\_ F-23***

***Table 3. Additional Wildlife Inventory and Monitoring Measures On and Adjacent to Areas with High Levels of Development ( $\geq 4$  Loctions/Section), Powder River and Billings Resource Management Plans, CBNG Amendment (2001) \_\_\_\_\_ F-24***

## **INTRODUCTION**

This Wildlife Monitoring and Protection Plan (WMPP) was prepared in conjunction with the *Statewide Oil and Gas Draft Environmental Impact Statement (DEIS) (BLM 2001 Montana DEIS) and Amendment of the Powder River and Billings Resource Management Plans (RMPs)*. The DEIS and Amendment addresses future exploration for and development of Bureau of Land Management (BLM) and state of Montana (state) managed coalbed natural gas (CBNG) resources and conventional oil and gas resources. The planning area excludes those lands administered by the Forest Service, the Crow, Northern Cheyenne and other Indian lands. The WMPP will be implemented on federal lands, including split estate, in cooperation with state agencies, federal agencies, tribal representatives, Operators and landowners. If owners and managers of state and private mineral development are willing to incorporate this guidance into management of their CBNG activities, they may become a partner by entering into a Cooperative Agreement.

A variety of planning issues related to wildlife were identified during preparation of the DEIS. The goal of the WMPP is to avoid or minimize impacts to wildlife and serve as a communication tool to foster cooperative relationships among the CBNG and conventional Oil and Gas industry (i.e., Operators), resource management agencies, landowners and adjacent Tribal Governments. Because this plan addresses a large geographic area composed of diverse wildlife habitats and unique situations, it must be programmatic in nature. However, the need to provide management recommendations and guidance to conserve species and habitats remains. Regional or site specific monitoring and protection plans which follow the guidance provided in this programmatic document will be required as part of each CBNG Project Plan. Implementation of this plan during the course of project development and operations should promote wildlife conservation and allow land managers and project personnel to maintain wildlife populations and productivity levels simultaneously with the development of natural gas and oil resources.

## **PLAN PURPOSE**

Oil and gas leasing decisions and lease stipulations were previously analyzed in the Bureau of Land Management (BLM) 1992 *Final Oil and Gas RMP/EIS Amendment* (BLM 1992). Wildlife stipulations attached to leases offer protective measures: 1) for certain species, 2) during a particular time period, or 3) within a specific area. These stipulations may not address other concerns related to special status species or water/habitat related issues caused by direct and indirect impacts from CBNG exploration and development. Because it is purely speculative to predict how all wildlife will react or how development will proceed, it is difficult to develop prescriptive mitigation standards across the entire planning area. Even though BLM has some adaptive management strategies in place (e.g., conditions of approval and compliance inspections), these mechanisms do not give us the information necessary to understand cause and effect relationships across a landscape. Therefore, the purpose of this Plan is to acquire baseline wildlife information, monitor populations and assess stipulations for effectiveness. The WMPP will facilitate our ability to pinpoint problems (including the evaluation of other contributing factors), design Project Plans which include conservation for declining species, monitor the effectiveness of decisions and make recommendations to adjust management to address specific situations.

## **AREA AND OBJECTIVES**

The WMPP document is the framework for wildlife monitoring and protection across the Powder River and Billings Resource Management Plan areas (approximately 6.5 million acres) and provides a template for regional and/or project specific WMPP development. The BLM, Montana Fish Wildlife and Parks (MFWP) and United States Fish and Wildlife Service (FWS) will enter into a Cooperative Agreement to work cooperatively to implement portions of the WMPP over the planning area. Specific geographic areas will be delineated as Regional Monitoring Units

(RMU). As energy development begins, RMU specific WMPPs, following the same template as this document, will be written in cooperation with other agencies, Operators, landowners and other interests. The objectives of the programmatic are to:

- Establish a framework for cooperation among agencies, Operators, landowners, Tribal Governments and interest groups;
- Provide a process for data collection, data management and reporting ;
- Determine needs for inventory, monitoring and protection measures;
- Provide guidance and recommendations for the conservation of wildlife species;
- Establish protocols for biological clearances of Special Status Species;
- Meet the terms and conditions of the Biological Opinion;
- Determine if management practices to conserve wildlife species and habitat in lease stipulations and conservation measures contained in the BLM Record of Decision, CBNG Project Plans or Oil and Gas APDs are meeting specified objectives;
- Develop recommendations to adjust management actions based on field observations and monitoring.

Implementation of the WMPP will begin with the issuance of the *Record of Decision* and will remain in effect for the life of the project (approximately 25 years). Guidance for the conservation of special status species will be incorporated into the “Project Plan of Development Preparation Guide.” Signatories on an Interagency Cooperative Agreement will serve as the “*Steering Committee*.” A “*Core Team*” (i.e., agency biologists) will oversee the implementation of the programmatic elements of the WMPP. As energy development is initiated in an identified RMU, Wildlife Monitoring Review Teams (i.e., RMU Team) consisting of resource specialists from the BLM, FWS, MFWP and applicable Operator funded biologists will write area-specific monitoring and protection plans. Resource specialists may serve as members on more than one RMU project area team. Individual RMU plans may be terminated at the end of any year when there is undeniable evidence illustrating that wildlife populations and productivity have been successfully maintained. The BLM Authorized Officer (AO) would base termination on recommendations from the *RMU Team*.

The programmatic template will undergo a major review for effectiveness every 5 years, or as determined by the *Core Team* and *RMU Team* members. A cooperative agreement among cooperators will be signed on an annual basis to include specific work components of the current year’s work.

## IMPLEMENTATION PROTOCOL

This section provides preliminary wildlife inventory, monitoring and protection protocol. Required actions for inventory, monitoring and protection vary by species and development intensity. In areas of development with > 4 well locations per section, additional actions in Table 3 become applicable. Standard protocol for Application for Permit to Drill (APD) and right-of-way (ROW) application field reviews are provided in Table 2. Alternative measures and protocols will be developed as determined by *Core Team* and *RMU Team* members in response to specific needs identified in annual reports. This document provides methods for a number of wildlife species/categories. Additional species/categories may be added based on needs identified in annual wildlife reports. The wildlife species/categories for which specific inventory, monitoring and protection procedures will be applied were developed based on input provided by the public, other agencies and the BLM during preparation of the DEIS.

Considerable efforts will be required by agency and operator personnel for plan implementation. Many of the annually proposed agency data collection activities are consistent with current agency activities. Additionally, agency cost-sharing approaches will be considered such that public demands and statutory directives are achieved.

## ANNUAL REPORTS AND MEETINGS

State and federal agencies will enter into a master Cooperative Agreement to implement the programmatic elements of inventory, monitoring and protection actions associated with CBNG development in the Powder River and Billings Resource Management Plan areas. A *Core Team* will oversee implementation across the planning area and summarize information from work achieved in various RMUs. Additional cooperative agreements with cooperators will be established as activity is initiated in a RMU.

During project development (i.e., 25 years), Operators will provide an updated inventory and description of all existing project features (i.e., location, size and associated level of human activity at each feature), as well as those tentatively proposed for development during the next 12 months. Operators should submit the inventory to BLM no later than October 15 of each calendar year. These data will be coupled with annual wildlife inventory, monitoring and protection data obtained for the previous year and included in annual reports. Annual reports will be prepared by the BLM. Annual wildlife inventory, monitoring and protection data gathered by parties other than the BLM, (e.g., Operators, MFWP) should provide the data to the BLM by October 15 of each calendar year. Upon receipt of these data, annual reports will be completed in draft form by the BLM and submitted to the Operators, USFWS, MFWP and other interested parties no later than November 15 of each year. A 1-day meeting of the *RMU Teams* and *Core Team* will be organized by the BLM and held in early December of each year to discuss and modify, as necessary, proposed wildlife inventory, monitoring and protection protocol for the subsequent year. Additional meetings specific to a RMU will be scheduled as necessary.

Discussions regarding annual Operator-specific financing and personnel requirements will be made at these meetings. A formula for determining these requirements will be developed at the first year's meeting (i.e., size of development, anticipated impacts, amount of public land, etc.). A protocol regarding how to accommodate previously unidentified development sites will also be determined during the annual meeting. Final decisions will be made by the BLM based on the input of all affected parties.

A final annual report will be issued by BLM to all potentially affected individuals and groups by early February of each year. Annual reports will summarize annual wildlife inventory and monitoring results, note any trends across years, identify and assess protection measures implemented during past years, specify monitoring and protection measures proposed for the upcoming year and recommend modifications to the existing WMPP based on the effectiveness and/or ineffectiveness of past years (i.e., identification of additional species/categories to be monitored). Where possible, data presented in reports will be used to identify potential correlations between development and wildlife productivity and/or abundance. The BLM will be the custodian of the data and stored in BLM's Geographic Information System (GIS) for retrieval and planning. Annual GIS data updates will be conducted. Raw data collected each year will be provided to other management agencies (e.g., USFWS, MFWP) at the request of these agencies. In addition, sources of potential disturbance to wildlife will be identified, where practical (e.g., development activities, weather conditions, etc.).

**Additional reports may be prepared in any year, as necessary, to comply with other relevant wildlife laws, rules and regulations (e.g., black-footed ferret survey reports, mountain plover and bald eagle habitat loss reports).**

## ANNUAL INVENTORY AND MONITORING

This document outlines the inventory and monitoring protocol for a number of selected wildlife species/categories. Protocol will be unchanged except as authorized by the BLM or specified in this plan. Additional wildlife species/categories and associated surveys may be added or wildlife species/categories and surveys may be omitted in future years, depending on the results presented in the coordinated review of annual wildlife reports. The MFWP



will be contacted during the coordination of survey and other data acquisition phases. Opportunistic wildlife observations may be made throughout the year by agency and Operator personnel.

The frequency of inventory and monitoring will be dependent upon the level of development. In general, inventory and monitoring frequency will increase with increased levels of development. The level of effort should also be determined by species presence and development projection. Inventory and monitoring results may lead to further currently unidentifiable studies (i.e., cause and effect). The following sections identify the level of effort required by the WMPP. Site and species-specific surveys will continue to be conducted in association with APD and ROW application or CBNG project field reviews.

### **Raptors (Including Bald Eagle and Burrowing Owl)**

Raptor inventories will be conducted over the entire CBNG project area every 5 years by BLM and MFWP. In potentially affected areas, baseline inventory should be conducted prior to the commencement of development to determine the location of raptor nests/territories and their activity status by the BLM, with Operator financial assistance. These inventories should be repeated every 5 years (in areas with < 4 well locations/section) thereafter for the Life-of-the-Project (LOP) to monitor trends in habitat use. These surveys may be implemented aerially (e.g., via helicopter) or from the ground. Operators may provide financial assistance for some work. Data collected during the surveys will be recorded on BLM approved data sheets and entered into the BLM GIS database.

Nest productivity monitoring will be conducted by the BLM or a BLM approved biologist. Active nests located within 1 mile of project-related disturbance areas will be monitored between March 1 and mid-July to determine nesting success (i.e., number of nestlings/fledglings per nest). These surveys generally will be conducted from the ground. However, some nests may be difficult to observe from the ground due to steep and rugged topography and may require aerial surveys. Operators may provide financial assistance for aircraft rental as necessary. Attempts will be made to determine the cause of any documented nest failure (e.g., abandonment, predation).

Additional raptor nest activity and productivity monitoring measures will be applied in areas with high levels of development (i.e., areas with > 4 well locations/section) on and within 1 mile of the project area. Inventory/monitoring efforts in these areas, as well as selected undeveloped reference areas will be conducted annually during April and May, followed by nest productivity monitoring. Site and species-specific nest inventories will also continue to be conducted as necessary in association with all APD and ROW application field reviews.

All raptor nest/productivity surveys will be conducted using procedures that minimize potential adverse effects to nesting raptors. Specific survey protocol for reducing detrimental effects are listed in Grier and Fyfe (1987) and Call (1978) and include the following:

- Nest visits will be delayed for as long as possible during the nesting season.
- Nests will be approached cautiously and their status (i.e., number of nestling/fledglings) will be determined from a distance with binoculars or a spotting scope.
- Nests will be approached tangentially and in an obvious manner to avoid startling adults.
- Nests will not be visited during adverse weather conditions (e.g., extreme cold, precipitation events, windy periods, or during the hottest part of the day).
- Visits will be kept as brief as possible.
- All inventories will be coordinated by the BLM.
- The number of nest visits in any year will be kept to a minimum.

**Ferruginous Hawk:** Timing of surveys is very important in documenting the territory, occupancy, success and productivity of ferruginous hawk populations. The accepted survey and monitoring guidelines for ferruginous hawk are taken from the *Survey and Monitoring Guidelines for Ferruginous Hawks in Montana, 1995*.

**Bald Eagle:** Inventory and monitoring protocol for the bald eagle will be as described for raptors, with the following additions. Operators will indicate the presence of eagle habitat as previously defined, on their application. Prior to CBNG development or construction, surveys of the wooded riparian corridors within 1.0 mile of a project area will be conducted in the winter and/or spring by biologists and/or BLM-approved biologists to determine the occurrence of winter bald eagle roosts. Surveys will be conducted from daybreak to 2 hours after sunrise and/or from 2 hours before sunset to 1 hour after sunset by fixed-wing aircraft. Follow-up ground surveys, if necessary, will be conducted during the same time frame. Surveys will be at least 7 days apart. The location, activity, number and age class (immature, mature) of any bald eagles observed will be recorded. If a roost or suspected roost is identified, BLM, USFWS and MFWP will be notified and a GPS record of the roost/suspected roost will be obtained and entered into the BLM GIS database. There will be No Surface Occupancy within 0.5 miles of any identified bald eagle roost sites.

Nest productivity will be conducted by the BLM or a BLM-approved biologist in areas with high levels of development (i.e., areas with greater than or equal to 4 well locations or section) on and within 1 mile of the project area. Active nests located within one mile of project-related disturbance areas will be monitored between March 1 and mid-July to determine nesting success (i.e., number of nestlings/fledglings per nest).

**Burrowing owl:** Operators should indicate the presence of prairie dog towns on their application. The presence of sensitive habitat does not indicate that a species may be present. It does, however, alert the company and BLM that a field review and surveys may be required to process the permit or initiate action. In association with APD and ROW application field reviews, prairie dog colonies within 0.5 miles of a proposed project area will be surveyed for western burrowing owls by BLM biologists or a BLM-approved Operator-financed biologist twice yearly from June through August to determine the presence/absence of nesting owls. Efforts will be made to determine reproductive success (no. of fledglings/nest).

### **Threatened, Endangered, Candidate and Other Species of Concern**

Operators should indicate the presence of cottonwood riparian, herbaceous riparian or wet meadows, permanent water or wetlands, prairie dog towns, or rock outcrops, ridges or knolls on their application. The presence of sensitive habitat may not indicate that a species may be present. It does, however, alert the company and BLM that a field review and surveys may be required to process the permit or initiate action. The level of effort associated with the inventory and monitoring required for threatened, endangered, candidate and other species of concern (TEC&SC) will be commensurate with established protocol for the potentially affected species. Methodologies and results of these surveys will be included in annual reports or provided in separate supplemental reports. As TEC&SC species are added to or withdrawn from USFWS and/or BLM lists, appropriate modifications will be incorporated to this plan and specified in annual reports.

TEC&SC data collected during the surveys will be provided only as necessary to those requiring the data for specific management and/or project development needs. Site- and species-specific TEC&SC surveys will continue to be conducted as necessary in association with all APD and ROW application field reviews. Data will be collected on BLM approved data sheets and entered into the BLM GIS database.

## **Black-footed Ferret**

Operators should indicate the presence of prairie dog towns on their application. The presence of sensitive habitat does not indicate that suitable black footed ferret habitat may be present. It does, however, alert the company and BLM that a field review and surveys may be required to process the permit or initiate action. BLM biologists and/or BLM-approved Operator-financed biologists will determine the presence/absence of prairie dog colonies within 0.5 miles of proposed activity during APD and ROW application field reviews. Prairie dog colonies on the area will be mapped to determine overall size following the approved methodology. Colony acreage will be determined using GIS applications. Colonies that meet USFWS size criteria as potential black-footed ferret habitat (USFWS 1989) will be surveyed to determine active burrow density using the methods described by Biggins et al. (1993) or other BLM- and USFWS-approved methodology.

Project activity will be located to avoid impacts to prairie dog colonies that meet USFWS criteria as black-footed ferret habitat (USFWS 1989). If avoidance is not possible, all colonies meeting the USFWS size criteria and any colonies for which density estimates are not obtained will be surveyed for black-footed ferrets by an operator-financed, USFWS-certified surveyor prior to but not more than 1 year in advance of disturbance to these colonies. Black-footed ferret surveys will be conducted in accordance with USFWS guidelines (USFWS 1989) and will be conducted on a site-specific basis, depending on the areas proposed for disturbance in a given year as specified in the annual report. If a black-footed ferret or its sign is found during a survey, all development activity would be subject to recommendations from the *Montana Black-footed Ferret Survey Guidelines, Draft Managing Oil and Gas Activities in Prairie Dog Ecosystems with Potential for Black-footed ferret Reintroduction* and re-initiation of Section 7 Consultation with USFWS.

## **Black-tailed Prairie Dog**

The BLM will determine the acreage of occupied black-tailed prairie dog habitat within suitable mountain plover habitat on federally managed surface acres and federal mineral estate lands. Further, a reasonable effort should be made to estimate actual impacts, including habitat loss, CBNG development will have on occupied black-tailed prairie dog acres within suitable mountain plover habitat over the entire project area.

Active prairie dog towns on BLM lands within 0.5 miles of a specific project area will be identified, mapped and surveyed as described in the Black-footed ferret section. In addition, reference prairie dog colonies subject to development will be identified. On an annual basis, the BLM and/or a BLM-approved Operator-financed biologist will survey, at least a portion of, the prairie dog colonies, including the reference colonies. Prairie dog populations are subject to drastic population fluctuations primarily due to disease (plague). Therefore, efforts will be made to compare the data from the reference colonies with that obtained from the project areas, in order to monitor the response of prairie dog populations to CBNG development.

## **Mountain Plover**

Surface use is prohibited within 1/4 mile of active mountain plover nest sites. Disturbance to prairie dog towns will be avoided where possible. Any active prairie dog town occupied by mountain plover will have No Surface Use between April 1 and July 31 which may be reduced to No Surface Use within 1/4 mile of an active nest, once nesting has been confirmed. An exception may be granted by the authorized officer after the BLM consults with the FWS on a case-by-case basis and the operator agrees to adhere to the new operational constraints.

On federally managed surface acres, active black-tailed prairie colonies within suitable mountain plover habitat will have a No Surface Occupancy.

Prior to permit approval, habitat suitability will be determined. The BLM, FWS and MFWP will estimate potential mountain plover habitat across the CBNG area using a predictive habitat model. Over the next 5 years, information will be refined by field validation using most current Service mountain plover survey guidelines (USFWS 2002c) to

determine the presence/absence of potentially suitable mountain plover habitat. In areas of suitable mountain plover habitat, surveys will be conducted prior to ground disturbance activities by the BLM or a BLM-approved Operator biologist using the Service protocol at a specific project area plus a 0.5 mile buffer. Efforts will be made to identify mountain plover nesting areas that are not subject to CBNG development to be used as reference sites. Comparisons will be made of the trends in mountain plover nesting occupancy between these reference areas and areas experiencing CBNG development.

The BLM shall monitor all loss of mountain plover habitat associated with all portions of this action (operators will indicate the presence of prairie dog towns or other mountain plover habitat indicators on their application). Suitable mountain plover habitat has been defined under 'critical habitat' for the mountain plover in the Biological Opinion. The actual measurement of disturbed habitat can be the responsibility of the BLM, their agent (consultant, contractor, etc) with a written summary provided to the Service's Montana Field Office upon project completion, or immediately if the anticipated impact area is exceeded.

### **Gray Wolf**

According to the *Biological Assessment for Coalbed Natural Gas Production in Montana*, state lands and counties (Gallatin and Park Counties) bordering Yellowstone National Park would be surveyed in the spring for wolves, occupied dens, or scat prior to development. These surveys could be conducted from the air or from the ground. Areas in which wolves are observed would continue to be surveyed annually until reintroduction objectives are met. Efforts will be made to compare production and/or occupancy trends in wolf populations in these areas to a reference population in order to gain more reliable information regarding the response of wolves to CBNG development.

### **Sage Grouse**

BLM and MFWP will conduct sage grouse lek inventories over the entire CBNG project area every 5 years to determine lek locations. Surveys of different areas may occur during different years with the intent that the entire CBNG project area will be covered at least once every 5 years. Existing MFWP

Region 7 trend blocks will be monitored annually. There are 4 trend blocks in FWP Region 7; one located in the Decker area and 3 others across the Region. Inventories and protocol will be consistent with the *Montana Sage Grouse Conservation Plan* coordinated by the BLM and MFWP. In areas with  $\geq 4$  well locations per section, aerial inventories will be conducted annually on affected sections, 2 mile buffers and selected undeveloped reference areas. Surveys may be conducted aerially or on the ground, as deemed appropriate by the BLM and MFWP. Operator may provide financial assistance.

Aerial surveys will be used for determining lek locations. BLM, MFWP or BLM-approved Operator-financed biologist will monitor sage grouse lek attendance within 2 miles of areas having  $< 4$  locations per section such that all leks on these areas are surveyed at least once every 3 years. Data collected during these surveys will be recorded on BLM and MFWP approved data sheets and entered into the BLM GIS database. An effort should also be made to compare trends of the number of males/lek to reference leks

Sage grouse winter use surveys of suitable winter habitat within 2 miles of a project area will be coordinated by the BLM and implemented by the BLM and/or MFWP during November through February as deemed appropriate by these management agencies and results will be provided in interim and/or annual reports. These surveys will be conducted to identify sage grouse wintering concentration areas. Historical information of winter sage grouse locations will be useful in focusing efforts in areas suspected of providing winter habitat. Sage grouse winter habitat use surveys will be conducted subsequent to snowfall events to identify crucial winter habitat.

## **Big Game**

Elk, mule deer, white-tailed deer and pronghorn are the common big game species that occur within parts or all of the CBNG planning area. BLM and MFWP will continue to collect annual big game seasonal habitat use data and make it available to Operators and landowners. Big game use of seasonal habitats is highly dependent upon a combination of environmental factors including forage quality and snow depth. Therefore, it is very difficult to attribute changes in habitat use to a single factor. Comparisons in trends between big game seasonal habitat reference areas and seasonal habitats associated with CBNG development may provide some insight into the response of big game to CBNG development.

## **General Wildlife**

Any avian mortality observed in pits will be documented, reported to the BLM and USFWS and measures will be taken to prevent future mortality at the pit(s). Well field access roads and other roads with project-related traffic increases will be monitored for wildlife mortality so that specific mitigation can be designed and implemented as deemed necessary by BLM, in consultation with MFWP, for areas with high traffic volume and/or increased wildlife/vehicle collisions and mortality.

## **Aquatic Species**

Baseline aquatic inventories will be conducted in potentially affected areas by BLM and MFWP with Operator financial assistance, for 1-2 years prior to development commencing, to determine occurrence, abundance and population diversity of the aquatic community. These inventories should be repeated every year in selected intermittent/perennial streams associated with produced water discharge as well as selected intermittent/perennial streams associated with no produced water discharge (control sample site).

Natural fluctuations in species occurrence, abundance and population diversity will be determined by comparing changes in control sample sites to baseline inventories. Changes in occurrence, abundance and population diversity of the aquatic community in streams associated with produced water discharge may then be possible by comparing to the natural fluctuations.

Detection of a retraction in the range of a species, a downward trend in abundance, or reduced population diversity in systems with produced water discharge shall warrant a review of Project Plans and possible recommendations for adjustment of management to address the specific problems.

Aquatic groups to be inventoried and monitored will include:

- Benthic macroinvertebrates** - Determine population diversity using Hess/kick net sampling protocol to measure species abundance and establish a diversity index.
- Amphibians and aquatic reptiles** - Determine population diversity and abundance utilizing sampling methodologies being developed for prairie species.
- Non-game fish** - Determine population diversity using electrofishing and seining.
- Algae (periphyton)** – Determine population diversity.

## **PROTECTION MEASURES**

Wildlife protection measures have been put in place through lease stipulations or terms and conditions from a Biological Opinion from FWS. The following sections describe stipulations or mitigation that restrict activities through lease agreements or terms and conditions to reduce the likelihood of “take” of a federally listed species.

## **Lease stipulation**

The lease stipulations were approved in the 1994 BLM Oil and Gas EIS. These are mandatory measures or actions that have been developed as a result of wildlife research and input from agencies and Operators. Avoidance of important breeding, nesting and seasonal habitats is the primary protection measure that will reduce the possibility of CBNG and Oil and Gas development having an impact on wildlife populations, productivity, or habitat use. Additional conservation measures will be incorporated through the Project Plan design or as Conditions of Approval. Data collected during monitoring efforts and properly analyzed will be used to determine the appropriateness and the effectiveness of these measures throughout the CBNG project area. Based on the results of the monitoring data, these measures will be reviewed by the *Core Team* and *RMU Teams*. As monitoring data are collected over time, it is likely that some protection measures will be added, while others will be modified or removed completely with approval from the BLM in cooperation with other agencies and the *Core Team*. All changes in these protection measures will be reported, with a justification for the change, in annual reports. A RMP amendment may be required depending on the recommended change.

**“Waivers”** A lease stipulation may be waived by the Authorized Officer (AO) if a determination is made by the BLM, in consultation with FWS, that the proposed action will not adversely affect the species in question.

**“Exceptions”** to protection measure may be granted by the AO, in coordination with USFWS for T&E species and MFWP, if the Operator submits a plan that demonstrates that impacts from the proposed action will not be significant, or can be adequately mitigated.

**“Modifications”** may be made by the AO if it is determined that portions of the area do not include habitat protected by the stipulation.

## **Raptors**

From March 1 – August 1, all surface disturbing activities are prohibited within ½ mile of active raptor nest sites except ferruginous hawk, bald eagle and peregrine falcon nest sites. For ferruginous hawks and bald eagles, no surface occupancy or use will be allowed within ½ mile of known active nest sites. No surface occupancy or use is allowed within 1 mile of identified peregrine falcon nests. Active raptor nests are defined as those that have been used within the last two years.

## **Big Game**

Surface use is prohibited to avoid disturbance of white-tailed deer, mule deer, elk, pronghorn antelope, moose and bighorn sheep during the winter use season, December 1 - March 31. This stipulation does not apply to the operation and maintenance of production facilities.

## **Elk Parturition Range**

In order to protect elk parturition range, surface use is prohibited from April 1 to June 15 within established spring calving range. This protection measure does not apply to the operation and maintenance of production facilities.

## **Bighorn Sheep – Powder River Breaks**

No surface occupancy or use is allowed in the designated Powder River Bighorn Sheep Range. In crucial winter range outside of the designated area, surface use is prohibited from December 1 to March 31.

## **Sage Grouse**

### *Lek sites*

In order to minimize impacts to sharptail and sage grouse leks, surface occupancy within ¼ mile of known leks is prohibited. The measure may be waived if the AO, in coordination with MFWP, determines that the entire leasehold can be occupied without adversely affecting grouse lek sites, or if all lek sites within ¼ mile of the leasehold have not been attended for 5 consecutive years.

### *Nesting area*

Surface use is prohibited between March 1 – June 15 in grouse nesting habitat within 2 miles of a known lek. This measure does not apply to the operation and maintenance of production facilities. This measure will be implemented to protect sharptail and sage grouse nesting habitat from disturbance during spring and early summer in order to maximize annual production of young and to minimize disturbance to nesting activities adjacent to nesting sites for the long-term maintenance of grouse populations in the area.

## **Winter range**

**Surface use is prohibited from December 1 through March 31 within designated crucial winter range to protect sage grouse from disturbance during winter season use.**

## **Prairie Dog Towns and Associated Black-footed Ferret Habitat**

Prior to surface-disturbing activities, prairie dog colonies and complexes 80 acres or more in size and containing 5 burrows per acre will be examined to determine the presence or absence of black-footed ferrets. The findings of this examination may result in some restrictions to the operator's plans or may even preclude use and occupancy.

The lessee or operator may, at their own option, conduct an examination on the leased lands to determine if black-footed ferrets are present, or if the proposed activity would have an adverse effect, or if the area can be cleared. This examination must be done by, or under the supervision of, a qualified resource specialist approved by the BLM. An acceptable report must be provided to documenting the presence or absence of black-footed ferrets and identifying the anticipated effects of the proposed action on the black-footed ferret and its habitat. This stipulation does not apply to the operation and maintenance of production facilities.

## **Interior Least Tern**

**The interior least tern is listed as an endangered species under the ESA. Birds occupy sandbars and beaches in eastern Montana and along the Yellowstone and Missouri Rivers. Surface occupancy and will be prohibited within 1/4 mile of wetlands identified as interior least tern habitat.**

## **Terms and Conditions from Section 7 Consultation**

In order to be exempt from the prohibitions of section 9 of the Act, the Bureau must comply with the following terms and conditions, which implement the reasonable and prudent measures described and outlined in the Biological Opinion. **These terms and conditions are nondiscretionary.**

### **All Species**

In the event that a bald eagle (dead or injured) or mountain plover (dead or injured) is located during construction and operation, the Service's Billings Sub-Office of the Montana Field Office (406-247-7366) and the Service's Law Enforcement Office (406-247-7355) will be notified within 24 hours. The action agency must provide for monitoring the actual number of individuals taken. Because of difficulty in identification, all small birds found dead should be stored in a freezer for the Service to identify.

- The Bureau shall monitor all loss of bald eagle (nesting, potential nesting and roost sites) and suitable mountain plover habitat associated with all actions covered under the *Montana Statewide Draft Oil and Gas EIS and Amendment of the Powder River and Billings RMPs* and ROD. Bald eagle nesting, potential nesting and roost sites and suitable mountain plover habitat have been defined under 'habitat use' and 'critical habitat' respectively, for each species in the Biological Opinion. The actual measurement of disturbed habitat can be the responsibility of the BLM their agent (consultant, contractor, etc) with a written summary provided to the Service's Montana Field Office upon project completion. The tracking will include the location and acres of habitat loss, field survey reports, what stipulations were applied and a record of any variance granted to timing and/or spatial buffers. The monitoring of habitat loss for these species will commence from the date the Record of Decision (ROD) is signed. The actual measurement of disturbed habitat can be the responsibility of the Bureau's agent (consultant, contractor, etc.) with a written summary provided to the Service's Montana Field Office semi-annually, or immediately if the Bureau determines that action (*i. e.* Application for Permit to Drill (APD), pipeline, compressor station) will adversely affect a listed species. However, it is the responsibility of the Bureau to ensure that the semi-annual reports are complete and filed with the Service in a timely manner. The semi-annual report will include field survey reports for endangered, threatened, proposed and candidate species for all actions covered under the *Montana Statewide Draft Oil and Gas EIS and Amendment of the Powder River and Billings RMPs* and ROD. The semi-annual reports will include all actions completed under this BO up to 30 days prior to the reporting date. The first report will be due 6 months from the signing of the ROD and on the anniversary date of the signing of the ROD. Reporting will continue for the life of the project.
- As outlined in the guidance and conservation measures in the *CBNG Programmatic Wildlife Monitoring and Protection Plan for the Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans* that "All new roads required for the proposed project will be appropriately constructed, improved, maintained and signed to minimize potential wildlife/vehicle collisions... Appropriate speed limits will be adhered to on all project area roads and Operators will advise employees and contractors regarding these speed limits."

### **Bald Eagle**

- The Bureau shall require implementation of all conservation measures/mitigation measures identified in the Biological Assessment prepared for the project and dated April 10, 2002 and wildlife inventory, monitoring and protection protocol provided by the WMPP. The Bureau shall monitor for compliance with the measures and protocol. These are as follows:
- The appropriate standard seasonal or year-long stipulations for raptors or no surface occupancy for bald eagles as identified in the Billings Resource Management Plan (U.S. Bureau of Land Management 1983),



Powder River Resource Management Plan (BLM 1984) and Oil and Gas Resource Management Plan/ EIS Amendment (BLM 1992) will be applied. This includes No Surface Occupancy within ½ mile of nests active in the last 7 years and ½ mile of roost sites.

- Inventory and monitoring protocol for the bald eagle will be as described for raptors, with the following additions. Operators will indicate the presence of eagle habitat as previously defined, on their application. Prior to CBNG development or construction, surveys of the wooded riparian corridors within 1.0 mile of a project area will be conducted in the winter and/or spring by biologists and/or BLM-approved biologists to determine the occurrence of winter bald eagle roosts. Surveys will be conducted from daybreak to 2 hours after sunrise and/or from 2 hours before sunset to 1 hour after sunset by fixed-wing aircraft. Follow-up ground surveys, if necessary, will be conducted during the same time frame. Surveys will be at least 7 days apart. The location, activity, number and age class (immature, mature) of any bald eagles observed will be recorded and if a roost or suspected roost is identified, BLM, USFWS and MFWP will be notified and a GPS record of the roost/suspected roost will be obtained and entered into the BLM GIS database. There will be No Surface Occupancy within 0.5 miles of any identified bald eagle roost sites.
- Nest productivity will be conducted by the BLM or a BLM approved biologist in areas with high levels of development (i.e., areas with greater than or equal to 4 well locations or section) on and within 1 mile of the project area. Active nests located within one mile of project-related disturbance areas will be monitored between March 1 and mid-July to determine nesting success (i.e., number of nestlings/fledglings per nest).
- No new above-ground power line should be constructed within the Primary Use Area or ½ mile from an active eagle nest or nest that has been occupied within the recent past. No surface occupancy or use is allowed within 0.5 miles of known bald eagle nest sites which have been active within the past 7 years. All other actions will be consistent with the *Montana Bald Eagle Management Plan - July 1994*.
- Power lines will be built to standards identified by the Avian Power Line Interaction Committee (1996) to minimize electrocution potential. The Service has more specific recommendations that reaffirm and compliment those presented in *Suggested Practices*. It should be noted that these measures vary in their effectiveness to minimize mortality and may be modified as they are tested in the field and laboratory. Local habitat conditions should be considered in their use. The Service does not endorse any specific product that can be used to prevent and/or minimize mortality, however, we are providing a list of *Major Manufacturers of Products to Reduce Animal Interactions on Electrical Utility Facilities*.

## New Distribution Lines and Facilities

The following represents areas where the raptor protection measures will be applied when designing new distribution line construction:

- 1.1 Bury distribution lines where feasible.
- 1.2 Raptor-safe structures (e.g., with increased conductor-conductor spacing) are to be used that address adequate spacing for each problematic species (i.e., minimum 60" for bald eagles would cover all species).
- 1.3 Equipment installations (overhead service transformers, capacitors, reclosers, etc.) are to be made raptor safe (e.g., by insulating the bushing conductor terminations and by using covered jumper conductors).
- 1.4 Jumper conductor installations (e.g., corner, tap structures, etc) are to be made raptor safe by using covered jumpers or providing adequate separation.
- 1.5 Employ covers for arrestors and cutouts.

- 1.6 Lines should avoid high avian use areas such as wetlands, prairie dog towns and grouse leks. If not avoidable, use anti-perching devices to discourage perching in sensitive habitats such as grouse leks, prairie dog towns and wetlands to decrease predation and decrease loss of avian predators to electrocution.

## **Modification of Existing Facilities**

Raptor protection measures to be applied when retrofitting existing distribution lines. Problem structures may include dead ends, tap or junction poles, transformers, reclosers and capacitor banks or other structures with less than 60" between conductors or a conductor and ground. The following modifications will be made:

- 2.1 Cover exposed jumpers.
- 2.3 Gap any pole top ground wires.
- 2.4 Isolate grounded guy wires by installing insulating link.
- 2.5 On transformers, install insulated bushing covers, covered jumpers, cutout covers and arrestor covers.
- 2.6 When mortalities occur on existing lines and structures, raptor protection measures are to be applied (e.g., modify for raptor-safe construction, install perches, perching deterrents, nesting platforms, nest deterrent devices, etc).
- 2.7 Use anti-perching devices to discourage perching in sensitive habitats such as grouse leks, prairie dog towns and wetlands to decrease predation and decrease loss of avian predators to electrocution.
- 2.8 In areas where midspan collisions are a problem, install line-marking devices that have been proven effective. All transmission lines that span streams and rivers, should maintain proper spacing and have markers installed.

These additional standards to minimize migratory bird mortalities associated with utility transmission lines, will be incorporated into the Terms and Conditions for all APD's and stipulations for Right-Of-Way applications.

### **Mountain Plover**

- The Bureau shall require implementation of the conservation measures for mountain plover as identified in the Biological Assessment prepared for the project and dated April 10, 2002 and wildlife inventory, monitoring and protection protocol provided by the *WMPP*. The Bureau shall monitor for compliance with the measures and protocol. These are as follows:
- Surface use is prohibited within 1/4 mile of active mountain plover nest sites. Disturbance to prairie dog towns will be avoided where possible. Any active prairie dog town occupied by mountain plover will have No Surface Use between April 1 and July 31. This area may be reduced to No Surface Use within 1/4 mile of an active nest, once nesting has been confirmed. An exception may be granted by the authorized officer after the BLM consults with the FWS on a case by case basis and the operator agrees to adhere to the new operational constraints.

- Due to the declining status of mountain plover in the analysis area and the need to retain this most important and limited nesting habitat, all active prairie dog colonies within suitable mountain plover habitat will have No Surface Occupancy (NSO). This NSO will be applied only to federally managed surface acres. This NSO may be modified in an amendment to this biological opinion after analysis of impacts to this preferred nesting habitat is completed.
- The BLM will determine the acreage of occupied black-tailed prairie dog habitat within the suitable mountain plover habitat of federally managed surface acres and on federal mineral estate lands. Further, a reasonable effort should be made to estimate the actual impacts, including habitat loss, CBNG development will have on occupied black-tailed prairie dog acres within suitable mountain plover habitat over the entire project area. The project area is large and certain areas will likely be developed for Coalbed Natural Gas before others. The BLM, Service and cooperators will develop a survey protocol that may include prioritization of subsets of the project area to be analyzed. Based on the results of such analysis, the NSO on active prairie dog within suitable mountain plover habitat may be modified in an amendment to the biological opinion.
- Prior to permit approval, habitat suitability will be determined. The BLM, FWS and MFWP will estimate potential mountain plover habitat across the CBNG area using a predictive habitat model. Over the next 5 years, information will be refined by field validation using most current Service mountain plover survey guidelines (USFWS 2002c) to determine the presence/absence of potentially suitable mountain plover habitat. In areas of suitable mountain plover habitat, surveys will be conducted prior to ground disturbance activities by the BLM or a BLM-approved Operator biologist using the Service protocol at a specific project area plus a 0.5 mile buffer. Efforts will be made to identify mountain plover nesting areas that are not subject to CBNG development to be used as reference sites. Comparisons will be made of the trends in mountain plover nesting occupancy between these reference areas and areas experiencing CBNG development.
- The BLM shall monitor all loss of mountain plover habitat associated with all portions of this action (operators will indicate the presence of prairie dog towns or other mountain plover habitat indicators on their application). Suitable mountain plover habitat has been defined under 'critical habitat' for the mountain plover in the Biological Opinion. The actual measurement of disturbed habitat can be the responsibility of the BLM, their agent (consultant, contractor, etc) with a written summary provided to the Service's Montana Field Office upon project completion, or immediately if the anticipated impact area is exceeded.
- If suitable mountain plover habitat is present, surveys for nesting mountain plovers will be conducted prior to ground disturbance activities, if ground disturbing activities are anticipated to occur between April 10 and July 10. Disturbance occurring outside this period is permitted, but any loss of mountain plover suitable habitat must be documented. Sites must be surveyed 3 times between the April 10 and July 10 period, with each survey separated by at least 14 days. The earlier date will facilitate detection of early-breeding plovers. A disturbance-free buffer zone of 1/4 mile will be established around all mountain plover nesting locations between April 1 and July 31. If an active nest is found in the survey area, the planned activity should be delayed 37 days, or seven days post-hatching. If a brood of flightless chicks is observed, activities should be delayed at least seven days (USFWS 2002). Exceptions and/or waiver to stipulations can be made through consultation with FWS on a case by case basis.
- Roads will be located outside of nesting plover habitat wherever possible. Apply mitigation measures to reduce mountain plover mortality caused by increased vehicle traffic. Construct speed bumps, use signing or post speed limits as necessary to reduce vehicle speeds near mountain plover.
- Creation of hunting perches will be minimized within ½ mile of occupied nesting areas. Utilize perch inhibitors (perch guards) to deter predator use.
- Native seed mixes will be used to re-establish short grass prairie vegetation during reclamation.

- There will be No Surface Occupancy of ancillary facilities (e.g., compressor stations, processing plants) within ½ mile of known nesting areas. Variance may be granted after consultation with the Service.
- In habitat known to be occupied by mountain plover, no dogs will be permitted at work sites to reduce the potential for harassment of plovers.
- Operators and the Bureau shall be provided by the Service with educational material illustrating and describing the mountain plover, its habitat needs, life history, threats and gas development activities that may lead to incidental take of eggs, chicks, or adults with requirements that these material be posted in common areas and circulated in a memorandum among all employees and service providers.

## Programmatic Guidance for the Development of Project Plans

Guidance for developing Project Plans and/or conservation measures applied as Conditions of Approval provide a full range of practicable means to avoid or minimize harm to wildlife species or their habitats. Operators will minimize impacts to wildlife by incorporating applicable WMPP programmatic guidance into Project Plans. Not all measures may apply to each site-specific development area and means to reduce harm are not limited to those identified in the WMPP. This guidance may change over time if new Conservation Strategies become available for Special Status Species or monitoring indicates the measure is not effective or unnecessary.

BLM and MFWP will work together through a Cooperative Agreement to collect baseline information about wildlife and sensitive habitats possibly containing special status species. During the project development phase, Operators will identify potentially sensitive habitats and coordinate with BLM to determine which species or habitats are of concern within or adjacent to the project area. In areas where required site-specific wildlife inventory has not been completed, Operators and BLM will work cooperatively to achieve it. BLM's responsibilities under NEPA, ESA and NHPA essentially are the same on split estate (i.e., federal minerals/private surface) as they are with federal surface. BLM and Operators will seek input from the private surface owner to include conservation measures in split estate situations.

The following guidance and conservation measures are considered "features" or project "design criteria" to be used during Project Plan preparation. The design of projects can incorporate conservation needs for wildlife species or measures can be added as "Conditions of Approval." These types of conservation actions offer flexibility for local situations and help minimize or eliminate impacts to the species of interest.

1. Use the best available information for siting structures (e.g., storage facilities, generators and holding tanks) outside of the applicable zone of impact in important wildlife breeding, brood-rearing and winter habitat based on the following considerations.
  - a. size of the structure(s),
  - b. level/type of anticipated disturbance
  - c. life of the operation and
  - d. extent to which impacts would be minimized by topography.
2. Concentrate energy-related facilities when practicable.
3. Develop a comprehensive Project Plan prior to Project POD or full field development activities to minimize road densities.
4. To reduce additional surface disturbance, existing roads and two-tracks on and adjacent to the CBNG project area will be used to the extent possible and will be upgraded as necessary.

5. Minimize stream channel disturbances and related sediment problems during construction of road and installation of stream crossing structures. Do not place erodible material into stream channels. Remove stockpiled material from high water zones. Locate temporary construction bypass roads in locations where the stream course will have minimal disturbance. Time construction activities to protect fisheries and water quality.
6. Design stream-crossings for adequate passage of fish (if present), minimum impact on water quality and at a minimum, the 25-year frequency runoff. Consider oversized pipe when debris loading may pose problems. Ensure sizing provides adequate length to allow for depth of road fill.
7. Use corridors to the maximum extent possible: roads, power, gas and water lines should use the same corridor whenever possible.
8. Avoid, where possible, locating roads in crucial sage grouse breeding, nesting and wintering areas and mountain plover habitats. Develop a route utilizing topography, vegetative cover, site distance, etc. to effectively protect identified wildlife habitats in a cost efficient manner.
9. Conduct all road and stream crossing construction and maintenance activities in accordance with Agency approved mitigation measures and BMPs.
10. Utilize remote monitoring technologies whenever possible to reduce site visits thereby reducing wildlife disturbance and mortalities.
11. All new roads required for the proposed project will be appropriately constructed, improved, maintained and signed to minimize potential wildlife/vehicle collisions and facilitate wildlife movement through the project area. Appropriate speed limits will be adhered to on all project area roads and Operators will advise employees and contractors regarding these speed limits.
12. Apply mitigation measures to reduce mountain plover, swift fox or sage grouse mortality caused by increased vehicle traffic. Construct speed bumps, use signing or post speed limits as necessary to reduce vehicle speeds near sage grouse leks, mountain plover habitat, or other important wildlife habitats
13. Road closures may be implemented during crucial periods (e.g., extreme winter conditions and calving/fawning seasons). Personnel will be advised to minimize stopping and exiting their vehicles in big game winter range while there is snow on the ground.
14. Roads no longer required for operations or other uses will be reclaimed if required by the surface owner or surface management agency. Reclamation will be conducted as soon as practical.
15. Operator personnel and contractors will use existing state and county roads and approved access routes, unless an exception is authorized by the surface management agency.
16. Use minimal surface disturbance to install roads and pipelines and reclaim sites of abandoned wells to restore natural plant communities.
17. Reclamation of disturbed areas will be initiated as soon as practical. Native species will be used in the reclamation of important wildlife habitat. Livestock palatability and wildlife habitat needs will be considered during seed mix formulation.
18. Site new power lines and pipelines in existing disturbed areas wherever possible.

19. Minimize the number of new power lines in sage grouse or mountain plover habitat. Bury lines near sage grouse leks and mountain plover nesting habitat when feasible.
20. Encourage monitoring of avian mortalities by entering into a Memorandum of Understanding (MOU) with FWS and the state agencies. The purpose of the MOU is to establish procedures and policies to be employed by the parties to lessen industry's liability concerns about the "take" of migratory birds.
21. Remove unneeded structures and associated infrastructure when project is completed.
22. If possible, minimize maintenance and related activities in sage grouse breeding/nesting complexes; 15 March -15 June, between the hours of 4:00-8:00 am and 7:00-10:00 pm.
23. Protect, to the extent possible, natural springs from disturbance or degradation.
24. Design and manage produced water storage impoundments so as not to degrade or inundate sage grouse leks, nesting sites and wintering sites, prairie dog towns or other Special Status Species habitats.
25. CBNG produced water should not be stored in shallow, closed impoundments or playas. Impoundments designed as flow through systems will lessen the likelihood that selenium will bioaccumulate to levels that will adversely affect other wildlife.
26. Develop offsite mitigation strategies in situations where fragmentation or degradation of Special Status Species habitat is unavoidable.
27. Protected reserve, workover and production pits potentially hazardous to wildlife by netting and/or fencing as directed by the BLM to prevent wildlife access and minimize the potential for migratory bird mortality.
28. Reduce potential increases in poaching through employee and contractor education regarding wildlife laws. Operator should report violations to BLM and MFWP.
29. Operator employees and their contractors will be discouraged from possessing firearms during working hours.

**Table 1.** Summary of General Wildlife Reporting, Inventory and Monitoring, CBNG Development; Powder River and Billings Resource Management Plans, CBNG Amendment (2002)

Action	Dates	Responsible Entity <sup>1</sup>
Plans of development for outcoming years, showing general location of proposed development	Annually	Team (BLM, USFWS, MFWP, Operators)
Annual reports summarizing findings and presenting necessary protection actions	Annually	BLM with reviews MFWP, USFWS, Operators and other interested parties
Meeting to finalize future year-s inventory, monitoring and protection measures	Annually	BLM with participation by USFWS, MFWP, Operators and other interested parties
Inventory and Monitoring		
Big game crucial winter range use monitoring (crucial winter range on the RMU plus 1-mile buffer)	When Applicable	MFWP with BLM assistance
Determine mountain plover habitat suitability	Prior to permit approval	BLM & operator assistance
In areas of suitable mountain plover habitat, conduct nest surveys in project area plus a .5 mile buffer	Prior to ground disturbing activities	BLM & operator assistance
In areas of suitable mountain plover habitat, map active black-tailed prairie dog colonies on federal surface and federal mineral estate.	Over the next couple years to provide data for an analysis required in the biological opinion.	BLM & operator assistance
Active prairie dog colonies within .5 mile of a specific project area will be identified, mapped and surveyed	Prior to permit approval	BLM with MFWP & operator assistance
Raptor nest inventories (RMU plus 1 mile buffer; burrowing owls excluded)	Every 5 years during April and May	BLM with MFWP & operator assistance

In areas with potential bald eagle winter roost sites, conduct surveys within 1 mile buffer	Prior to ground disturbing activities	BLM & operator assistance
Conduct bald eagle nest inventories within .5 miles buffer of project area	Between March 1 and mid July	BLM & operator assistance
Monitor productivity at active bald eagle nests within 1 mile of project-related disturbance	Between March 1 and mid July	BLM & operator assistance
Raptor nest productivity monitoring at active nests within 1 mile of project disturbance area	Every 5 years during March to mid-July	BLM with MFWP & operator assistance
Aerial sage grouse lek inventories (RMU plus 2 mile buffer)	Every 5 years	BLM with MFWP & operator assistance
Sage grouse lek attendance monitoring on and within 2 miles of the RMU	Annually	BLM with MFWP & operator assistance will visit selected leks each year so that all leks will be visited at least once over a 3 year period
Threatened, Endangered & Sensitive species inventory/monitoring within selected CBNG development areas and selected undeveloped comparison areas	When Applicable	BLM with MFWP & operator assistance
Native American culturally significant species	When Applicable	BLM, MFWP, Tribal Representatives & Operator Assistance
Other wildlife species inventory/monitoring within selected CBNG development areas and selected undeveloped comparison areas	When Applicable	BLM with MFWP & operator assistance



**Table 2.** Summary of APD/ROW Survey and Protection Measures, CBNG Development within the Powder River and Billings Resource Management Plans

<b>Protection Measure</b>	<b>Dates</b>
Bald eagle nest surveys within 0.5 mile of project area	Yearlong
Bald eagle nest avoidance within 0.5 mile of active nests	No Surface Use or Occupancy
Bald Eagle Winter Roost surveys within 1 mile of project area	December 1 to April 1
Bald Eagle Winter Roost avoidance within 0.5 miles of roost site	No surface Use or Occupancy
Black-footed ferret surveys	Prairie dog colonies > 80 acres
Mountain plover surveys within 0.5 miles of project area	May 1 to June 15
Active prairie dog colonies on federal surface in mountain plover habitat	BLM & operator assistance
Mountain plover nest/brood avoidance within .25 miles of project area	April 1 to July 31
Peregrine falcon nest avoidance within 1 mile of active nest	BLM & operator assistance
Ferruginous nest avoidance within .5 miles of an active nest	No surface use or occupancy
Threatened, Endangered & Sensitive species surveys	As necessary
Threatened, Endangered & Sensitive species avoidance	As necessary
Big game crucial winter range avoidance	December 1 - March 31
Elk Parturition Range avoidance	April 1 - June 15
Big Horn Sheep – Powder River Breaks	No surface use or occupancy
Prairie dog colony mapping and burrow density determinations	Yearlong
Raptor nest survey/inventory within 0.5 miles of project area	Yearlong
Raptor nest avoidance within 0.5 miles of active nests	March 1 – August 1
Sage grouse nesting habitat avoidance on areas within 2.0 miles of a lek	March 1 - June 15
Sage grouse and sharptail lek avoidance within 0.25 miles of a lek	No Surface Use or Occupancy
Sharp-tailed grouse nesting habitat avoidance on areas within 0.5 mi. of a lek	March 1 – June 15
Western burrowing owl surveys (prairie dog colonies within 0.5 miles of disturbance)	June – August
General wildlife avoidance/protection	As necessary

**Table 3.** Additional Wildlife Inventory and Monitoring Measures On and Adjacent to Areas with High Levels of Development (4 Locations/Section), Powder River and Billings Resource Management Plans, CBNG Amendment (2001)

Action	Dates	Responsible Entity
Raptor nest inventory/monitoring on areas with > 4 locations/section plus a 1-mile buffer and selected undeveloped comparison areas	Annually during April and May	BLM surveyor with Operator-provided financial assistance
Raptor productivity monitoring on areas with > 4 locations/section plus a 1-mile buffer and selected undeveloped comparison areas	Annually during March-July	BLM surveyor with Operator-provided financial assistance for BLM volunteer support
Selected TEC&SC inventory/monitoring on suitable habitats in areas with > 4 locations/section plus a 1-mile buffer and selected undeveloped comparison areas	Annually during spring and summer	BLM or Operator-financed BLM-approved biologist
Collect baseline information for benthic macroinvertebrates, amphibians and aquatic reptiles, algae and non-game fish. Monitor changes on selected streams	Baseline 1 – 2 years prior and annually over the life of the project	BLM surveyor with Operator-provided financial assistance

<p>Aerial sage grouse lek inventory on areas with 4 locations/section plus a 2-mile buffer and selected undeveloped comparison areas.</p>	<p>Annually during March to mid-May</p>	<p>BLM surveyor with Operator-provided financial assistance</p>
<p>Sage grouse lek attendance monitoring on areas with 4 locations/section plus a 2-mile buffer and selected undeveloped comparison areas</p>	<p>Year-long and in any year as deemed necessary by BLM and/or USFWS</p>	<p>Each known lek will be visited at least once annually by the BLM and/or an Operator-financed BLM-approved biologist; subsequent visits will occur at BLM-selected leks by the BLM and/or Operator-financed BLM-approved biologist</p>
<p>Others studies on areas with 4 locations/section and selected undeveloped comparison areas</p>		<p>USFWS and/or BLM with Operator and other party-provided financial assistance</p>

## Appendix G

### CBNG PROJECT SURFACE USE DATA SUMMARY FORM

<b>Company Name:</b>	<b>Date:</b>
<b>Project Name:</b>	<b>County:</b>
<b>Number of Wells:</b>	<b>Leases Involved:</b>
<b>Township (s) Involved: T N R W</b>	<b>Sections:</b>
<b>T N R W</b>	<b>Sections:</b>
<b>Number of Proposed Central Gathering/Metering Facilities:</b>	
<b>Miles of Proposed Improved Roads (including spot upgrade areas):</b>	
<b>Miles of Existing and Proposed 2-Track Roads:</b>	
<b>Miles of Corridor (define utilities):</b>	
<b>Miles of Gas Pipeline Not w/in a Corridor:</b>	
<b>Miles of Water Pipeline Not w/in a Corridor:</b>	
<b>Miles of Buried Power Cable Not w/in a Corridor:</b>	
<b>Watershed(s) Involved:</b>	
<b>Number of Proposed Discharge Points:</b>	
<b>Additional Comments:</b>	
<b>Prepared By:</b>	<b>Telephone:</b>

## Hydrologic Watershed Field Analysis Summary Sheet

<b>POD Name:</b>	
<b>Company:</b>	
<b>Watershed Involved:</b>	
<b>Watershed Area :</b>	
<b>Average Watershed Slope, ft./mi.:</b>	<b>Geographic Factor:</b>
<b>Average Annual Precipitation:</b>	
<b><u>Existing Channel information</u></b>	
<b>Average Bank Full Width, ft.</b>	
<b>Average Channel Slope, feet/foot</b>	
<b>Average Channel Width, ft. and Depth, ft.</b>	
<b>General Channel Condition: Stable/Unstable (potential erosion areas of concern)</b>	
<b><u>Proposed Channel Improvements</u></b>	
<b>Area of Headcut Modification, square feet:</b>	<b>acres:</b>
<b>Area of Pipeline or utility corridor channel crossing, square feet:</b>	<b>acres:</b>
<b>Area of Low Water Road Crossings, square feet:</b>	<b>acres:</b>
<b>Area of other channel modifications (describe by type):</b>	<b>acres:</b>