PINNACLE GAS RESOURCES – WADDLE CREEK AND FORK'S RANCH CBNG WELL DRILLING APPLICATIONS

Pinnacle Gas Resources
1 East Alger, Suite 206
Sheridan, WY 82801

State of Montana Oil and Gas Lease OG-32986-98 & OG-32988-98
Township 9 South, Range 42 East, Section 36: All
Township 9 South, Range 43 East, Section 36: All
Big Horn County, Montana

Pinnacle Gas Resources has proposed the Waddle Creek Plan of Development (POD) and the Fork's Ranch POD for coal bed natural gas production. This project lies east of Decker and the CX field and consists entirely of state land. This proposal consists of the drilling and completion of 32 coal bed natural gas (CBNG) wells.

The wells will be drilled on 80 acre spacing per coal seam. Each section will have 16 wells with eight pad locations with 2 wells per pad site. Each well will be drilled to five different coal seams within the Fort Union Formation. The gas will be transported to existing compressor stations located on fee lands. Four evaporation pits, two each on Waddle Creek and Fork's Ranch, will be utilized on state land for water management.

The Environmental Assessment for this project was jointly prepared with the Montana Board of Oil and Gas Conservation (MBOGC). They will be signatory to a joint Record of Decision.

The Environmental Assessment was released for public comment on January 30, 2008. The comment period was held through March 3, 2008. Six parties submitted comments for these projects. A comment/response to comment section was added to the draft EA, but no substantive changes were made to the EA narrative as a result of the comments. A draft record of decision is attached for your review.

The Director requests Land Board consideration and, as appropriate, authorization to approve the Waddle Creek and Fork's Ranch Plans of Development relative to activities proposed on state land.

TRUST LAND MANAGEMENT DIVISION
MONTANA BOARD OF OIL AND GAS CONSERVATION

RECORD OF DECISION

Pinnacle Gas Resources
Waddle Creek CBNG Project Plan of Development
Fork's Ranch CBNG Project Plan of Development

Proposal:
Pinnacle Gas Resources (Pinnacle) has proposed the Waddle Creek Plan of Development (POD) and the Fork's Ranch POD for coal bed natural gas production. These PODs include the drilling of 32 Coal Bed Natural Gas (CBNG) wells on state land in Big Horn County, Montana. This area lies east of Decker, Montana within the Powder River Basin. Montana Board of Oil and Gas Conservation accepted the Waddle Creek POD and the Fork's Ranch POD on November 2, 2006, but reserved the issuance of permits until the environmental reviews had been complete. The project area lies east of the CX field.

Decision:
The Trust Land Management Division is under the regulatory authority of the Montana Board of Oil and Gas for oil and gas operations in Montana. TLMD is also under the regulatory authority of MDEQ for air quality and water quality. The operator must abide by the rules and regulations imposed by the regulatory agencies.

Implementation of Alternative B will entail the following actions:

- A total of 32 coal bed natural gas wells will be drilled on two state sections. Each section will have eight pad locations with two wells per pad site on the Waddle Creek POD and the Fork's Ranch POD. Each well would be drilled to five different coal seams within the Fort Union Formation.
- Underground power lines will be placed from four separate power drops to the well pads.
- Nine new two track trails that connect to existing two track trails would be utilized to access the sixteen well pads in the state sections.
- Water lines and gas lines would be installed for each well along corridors. These lines would run along existing and new roads. The gas would be transported to existing compressor stations located on fee surface.
- Four evaporation pits, two each on Waddle Creek POD and Fork's Ranch POD, will be utilized on state lands for water management. All pits will be lined and off channel. Four evaporators will be located in each evaporation pond to increase evaporation rates.
- Pinnacle will install monitoring wells around each evaporation pit and storage pond to mitigate potential risks associated with the project.

The Waddle Creek POD and Fork's Ranch POD consist entirely of state land managed by the Trust Land Management Division. The TLMD has established the CBNG Operating and

Reclamation Requirements to mitigate any impacts that may occur as a result of development on state lands and will be incorporated into the project approval.

Finding of No Significant Impact

Based upon a review of the Environmental Analysis done by the Montana Board of Oil and Gas Conservation and the Trust Land Management Division, I determine that approval of the proposed action does not constitute a major state action significantly affecting the quality of the human environment, and does not require the preparation of an environmental impact statement.

_____

Monte G. Mason
Chief, Minerals Management Bureau
Date: _____

_____

Tom Richmond
Administrator, Montana Board of Oil and Gas Conservation
Date: _____

STATE OF MONTANA

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

TRUST LAND MANAGEMENT DIVISION

ENVIRONMENTAL ASSESSMENT

PINNACLE GAS RESOURCES
WADDLE CREEK PLAN OF DEVELOPMENT
FORK'S RANCH PLAN OF DEVELOPMENT

Township 9 South, Range 42 East, Section 36: All
Township 9 South, Range 43 East, Section 36: All

Big Horn County, Montana

FINAL

March 5, 2008

CHAPTER 1
PURPOSE AND NEED FOR ACTION

1.1 Proposed Action

Pinnacle Gas Resources, Inc. (Pinnacle) has proposed two Plans of Development (POD) known as the Waddle Creek POD and Fork's Ranch POD. These PODs include the drilling of up to 32 coal bed natural gas (CBNG) wells on State land to ten different coal seam targets. This area is located approximately 17 to 22 miles east of Decker, Montana in Big Horn County. Project construction is proposed to commence immediately upon issuance of required permits and approval. Montana Board of Oil and Gas Conservation (MBOGC) accepted these PODs for review on November 2, 2006. This Environmental Assessment was jointly prepared by DRNC Trust Land Management Division and MBOGC. MBOGC will issue their own separate Record of Decision prior to issuing regulatory permits on the 32 wells on state lands. The project area lies east of Fidelity's CX Field and Pinnacle's Dietz Field, where 824 wells are currently producing and 18 wells have been drilled and are awaiting completion.

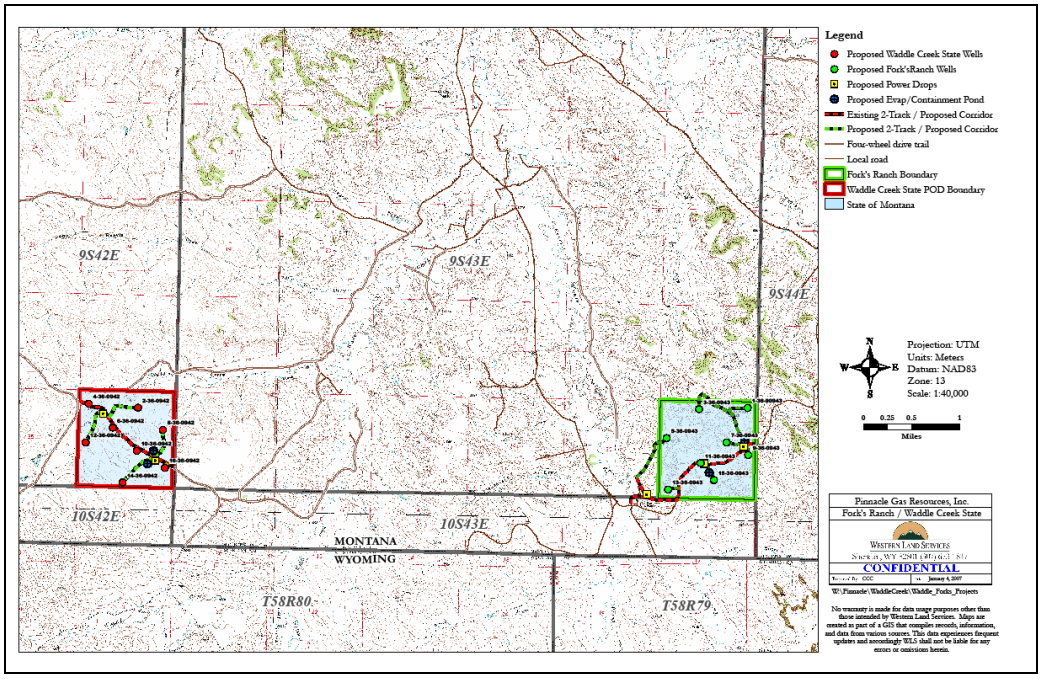

Figure 1: Map of Project Area
Waddle Creek POD is outlined in red on far left side of map and Fork's Ranch POD is outlined in green on right corner of map.

The proposed action would involve drilling up to 32 CBNG wells and utilization of both existing infrastructure and proposed new infrastructure to support this development. There would be approximately 4 miles of new two-track access roads and approximately 11 miles of new corridor with water, gas, and power lines. These lines would be co-located whenever possible to minimize impacts to resources. Four evaporation/ containment ponds have been proposed to support management of water produced in association with the natural gas production. The gas

would be taken to existing compressors located on fee lands and legal access would be obtained in the form of easements and licenses for the pipelines.

Pinnacle Gas Resources would use truck-mounted, water well type rigs for drilling the wells. The surface of the pad site would not be bladed nor would a pad site be built unless topography required it. The site may be mowed before the rig is brought on site. The area of the pad site would be approximately 120' by 120'. A small reserve pit, approximately 4 feet X 20 feet X 40 feet would be constructed to serve the wells drilled on each pad. Approximately ½ acre would be required to drill 2 wells on a pad site. The number of wells per site depends on the number of coal seams targeted. If it is necessary to remove any topsoil then it would be salvaged and used in reclamation of the site. Construction would be restricted to dry or frozen conditions to minimize impact to the site.

Well heads and other surface facilities would be equipped with fiberglass covers that would be painted an unobtrusive color to blend with the natural environment. Pits and facilities would be fenced to protect them from livestock damage or from livestock becoming harmed. Initially pad sites and corridors would have exposed areas of soil and would be more noticeable during the construction phase of development. Once the wells are drilled, producing, and brought on line all areas that could be reclaimed would be seeded to native grass species.

The department has developed detailed Operating and Field Reclamation Requirements (See Appendix A) that would provide guidance on all aspects of the construction and reclamation phases that protect the resource in CBNG operations.

Pinnacle Gas Resources would install remote monitoring equipment that would measure natural gas and water production. This remote monitoring would reduce the amount of traffic to the well sites once the wells are brought on production.

This environmental assessment focuses on 32 proposed wells on state-owned land. It incorporates by reference and tiers off of the EIS completed jointly by MBOGC, Montana Department of Environmental Quality (MDEQ), and Bureau of Land Management (BLM). A Finding of No Significant Impact (FONSI) was issued by MBOGC on March 26, 2003. The Montana Statewide Final Oil and Gas EIS and Amendment of the Powder River and Billings RMP (MT FEIS), approved April 30, 2003, is incorporated in this analysis.

1.2 Need for the Action

Pinnacle Gas Resources holds valid state oil and gas leases within the Waddle Creek POD and Fork's Ranch POD Project Area. Pinnacle submitted a request to drill coal bed natural gas wells on state land to the Montana Department of Natural Resources and Conservation, Trust Land Management Division (TLMD) on November 2, 2006. Oil and gas leases issued by the State of Montana require the lessee to submit proposed activities on the state lease to the department for review. The Montana Environmental Policy Act (MEPA) requires that an environmental review be completed if the action has a potential for impacting the human environment.

The Montana Department of Natural Resources and Conservation, Trust Land Management Division manages state owned trust lands under the direction of the State Board of Land Commissioners (Land Board). Both the Land Board and the Department have the fiduciary duty to manage and utilize these lands to generate revenue for the trust beneficiaries, which are the schools throughout the state of Montana. It is TLMD's responsibility to consider environmental impacts and to protect the future income generating capacity of the lands.

Coal bed natural gas production is relatively new to Montana. Since the first wells were drilled on state lands and began producing in 2003, total revenue has reached over $3.87 million for the school trust fund with current revenue exceeding $80,000 per month.

1.3 Relevant Plans, EIS, EA, Regulations, and Other Documents

1.3.1 Montana Final Oil and Gas EIS and Amendment of the Powder River and Billings Resource Management Plans (MT FEIS) approved April 30, 2003.

1.3.2 The Pinnacle Gas Resources Waddle Creek POD and Fork's Ranch POD accepted by the Montana Board of Oil and Gas Conservation on November 6, 2006.

1.4 Objectives of the Action

1.4.1 **Objective #1**: Develop a coal bed natural gas project in southeastern Montana on state minerals.

1.4.2 **Objective #2:** Generate revenue for the State of Montana school trust beneficiary Common Schools (K-12).

1.5 Decision(s) That Must Be Made

The Minerals Management Bureau Chief of the Trust Land Management Division of the Montana Department of Natural Resources and Conservation must decide whether to recommend development of coal bed natural gas (as briefly described in Section 1.1 and in detail in Section 2.2). He must also determine if the selected alternative (plan) would or would not be a major State action, significantly affecting the quality of the human environment. If the Bureau Chief determines that it would not significantly affect the quality of the human environment, then he could draft and submit a Record of Decision (ROD) to the Land Board for their consideration. If the Land Board approves the Department's proposed ROD, the Bureau Chief would then execute the ROD and the project could proceed.

1.6 Scope of this Environmental Analysis

1.6.1 Issues Studied in Detail

1.6.1.1 Air Quality (Issue #1)

Increased activity in the project area could result in increased air emissions from drilling equipment and increased travel to and from the well locations for the duration of the project.

1.6.1.1 Cultural Resources (Issue #2)

Land disturbance caused by constructing the well pads and the related infrastructure that is necessary for completion of this project could have an impact on the cultural resources in the area.

1.6.1.2 Hydrology (Issue #3)

Coal bed natural gas production carries water from the coal seams during the production phase. Management of produced water would consist of evaporation/containment ponds throughout the project area that are capable of handling the water produced from these state wells. Stockwater developments could also be installed if desired by the state surface grazing lessee. Other potential secondary management options that Pinnacle Gas Resources could consider in the future are managed irrigation on fee lands and injection if a suitable zone is found. Discharge of treated water to surface waters could also be considered if adjoining lands are also developed. These other secondary management options have not been proposed by Pinnacle, have not been reviewed in this document, and would not be authorized by any record of decision issued pursuant to this document. If alternative water management options are proposed in the future, they would require additional review and permitting through the appropriate agency.

1.6.1.3 Lands and Realty (Issue #4)

There is currently a State of Montana Grazing lease that covers both state sections in this project. Coal bed natural gas development would decrease the AUMs that are currently set for this lease and could interrupt grazing patterns during the drilling and construction phases.

1.6.1.4 Soils (Issue #5)

Construction of the well pads and infrastructure and the increased travel on the two track trails into the state sections could result in soil impacts and effect soil productivity. Erosion could also be a problem throughout the duration of this project.

1.6.1.5 Vegetation (Issue #6)

Construction of the well pads and infrastructure and the increased travel on the two track trails into the state section could result in the temporary removal of vegetation. Increased activity in the area could increase the potential for noxious weed introduction.

1.6.1.6 Wildlife (Issue #7)

Coal bed natural gas development could alter the habitat or create disturbance that could be detrimental to wildlife species.

1.6.1.7 Social and Economic (Issue #8)

Coal bed natural gas development would generate revenue for the school trust fund.

1.6.2 Issues Eliminated From Further Study

1.6.2.1 Noise (Resource #1)

Coal bed natural gas development would increase the noise level in the project area during the initial drilling phase.

Rationale for Elimination: This project area lies in an area that has minimal human activity. There would be no compressor stations or batteries on state lands, they would use existing compressor stations located on fee lands. The increased level of noise would only occur during the weeks that it would take to drill the wells.

1.6.2.2 Aesthetics (Resource #2)

Drilling and completing up to thirty-two wells on state lands would require insulated fiberglass covers and pump panels be placed on the surface to house the well casing, piping, valves, flow meters and pressure gauges for each well.

Rationale for Elimination: This project area lies in an area of hills and valleys, making the long-range visibility of these well housings improbable. In addition, the covers and panels are small (less than 4 feet tall) and would be painted in a manner to blend in with the landscaping whenever possible. There is minimal human activity on the state sections, so public viewing of the wells is not probable.

1.6.2.3 Recreation (Resource #3)

Wildlife uses these state sections for habitat. As a result, there is some recreation potential for fall hunting of big game.

Rationale for Elimination: There is public access to Waddle Creek but this project would not impact the public's ability to recreate on these state sections. There may be some short term disturbance of wildlife where they would move out of the area for a short period of time but they should return once drilling is completed. Development of minerals does not restrict use for recreational use.

1.7 Applicable Permits, Licenses, and Other Consultation Requirements

1.7.1 Air Quality Permits from MDEQ for drilling rig operations.

1.7.2 Plan of Development approval and Permits to drill from Montana Board of Oil and Gas.

1.7.3 Approval of a Storm Water Pollution Prevention Plan from MDEQ.

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CHAPTER 2
ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

The purpose of this chapter is to describe and compare the alternatives by summarizing the environmental consequences. There are two alternatives outlined in this chapter: the No Action Alternative (Alternative A) and the Proposed Action (Alternative B). Based on the descriptions of the relevant resources in Chapter 3: Affected Environment and the predicted effects of both alternatives in Chapter 4: Environmental Consequences, this chapter presents the predicted attainment of project objectives and the predicted effects of all alternatives on the quality of the human environment in comparative form, providing a basis for choice among the options for the decision maker and the public.

2.2 Description of Alternatives

2.2.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

2.2.1.1 Principal Actions of Alternative A

Coal bed natural gas on state land would not be developed. However, ongoing DNRC permitted and approved activities would continue in the project area:

- Livestock grazing: an existing surface lease for 283 AUMS (animal unit months) on these two sections would continue on the project area.
- Vehicle access: The Waddle Creek and Fork's Ranch PODs are accessed by two track trails.
- Offset Development: Selection of Alternative A does not prevent offset lands from being developed for coal bed natural gas production.

2.2.1.2 Past Relevant Actions

The plan of development area lies to the east of the existing CX Field boundaries developed by Fidelity Exploration and Production Company and to the southeast of the Dietz Field boundary developed by Pinnacle Gas Resources. There are currently 824 productive coal bed natural gas wells in those two fields and another 18 awaiting completion.

2.2.1.3 Present Relevant Actions Not Part of the Proposed Action

No other PODs are being reviewed concurrently with this action.

2.2.1.4 Reasonably Foreseeable Relevant Actions Not Part of the Proposed Action

Pinnacle Gas Resources, Inc. has submitted the Black Eagle Butte POD, the Fourmile East Project POD, the Fourmile West POD and the Deer Creek Fee POD to BOGC. Coal bed natural gas development would likely continue in and around the CX and Dietz Fields over the next 30 years.

All of these activities would also occur if Alternative B, which is described in Section 2.2.2, were implemented.

2.2.2 Alternative B: Coal Bed Natural Gas Development on State Lands (Proposed Action)

2.2.2.1 Principal Actions of Alternative B

- Up to 32 coal bed natural gas wells would be drilled on two state sections. There would be 8 pad sites on each state section with 2 wells per pad or 16 wells per section. Each well would be drilled to target a different set of coal seams within the Fort Union Formation. (See Table 1, 2, and 3 for state well lists). Each well would target five separate coal seams. The natural gas from the seams would be commingled to minimize the number of wells required on each pad site. The pad sites would be approximately 120 ft by 120 ft. and the site would be mowed. These would be reseeded to native grass species after drilling
- Underground power lines would be located in corridors off of four power drops originating from overhead lines that run through the state sections.
- Two track trails would be utilized to access the eight well pads in each of the state sections.
- Produced water would be managed through 4 evaporation/containment ponds with 2 each on Waddle Creek POD and Fork's Ranch POD. Stockwater developments could also be installed if desired by the state surface grazing lessee. Other potential secondary management options that Pinnacle Gas Resources could consider in the future are managed irrigation on fee lands and injection if a suitable zone is found. Discharge of treated water to surface waters could also be considered if adjoining lands are also developed. These secondary management options have not been proposed by Pinnacle, have not been reviewed in this document, and would not be authorized by any record of decision issued pursuant to this document. If alternative water management options are proposed in the future, they would require additional review and permitting through the appropriate agency.

Table 1: Wells Proposed on State Land - Waddle Creek POD; Section 36, T9S, R42E

Site	Well	Well Name	Coal Seam	QTRQTR	Section	Township Range
1	1	02S/An/Ca/UC/LC-36-09-42	Smith/Anderson/Canyon/Upper Cook/Lower Cook	NWNE	36	T9S R42E
	2	02/Br/K/F/Kn/Ke-36-09-42	Brewster/King/Flowers/Knoblach/ Kendrick	NWNE	36	T9S R42E
2	3	04S/An/Ca/UC/LC-36-09-42	Smith/Anderson/Canyon/Upper Cook/Lower Cook	NNNW	36	T9S R42E
	4	04/Br/K/F/Kn/Ke-36-09-42	Brewster/King/Flowers/Knoblach/ Kendrick	NWNW	36	T9S R42E
3	5	06S/An/Ca/UC/LC-36-09-42	Smith/Anderson/Canyon/Upper Cook/Lower Cook	SENW	36	T9S R42E
	6	06/Br/K/F/Kn/Ke-36-09-42	Brewster/King/Flowers/Knoblach/ Kendrick	SENW	36	T9S R42E
4	7	08S/An/Ca/UC/LC-36-09-42	Smith/Anderson/Canyon/Upper Cook/Lower Cook	SENE	36	T9S R42E
	8	08/Br/K/F/Kn/Ke-36-09-42	Brewster/King/Flowers/Knoblach/ Kendrick	SENE	36	T9S R42E
5	9	10S/An/Ca/UC/LC-36-09-42	Smith/Anderson/Canyon/Upper Cook/Lower Cook	NWSE	36	T9S R42E
	10	10/Br/K/F/Kn/Ke-36-09-42	Brewster/King/Flowers/Knoblach/ Kendrick	NWSE	36	T9S R42E

6	11	12S/An/Ca/UC/LC-36-09-42	Smith/Anderson/Canyon/Upper Cook/Lower Cook	NWSW	36	T9S R42E
	12	12/Br/K/F/Kn/Ke-36-09-42	Brewster/King/Flowers/Knoblach/Kendrick	NWSW	36	T9S R42E
7	13	14S/An/Ca/UC/LC-36-09-42	Smith/Anderson/Canyon/Upper Cook/Lower Cook	SESW	36	T9S R42E
	14	14/Br/K/F/Kn/Ke-36-09-42	Brewster/King/Flowers/Knoblach/Kendrick	SESW	36	T9S R42E
8	15	16S/An/Ca/UC/LC-36-09-42	Smith/Anderson/Canyon/Upper Cook/Lower Cook	SESE	36	T9S R42E
	16	16/Br/K/F/Kn/Ke-36-09-42	Brewster/King/Flowers/Knoblach/Kendrick	SESE	36	T9S R42E

Table 2: Wells Proposed on State Land on Fork's Ranch POD; Section 36, T9S, R43E

Site	Well	Well Name	Coal Seam	QTRQTR	Section	Township Range
1	1	01S/An/Ca/UC/LC-36-09-43	Smith/Anderson/Canyon/Upper Cook/Lower Cook	NENE	36	T9S R43E
	2	01/Br/K/F/Kn/Ke-36-09-43	Brewster/King/Flowers/Knoblach/Kendrick	NENE	36	T9S R43E
2	3	03S/An/Ca/UC/LC-36-09-43	Smith/Anderson/Canyon/Upper Cook/Lower Cook	NENW	36	T9S R43E
	4	03/Br/K/F/Kn/Ke-36-09-43	Brewster/King/Flowers/Knoblach/Kendrick	NENW	36	T9S R43E
3	5	05S/An/Ca/UC/LC-36-09-43	Smith/Anderson/Canyon/Upper Cook/Lower Cook	SWNW	36	T9S R43E
	6	05/Br/K/F/Kn/Ke-36-09-43	Brewster/King/Flowers/Knoblach/Kendrick	SWNW	36	T9S R43E
4	7	07S/An/Ca/UC/LC-36-09-43	Smith/Anderson/Canyon/Upper Cook/Lower Cook	SWNE	36	T9S R43E
	8	07/Br/K/F/Kn/Ke-36-09-43	Brewster/King/Flowers/Knoblach/Kendrick	SWNE	36	T9S R43E
5	9	09S/An/Ca/UC/LC-36-09-43	Smith/Anderson/Canyon/Upper Cook/Lower Cook	NESE	36	T9S R43E
	10	09/Br/K/F/Kn/Ke-36-09-43	Brewster/King/Flowers/Knoblach/Kendrick	NESE	36	T9S R43E
6	11	11S/An/Ca/UC/LC-36-09-43	Smith/Anderson/Canyon/Upper Cook/Lower Cook	NESW	36	T9S R43E
	12	11/Br/K/F/Kn/Ke-36-09-43	Brewster/King/Flowers/Knoblach/Kendrick	NESW	36	T9S R43E
7	13	13S/An/Ca/UC/LC-36-09-43	Smith/Anderson/Canyon/Upper Cook/Lower Cook	SWSW	36	T9S R43E
	14	13/Br/K/F/Kn/Ke-36-09-43	Brewster/King/Flowers/Knoblach/Kendrick	SWSW	36	T9S R43E
8	15	15S/An/Ca/UC/LC-36-09-43	Smith/Anderson/Canyon/Upper Cook/Lower Cook	SWSE	36	T9S R43E
	16	15/Br/K/F/Kn/Ke-36-09-43	Brewster/King/Flowers/Knoblach/Kendrick	SWSE	36	T9S R43E

2.2.2.2 Mitigation and Monitoring

The Montana Department of Natural Resources and Conservation, Trust Land Management Division has developed the Coal Bed Natural Gas Field Operating and Reclamation Requirements to mitigate disturbances and cumulative impacts to the environment. A copy of these requirements is provided in Appendix A of this environmental assessment.

The Montana Department of Environmental Quality has regulatory authority over the monitoring of water quality and air quality issues. The Montana Board of Oil and Gas Conservation has regulatory authority over oil field operations, including pit construction and reclamation. In conjunction with these regulating agencies, Pinnacle Gas Resources, Inc. has identified the following mitigation and monitoring measures in addition to the standard requirements enforced by MDEQ and MBOGC:

- Pinnacle would develop and submit a Storm Water Pollution Prevention Plan (SWPPP) prior to development of the project.
- The first wells to produce water from each target coal seam or combination of coal seams would be designated as one of the four POD reference wells, and would be sampled within 30-60 days of initiation. They would have the ability to be sampled at the wellhead for water quality.
- Annual water quality analyses must be completed on all state evaporation pits.

2.3 Summary Comparison of the Activities, the Predicted Achievement of Project Objectives, and the Predicted Environmental Effects of All Alternatives

2.3.1 Summary Comparison of Project Activities

Project Activity	Alternative A (No Action)	Alternative B (Proposed Action)
Drill CBNG wells on State Land	0 Wells Drilled	32 State Wells Drilled
Overhead Power lines Installed	None	There would be .95 miles on Waddle Creek and 1.3 miles on Fork's Ranch.
Underground Power lines	None	Underground power lines would be located in corridors that originate from four power drops.
Two Track Trails/All Weather Roads	Two existing two track trails.	Nine new two track trails running from the existing two track trails to the well locations. This would be approximately 4 miles of new two track trails.
Water lines/Gas lines	None	Water line and gas line would be installed for each well along corridors. These lines would run along existing and new roads and tie into a central line. The gas would be transported to existing compressor stations located on fee surface.
Evaporation/Containment Ponds	None	Four evaporation ponds with two each on Waddle Creek POD and Fork's Ranch POD. All of these ponds would be serving the state wells.
Water Treated – Discharged	None	Pinnacle Gas Resources could apply to Montana Department of Environmental

		Quality in the future for a discharge permit to Tongue River, Waddle Creek, and/or Hanging Woman Creek. This would not be the primary water management technique and would not be pursued unless adjacent lands are developed.
Water Quality/Air Quality Monitoring	Required under existing MPDES permit and MDEQ regulations	Required under existing MPDES permit and MDEQ regulations.

2.3.2 Summary Comparison of Predicted Achievement of Project Objectives

Project Objective	Alternative A (No Action)	Alternative B (Proposed Action)
Develop a coal bed natural gas project in southeastern Montana encompassing state surfaces/minerals	No state minerals would be developed.	State minerals would be developed.
Generate revenue for the State of Montana Common School trust beneficiaries.	No revenue generated for school trust.	State trust fund would receive 12.5% of all gas production on state lands for a total of over $4 million for the life of the project.

2.3.3 Summary Comparison of Predicted Environmental Effects

Issue	Alternative A (No Action)	Alternative B (Proposed Action)
Air Quality	No impact to air quality from state activity. Emissions would be regulated by MDEQ.	Pollutant emissions would occur in the short term but would remain below the limits. Emissions would be regulated by MDEQ.
Cultural Resources	No impact to cultural resources from state activity.	No sites were found on Waddle Creek and the Fork's Ranch PODs.
Hydrology	No impact to hydrology from state activity. No discharge from state lands. No evaporation pits or storage ponds would be located on state land.	There would be four evaporation ponds with two each on Waddle Creek POD and Fork's Ranch POD. These ponds would have the capacity available to handle all of the water produced on the state land. Stockwater developments could also be installed if desired by the state surface grazing lessee. Other potential secondary management options that Pinnacle Gas Resources could consider in the future are managed irrigation on fee lands and injection if a suitable zone is found. Discharge of treated water to surface waters could also be considered if adjoining lands are also developed. Prior to any of these options being pursued they would have to apply for the appropriate permits and receive permission from DNRC Water Resources for beneficial use for irrigation and/or stockwater; MDEQ for discharge to surface waters; EPA and DNRC Water Resources for subdrip irrigation on fee lands; and BOGC for injection wells. These secondary management options have not been proposed by Pinnacle, have not been reviewed in this document, and would not be authorized by any record of decision

		issued pursuant to this document. They would require additional review.
Lands and Realty	No impact to lands and realty from state activity. Existing grazing lease, and oil and gas lease would remain in effect for state lands.	32 CBNG wells would be drilled on state lands and related infrastructure put in place. The existing grazing and oil and gas leases would remain in effect.
Soils	No impact to soils from state activity. Grazing of the state section could continue, which could have minor impacts on the soil, such as compaction and erosion.	Increased chance for soil compaction due to vehicle travel and increased chance for erosion due to topsoil and vegetation removal. Some degradation in soil quality could also occur. Sites would be reclaimed after completion of drilling to reduce exposure of the soil surface.
Vegetation	No impact to vegetation from state activity. Grazing under existing state lease on state sections would continue to harvest vegetation.	Some vegetation would be removed for well pad construction and evaporation pond construction and related infrastructure. Vehicle travel could decrease vegetation quality and quantity. It could increase potential for introduction of noxious weeds. CBNG Operating and Reclamation Requirements in Appendix A would give direction on the reestablishment of native grass species and control of noxious weeds. Total AUMS would be reduced from 283 to 277.
Wildlife	No impact to wildlife from state activity.	There is a sharp tailed grouse lek on Waddle Creek that would have NSO within ¼ mile and timing restrictions for new disturbances within ½ mile from March 1 to June 15. The state sections provide habitat for wintering, summering, and parturition for mule deer, elk, and antelope.
Social and Economic	No impact to social and economic factors from state activity. No revenue generated for the state trust fund.	State and local income generated from successful development. State trust fund would receive 12.5% of royalties generated on state section for approximately $4 million over the life of the project.

2.4 Identification of the Preferred Alternative

Alternative B: Coal Bed Natural Gas Development is the preferred alternative.

CHAPTER 3
AFFECTED ENVIRONMENT

3.1 Introduction

This chapter details the existing condition of the environmental resources and factors of the Waddle Creek Plan of Development and Fork's Ranch Plan of Development that would affect or that would be affected by implementing either Alternative A, the no action alternative, or Alternative B, the proposed alternative. Chapter 3 focuses on the site specific issues described in Section 1.6.1.

This description of the existing environment in Chapter 3, the description of the activities of Alternative A: No Action in Chapter 2, and the predicted effects of Alternative A in Chapter 4 combine to establish the baseline conditions against which the decision maker and the public can compare the potential effects of Alternative B: Coal Bed Natural Gas Development on State Lands.

3.2 Description of Relevant Affected Resources

3.2.1 Air Quality (Issue #1)

Air pollution is controlled through the ambient air quality and emission standards established by the Clean Air Act and under Montana laws implemented by the Montana Department of Environmental Quality (MDEQ). The Clean Air Act Amendments of 1977 created a system for the Prevention of Significant Deterioration (PSD) of "attainment" and "unclassified" areas. This program is designed to limit the increase of pollutants in areas above a legally defined baseline level. The Montana Ambient Air Quality Standards (MAAQS) establishes upper limits, depending on the classification of the area. PSD Class I areas have more stringent limits than PSD Class II areas. The allowable incremental impacts for NO_2, SO_2, and PM_{10} within PSD Class I areas are very restricted (MT FEIS). The closest PSD Class I defined area is the Northern Cheyenne Indian Reservation, which lies approximately 21.5 miles north of the project area.

The air quality in the project area is good. This is a remote area with limited industrial and residential activity. Coal mine operations that are approximately 12 miles west of the proposed PODs may have some localized suspended particulates. Activities potentially affecting air quality issues are primarily regulated by the MDEQ. Gas venting is regulated by a BOGC requirement that prohibits venting commercial quantities of gas.

3.2.2 Cultural Resources (Issue #2)

Cultural Resources are tangible remains of past human activity within the landscape. Cultural Resources are identified and defined as geographic units or "sites" where past human activity occurred and evidence of past use can be documented. Generally, any site of human activity older than 50 years can be considered a cultural resource.

Pinnacle Gas Resources, Inc. contracted Western Land Services to conduct a class III cultural resource inventory of the state sections in the Waddle Creek and Fork's Ranch Plans of Development area. The entirety of both sections was surveyed.

The inventory of the project area consisted of block surveys entailing transects spaced 30 meters apart between participants and oriented along cardinal directions. Shovel testing was conducted on all isolated finds and prehistoric sites when necessary. Shovel tests are 30 x 30 cm test units, dug in 10 cm levels and screened through ¼" hardware cloth. Shovel testing was not completed on the historic sites as most are completely exposed on the surface and the surface manifestation is taken as the general site boundary.

Western Land Services conducted the survey on Waddle Creek POD on November 13, 14, and 16, 2006. No new archaeological sites were found but a total of four new isolated finds were recorded. These were all prehistoric in age. Isolated finds do not meet NRHP criteria and are not considered eligible for nomination.

During the survey of Fork's Ranch POD on September 25, 26, and 28, 2006, a total of four isolated finds were recorded. No new archaeological sites were found. Isolated finds do not meet NRHP criteria and are not considered eligible for nomination.

In addition to the cultural resource investigations done by Western Land Services, no other cultural properties were identified during the field investigations, file searches at the Montana State Historic Preservation Office (SHPO), the National Register of Historic Places (NRHP) database, or from the General Land Office.

3.2.3 Hydrology (Issue #3)

The Waddle Creek and Fork's Ranch projects lie entirely within the Tongue River Watershed. The majority of the projects lie within the North Fork Waddle Creek, unnamed tributary of Waddle Creek, and unnamed tributary to Hanging Woman Creek - sub watersheds of the Tongue River. Each of these tributaries are ephemeral in nature, only receiving flows during runoff periods associated with high intensity low frequency precipitation events.

3.2.3.1 Surface Waters

The Tongue River Watershed covers approximately 1477 square miles. It originates in the Big Horn Mountains in Wyoming and runs north and is perennial throughout its length to the Yellowstone River. There are many tributaries to the Tongue River, including Waddle Creek and Hanging Woman Creek which are near the project area. A representative water quality sample of the Tongue River below the reservoir is outlined in Table 3 below.

Table 3:
Water quality sample from Tongue River

Constituent	Result
pH	7.1
Electrical Conductivity	636 µmhos/cm
Total Dissolved Solids	400 mg/L
Sodium Adsorption Ratio	1.0

3.2.3.2 Ground Water

The sands and coals of the Fort Union formation are a major source of groundwater in the project area. This formation is generally encountered at depths from 50 feet to 600 feet in the project area.

Fidelity Exploration and Production Company has focused on the Dietz, Monarch, and Carney seams of the Fort Union Formation. Pinnacle Gas Resources, Inc. proposed to explore the Smith, Anderson, Canyon, Upper Cook, Lower Cook, Brewster, King, Flowers, Knoblach, and Kendrick members of the Fort Union Formation.

No water quality analysis is available for the target coal seams within or immediately adjacent to these PODs at this time. Since these PODs will be targeting the Cook and Canyon coal seams, a representative water analysis from the Coal Creek POD project to the northwest provides the following water quality data for a co-mingled collection from the Cook and Canyon coal seams: pH was 10.4, Total Dissolved Solids (TDS) was 4330 mg/L, Sodium Adsorption Ration (SAR) was 185. Another sample at the Coal Creek project from the Lower Flowers showed a pH of 8.6 and a SAR of 60.4.

Water quality samples were taken from CBNG projects across the state line in Wyoming and a representative sample for the Anderson coal seam had a pH of 8, TDS of 1270 mg/L, and SAR of 39.1. The sample for the Canyon coal seam was a pH of 8.0, TDS of 1360, and SAR of 52.6. A sample for the Cook had a pH of 8.5, TDS of 1490, and SAR of 37.3.

No sample analyses were available for the King, Upper Wall, Lower Wall, Knoblach, and Kendrick coal seams at this time. Samples will be collected from the first wells completed to these seams and produced within the PODs.

A groundwater rights search was done for the entire proposed area of development. The DNRC water rights search revealed a total of 10 permitted groundwater rights within a one mile radius of the Waddle Creek POD, two of these ground water rights are located within the project area, with the remaining eight within one mile. The search revealed a total of 9 permitted groundwater rights (water wells) within a one mile radius of the Fork's Ranch POD.

A further search of the Montana Bureau of Mines MBMG GWIC data base revealed 15 wells, five of which are located within the Waddle Creek POD project boundary. The remaining 10 are located within one mile. Two springs and five wells are listed within one mile of the Fork's Ranch POD project boundary but no water rights or features were identified within the project boundary.

An evaluation of USGS 7.5 minute topographic maps revealed no natural or developed springs exist inside or adjacent (within one mile) of the Waddle Creek

POD project boundary. The search found two natural and developed springs exist inside and adjacent to the Fork's Ranch POD project boundary.

3.2.4 Lands and Realty (Issue #4)

The surfaces of both state sections within this proposed project are included in active Grazing Lease Agreement No. 1383 issued to Padlock Ranch Co Inc. with an expiration date of February 28, 2017. The total Animal Unit Months (AUM's) for these two sections are 283, based on a 2006 field evaluation conducted by Gary Brandenburg, Land Use Specialist, DNRC Southern Land Office.

Waddle Creek POD (T9S, R42E; Section 36) has 641.36 acres with 636.36 being suitable for grazing; the remainder is listed as unsuitable because of a county road being present. This section has 154 AUMS. There is a buried phone cable that crosses the section.

On Fork's Ranch POD (T9S, R43E; Section 36) there are 129 AUMS from the 625 Acres that are listed as suitable for grazing. There are 15 acres that are listed as unsuitable because of a road, steep slopes, and rock outcrops. There is a buried phone cable that crosses the south part of the section.

In addition to a grazing lease on Fork's Ranch POD there is a Special Recreational Use License No. SLO-03-007. This license is an exclusive license issued for outfitting to Cole Benton, Grizzly Outfitters. Use is limited to hunting and the license will expire on February 28, 2009.

3.2.5 Soils (Issue #5)

The Soils Appendix of the Final Statewide Oil & Gas EIS gives a description of soils in the area. More specific soil information was submitted in the Plan of Development for the Waddle Creek and Fork's Ranch projects. The majority of soils found within the project area were derived from weathered sedimentary-based parent material. Most of these soil series consist of shallow to very deep, well drained soils formed in place with material weathered from silty clay loam and silty clay shale. Due to the variability of elevation and parent material, Hydrologic Soil Groups vary throughout the project area from B to D. They are defined as:

- Soil Group B - Soils have a moderate infiltration rate when thoroughly wet. They are chiefly moderately deep, well-drained soils of moderately fine to moderately coarse texture.
- Soil Group C - Soils have a slow infiltration rate when wet; are fine textured in nature; and have a layer that impedes downward movement of water.
- Soil Group D - Soils having a very slow infiltration rate. They are chiefly clay soils that have a high swelling potential and shallow soil over a nearly impervious material.

The use of NRCS Soil Survey Map data identified 17 different soil series on Waddle Creek and 10 different soil series on Fork's Ranch project areas.

On the Waddle Creek POD Hydro-Allentine complex (Hnh), Nelson fine sandy loam, (Nd), Nunn silty clay loam (No), and Travessilla-Thedalund loams (TS) are the primary soil series present. Hnh is made up of about 75 percent Hydro loam and 25 percent Allentine clay loam and these are sloping soils on fans and terraces with slopes from 4 to 8 percent. The Hydro soils are hydrologic group C and the Allentine soils are hydrologic group D. Nd soils are undulating and rolling soil on hills and ridges in the sandstone uplands. Slopes range from 2 to 15 percent. These soils are in hydrologic group B. Nunn soils are on fans and foot slopes and have slopes from 4 to 8 percent. They are in hydrologic group C. The TS complex is made up of rolling soils on hills and ridges. It is about 40 percent Travessilla loam, 40 percent Thedalund loam and 15 percent rock outcrop. Slopes are 8 to 15 percent. The Travessilla soils are hydrologic group D and the Thedalund soils are hydrologic group C. For all four of these soil series runoff is medium and the hazard of erosion is moderate.

On the Fork's Ranch POD the Midway-Thedalund complex, both hilly (MVf) and rolling (MVe) make up a large percentage of the soil composition on the state sections. MVf is about 60 percent Midway silty clay loam, 25 percent Thedalund loam, and 15 percent shale and rock outcrop with slopes ranging from 15 to 35 percent. MVe is about 55 percent silty clay loam, 30 percent Thedalund loam, and 15 percent Thurlow and Heldt silty clay loams with slopes in the 8 to 15 percent range. In both, runoff is rapid and the hazard of erosion is severe. Runoff from the shaly areas carries large amount of sediment. The Midway soils are hydrologic group D and the Thedalund soils are hydrologic group C.

3.2.6 Vegetation (Issue #6)

The primary habitat in the state sections can be characterized as Low to Moderate Cover Grasslands. These communities are dominated by short to medium-height grasses and forbs. This is the most abundant grassland type in Montana (Western Land Services, 2006). Draws, ridge lines, slopes and flats are dominated by native grasses and forbs. There are also areas of Sagebrush Shrubland type. This shrubland type is dominated by Wyoming Big Sagebrush (Artemeisa tridentate wyomingensis). Plant species common to both of these plant communities include bluebunch wheatgrass (Agropyron spicatum), western wheatgrass (Agropyron smithii), green needle grass (stipa viridula), and blue grama (Bouteloua gracilis). A 2006 field evaluation conducted of the two state sections indicated the presence of these plant species and other species common to this habitat type. (Gary Brandenburg, Land Use Specialist, Southern Land Office, Field Evaluation Form, 1996 -See Tables 4 and 5). There are 154 Animal Unit Months (AUMS) grazing on Waddle Creek POD and 129 AUMS on Forks' Ranch POD.

Table 4: Section 36, T9S, R42E – Waddle Creek POD
Vegetation species and composition on Silty/Sandy/Shallow Soil Complex

Common Name	Scientific Name	Composition
Bluebunch wheatgrass Western wheatgrass	Agropyron spicatum Agropyron smithii	20%
Green needlegrass	Stipa viridula	5%
Prairie sandreed Little bluestem	Calamovilfa longifolia Schizachyrium scoparium	5%
Needle and thread grass	Stipa comata	15%
Blue grama	Bouteloua gracilis	5%
Prairie junegrass Sandberg bluegrass	Koeleria cristata Poa sandbergii	10%
Threadleaf sedge	Carex filifolia	5%
Forbs		10%
Big sagebrush	Artemesia tridentata	10%
Plains pricklypear cactus Broom snakeweed Fringed sagewort	Opuntia Polyacantha Gutierrezia sarothrae Artemisia frigida	5%
Cheatgrass Others	Bromus tectorum	5% 5%

Table 5: Section 36, T9S, R43E – Fork's Ranch POD
Vegetation species and composition on Thin Hilly Soil Complex

Common Name	Scientific Name	Composition
Bluebunch wheatgrass Western wheatgrass	Agropyron spicatum Agropyron smithii	20%
Green needlegrass	Stipa viridula	5%
Prairie sandreed Little bluestem Sideoats grama Indian ricegrass	Calamovilfa longifolia Schizachyrium scoparium Bouteloua curtipenula Oryzopsis hymenoides	5%
Needle and thread grass	Stipa comata	10%
Blue grama	Bouteloua gracilis	5%
Prairie junegrass Sandberg bluegrass	Koeleria cristata Poa sandbergii	10%
Threadleaf sedge	Carex filifolia	5%
Prairie threeawn Plains muhly	Aristida oligantha Muhlenbergia cuspidata	5%
Forbs		10%
Big sagebrush	Artemesia tridentata	10%
Plains pricklypear cactus Broom snakeweed Fringed sagewort	Opuntia Polyacantha Gutierrezia sarothrae Artemisia frigida	5%
Kentucky bluegrass Cheatgrass Others	Poa pratensis Bromus tectorum	10%

A search of the Montana Natural Heritage Program's Plant Species of Concern List revealed no element occurrences on state lands (Montana Natural Heritage Program,

2006). No state listed noxious weeds were discovered by a search of inventory maps, databases, or field evaluations.

3.2.7 Wildlife (Issue #7)

Pinnacle Gas Resources contracted Western Land Services to conduct a wildlife and habitat evaluation. The field review of Waddle Creek POD was conducted on 4/16/07, 4/18/07 and 4/26/07 and review of Fork's Ranch POD on 10/28/06, 10/29/06, 12/7/06, 1/16/07, 2/20/07, 4/5/07, 4/16/07, 4/26/07, and 6/1/07. In addition to the onsite evaluations, the Montana Fish, Wildlife and Parks (FWP) GIS layers were researched to identify crucial winter ranges and distribution of wildlife in the region. The Montana Natural Heritage Program was also researched to identify Montana Animal Species of Concern. The Miles City BLM Office was contacted to obtain data on previously documented wildlife species for the area and within the surrounding POD boundary. The FWP biologist participated in on site reviews with representatives of DRNC, Pinnacle Gas Resources, and Western Land Services.

3.2.7.1 Raptors

There is an inactive raptor nest located adjacent to the Waddle Creek POD in (T9S, R42E; Section 35). Raptors that were seen in the area of the Waddle Creek POD were Golden Eagles, Red-tailed Hawk, and Northern Harrier.

No bald eagle nest sites were located within the Waddle Creek and Fork's Ranch PODs or their one mile buffer.

3.2.7.2 Prairie Dogs

A black-tailed prairie dog colony is located adjacent to the northeast corner of the Waddle Creek POD (T9S, R42E; Section 36).

3.2.7.3 Plover

Mountain Plover generally inhabit areas with a slope less than 5% with short and sparse vegetation (less than 4 inches tall and at least 30% bare ground). The terrain in the Waddle Creek and Fork's Ranch PODs is either too steep or rugged or the vegetation is too tall and dense to provide good habitat.

3.2.7.4 Greater Sage Grouse and Sharp Tailed Grouse

There is a sharp tailed grouse lek located within the Waddle Creek POD (T9S, R42E; Section 36) in the southwest quarter.

There were no sage grouse leks within a one mile boundary of the Waddle Creek POD. There is one sage grouse lek located within the one to two mile boundary of the section. The Waddle Creek POD falls within the area designated as sage grouse winter range but a field review revealed sagebrush densities were limited with more open prairie and grassland. See Figure 2.

Figure 2: Picture of Waddle Creek POD (Section 36, T9S, R42E)

There were no sage grouse or sharp tailed grouse leks found during field reviews of the Fork's Ranch POD and no sage grouse leks were identified within the two mile boundary.

3.2.7.5 Big Game

The state sections lie within good habitat for wintering, summering, and parturition for mule deer, elk and antelope.

There were mule deer and pronghorn antelope observed throughout the survey area on Waddle Creek (T9S, R42E; Section 36) and the Fork's Ranch (T9S, R43E; Section 36) PODs. In addition, there was elk sign (droppings) in the northeast quarter of the Fork's Ranch POD.

3.2.7.6 West Nile Virus

West Nile Virus is a mosquito borne disease that could cause encephalitis and other brainstem diseases in humans and is a major impact on vertebrate wildlife populations (Bureau of Land Management, 2005). It is spread when mosquitoes feed on infected birds and then people or other birds or animals. It is not spread by person to person contact and there is no evidence that people can contract the virus by handling infected animals.

Mosquitoes could potentially breed in any standing water that lasts for more than 4 days. Surface water availability has increased with CBNG development in the Powder River Basin, which includes the project area. West Nile Virus has been identified in mosquitoes trapped in and around CBNG produced water reservoirs in the vicinity of sage grouse mortalities (Bureau of Land Management, 2005). Other factors that may influence West Nile Virus are stock water reservoirs and troughs, natural wetlands, and various environmental influences.

3.2.8 Social and Economic (Issue #8)

Coal bed natural gas production is currently developed on approximately 2,924 acres of state land. Royalty revenue generated for the State through May 2007 for CBNG totaled $3,807,159. Current royalty payments are approximately $80,000 per month. This revenue comes from the Badger Hills POD area, the Dry Creek POD area, the Coal Creek POD area, the Deer Creek North POD area, and the Dietz POD area. Infill drilling on the Badger Hills POD and Deer Creek North POD areas has been complete and the wells are producing. Infill drilling on the Coal Creek POD includes an additional 20 state wells. The drilling has begun and the state will soon start receiving royalties from these wells. The Dietz POD wells have been drilled and most have begun producing. However, we will receive additional royalties once the remainder of the wells begin producing.

A more in depth analysis of the social and economic conditions of the project area can be found in Chapter 3: Affected Environment, and the Socioeconomic appendix of the MT FEIS.

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CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter forms the scientific and analytic basis for the summary comparison of effects presented in Chapter 2 of this Environmental Assessment. This chapter describes the environmental consequences or effects of the proposed action and the cumulative effects of concurrent and future state activities within the analysis areas.

4.2 Predicted Attainment of Project Objectives of all Alternatives

4.2.1 Predicted Attainment of Project Objective #1: Develop a coal bed natural gas project in southeastern Montana on state mineral development.

4.2.1.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Under this alternative, coal bed natural gas development would continue on fee lands in Wyoming a ¼ mile to the south of the Waddle Creek and Fork's Ranch PODs. The state sections lie in an area with high probability of additional coal bed natural gas development.

4.2.1.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

Under this alternative, coal bed natural gas development would occur on state tracts providing reasonable, efficient, and systematic means of developing the gas field. Development of the state tracts would prevent drainage and protect correlative rights of the state; thereby ensuring the state receives payment for the minerals removed from the state tract.

4.2.2 Predicted Attainment of Project Objective #2: Generate revenue for the State of Montana school trust fund.

4.2.2.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Under this alternative, no economic contribution to the school trust would occur above the current lease oil & gas and grazing rentals from this section. This would have a direct effect upon the TLMD's fiduciary obligation to generate revenue for the beneficiaries of the school trust fund.

4.2.2.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

Under this alternative, thirty two wells would be drilled on the two state sections. This would positively impact local and state tax revenue. The state school trust would receive royalty revenue equivalent to 12.5% of the gross value of the produced natural gas from the state tract. Based upon performance of wells in the CX and Dietz fields, which are west of this project, this would generate over $4 million to the Common School Trust over the life of the project.

4.3 Predicted Effects on Relevant Affected Resources of All Alternatives

4.3.1 Predicted Effects on Air Quality (Issue #1)

4.3.1.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Direct and Indirect: There would be no direct or indirect impacts to air quality as a result of this alternative.

Cumulative: No cumulative impacts as a result of state activities

4.3.1.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

Direct and Indirect: Air Quality impacts from CBNG developments are discussed in the 2003 Statewide Oil and Gas EIS, including cumulative impacts.

The time to drill each of the thirty two coal bed natural gas wells on the state sections would be approximately one to two days per well. Water well rigs would be utilized in lieu of traditional oil and gas drilling rigs due to the shallow depths of the coal seam targets. These smaller rigs do not have high horsepower engines so emissions would not be significant.

During the production phase of this project, vehicle traffic may result in an intermittent deterioration in air quality in the area. Dry conditions may cause a higher volume of dust in the air. There would be no compressor stations proposed on state lands and they would use existing compressor stations located on fee lands, so long term impacts would not occur as a result of state activities.

Pollutant emissions would occur during the drilling phase of the thirty two wells on the two state sections. Localized short term increases in CO, NO_2, SO_2, $PM_{2.5}$ and PM_{10} concentrations would occur. However, maximum concentrations would remain below the applicable state, local, and federal air quality standards. The Montana Department of Environmental Quality has regulatory authority to review and issue permits covering all new or modified air pollution emission sources. These permits would be required prior to construction.

The following mitigation measures have been proposed for this alternative:

- Pinnacle would install remote monitoring equipment to minimize the amount of vehicle traffic to and from the individual well sites.
- Speed limits would be implemented on new unpaved roads throughout the POD area.
- Exposed soil would be reclaimed as soon as feasible to native grass species to minimize erosion and movement of soil during windy days.
- The Montana Board of Oil and Gas Conservation regulates gas venting. They prohibit venting of commercial quantities of gas.

Cumulative: Air Quality impacts from CBNG developments are discussed in the 2003 Statewide Oil and Gas EIS, including cumulative impacts. No cumulative impacts would occur as a result of the development of these PODs. Air Quality is regulated by the Montana Department of Environmental Quality through the Clean Air Act.

4.3.2 Predicted Effects on Cultural Resources (Issue #2)

4.3.2.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Direct and Indirect: There would be no direct or indirect impacts to cultural resources as a result of this alternative.

Cumulative: There would be no cumulative impacts to cultural resources under this alternative.

4.3.2.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

Direct and Indirect: There were no new archaeological sites found on Waddle Creek and Fork's Ranch PODs. There were four isolated finds recorded on Waddle Creek POD and four isolated finds on Fork's Ranch POD. Isolated finds do not meet NRHP criteria and are not considered eligible for nomination.

The following mitigation measure would be enforced for this alternative:

- If any cultural values (sites, artifacts, human remains) are observed that were not previously addressed and reviewed, they would be left intact, operations halted, and the TLMD notified immediately. Pinnacle Gas Resources, Inc. is responsible for informing all persons in the area who are associated with this project that they would be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. TLMD would conduct an evaluation of the cultural values to establish appropriate mitigation, salvage, or treatment. If additional archaeological survey work is required, Pinnacle Gas Resources would be responsible for this expense. This is a requirement in both the lease agreement and the Coal Bed Natural Gas Operating and Reclamation Requirements found in Appendix A of this report.

Cumulative: No cumulative impacts to cultural resources would occur as a result of state mineral development.

4.3.3 Predicted Effects on Hydrology (Issue #3)

4.3.3.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Direct and Indirect: There would be no direct or indirect impacts to hydrology as a result of this alternative.

Cumulative: The state would not contribute to cumulative impacts under this alternative. Alternative B: Coal Bed Natural Gas Development (Proposed Action)

4.3.3.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

Direct and Indirect: The proposed development of state wells throughout the entire Waddle Creek and Fork's Ranch PODs would initially add an anticipated 288 gpm. This is 144 gpm for 16 wells on each of the PODs if activated simultaneously. The initial maximum discharge rates for the 16 proposed wells is 9 gpm per well based on similar production of active wells in Wyoming. Water production would have a steady decline in future years. The primary management option for this project is evaporation/ containment ponds. These ponds would have the ability to handle all the water produced from these PODs. If needed, wells could be shut in temporarily to lower the amount of water produced initially when water production would be highest.

The evaporation/containment ponds would be approximately 4.5 acres in size and have an active storage capacity of 60 acre-feet. Total construction disturbance for each evaporation pond would be 7 acres, but about 2.5 acres would be reseeded upon completion of the construction of the pits. Each pond would be lined with a minimum 20 mil liner to prevent potential ground water infiltration. The structural integrity of the liner would far outlive the life of the coal bed natural gas wells, potentially lasting up to 50 years before replacement would be warranted. The

evaporation ponds would be off channel. A total of four evaporation/containment ponds would be constructed on state lands; two each on Waddle Creek and Fork's Ranch PODs. Evaporation would occur naturally from the surface of the pits and also would be assisted by evaporators installed within the evaporation pits. Evaporation rates depend on external factors such as temperature and wind speed.

The water budget calculations for the inflow/outflow into the two proposed storage pits for each POD are shown in Table 8. The calculations reflect the expected production of 16 wells with 2 evaporation/containment ponds per section. The calculations are the same for each of the two proposed PODs. Inflow to the system is the total well production that incorporates a production decline over time. Outflows are from direct pit surface evaporation and evaporation from seven evaporators during the annual period from April through September. This evaluation shows that two storage pits are capable of handling the production from 16 wells. Pit capacities are designed to accommodate higher production volumes.

Each evaporation pit would have up to seven evaporators which consist of a 25 horsepower submersible pump equipped with a multi-stage propeller system to fracture the water column emitting from the pump system into a mist to maximize evaporation. The evaporators would be placed within the pool area of the pond and would stand approximately 38 inches above the high water line. Placing the evaporation units in the pond would minimize the drift of suspended water particulates to surrounding soil and vegetation. Mitigation measures that would be undertaken by Pinnacle Gas Resources to avoid soil and vegetation contamination include:

- Effluent volumes processed through the evaporators would be modified in order to minimize the amount of un-evaporated material from drifting outside the pit area;
- Solid synthetic drift fences would be utilized to minimize un-evaporated material from leaving the facility locations;
- Wind monitors would be installed to shut down the evaporation units during periods of high winds;
- Shallow monitoring wells would be installed adjacent to storage and evaporation ponds to monitor for potential liner leaks. Monitoring would take place monthly for the first year, and then annually in subsequent years;
- All pits would be protected with a 10 foot high panel fence to protect livestock and wildlife from becoming entrapped.

Table 8: Water Budget Calculations for the Waddle Creek, Heller's Peak, and Fork's Ranch POD's

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
	31	28	31	30	31	30	31	31	30	31	30	31	31	28	31	30	31
Production per Well [1] (gpm)	9	9	9	8.1	7.3	6.6	5.9	5.3	4.8	4.3	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Well Production [2] (gpm)	144	144	144	130	117	106	94	85	77	69	64	64	64	64	64	64	64
Total Loss from Evaporators [3] (gpm)	0	0	0	-161	-161	-161	-161	-161	-161	0	0	0	0	0	0	-161	-161
Total Loss from Surface Evaporation [4] (gpm)	-5	-7	-13	-23	-31	-37	-47	-43	-26	-18	-8	-7	-5	-7	-13	-23	-31
Water Balance [5] (gpm)	139	137	131	-54	-75	-93	-114	-119	-110	51	56	57	59	57	51	-120	-128
Water Balance (ac-ft per month)	19	17	18	-7	-10	-12	-16	-16	-15	7	7	8	8	7	7	-16	-17
Summation of Storage Needs [6] (ac-ft)	101	84	66	73	83	96	111	120	120	113	106	98	90	83	76	92	109

Total Number of Wells	16
Number of Evaporators	7
Number of Evaporation Pits	2
Pit Capacity (acre-feet)	60

Input Value to Water Balance
Formula / Calculated Value
Formula / Calculated Water Balance Value

[1] Assumes all wells are brought on line at once, initial rate is 9 gpm per well, and a 10% reduction per month starting after 3rd month.
[2] Based on total number of wells times the monthly production rate per well.
[5] Assumes an evaporator evaporation rate of 23 gpmper evaporator times number of evaporators.
[4] Evaporation from surface of pits (4.5 acres each) given an annual pan evaporation on 48 inches per year.
[5] Well production input minus total loss from evaporators and surface evaporation.
[6] Starting storage volume in pits equals capacity.

Material for each evaporation pit would be collected on site at each specific pond location. A minimum of one foot of top soil would be stripped from construction of the site and stored. Each pond would be constructed such that the completed high water line elevation is at grade with the natural ground level. Embankments would be constructed utilizing semi-compacted earthen fill material collected onsite. When completed, compaction would meet a 90% level. Each facility would have a three foot freeboard to ensure that no overtopping occurs as a result of precipitation events (100 year – 32 hour). Total anticipated disturbance for the proposed evaporation pits on state land would be approximately 7 acres each; with a total disturbance for the two PODs of 28 acres. Additional stipulations that the state would employ to ensure impacts are mitigated:

- Liners must be a minimum of 20 mil thickness for ponds on state lands;
- Contact must be made with the surface grazing lessee, Padlock Ranch Co. Inc. to determine where stock water developments should be located if desired;
- Water quality sample of state evaporation ponds annually, with the first sample submitted once all the state wells are put on production.

The Montana Board of Oil and Gas Conservation has regulatory authority over off channel containment facilities. They would oversee the design and construction of the pits throughout the project area.

Stockwater developments could also be installed if desired by the state surface grazing lessee. Other potential management options that Pinnacle Gas Resources could consider in the future are managed irrigation on fee lands and injection if a

suitable zone is found. Discharge of treated water to surface waters could also be considered if adjoining lands are also developed. These other secondary management options have not been proposed by Pinnacle, have not been reviewed in this document, and would not be authorized by any record of decision issued pursuant to this document. If alternative water management options are proposed in the future, they would require additional review and permitting through the appropriate agency.

Use of the water for stockwater would involve installation of a frost-free hydrant that would have the ability to divert flows from the pipeline that delivers effluent from the wells to the tank. Each tank would have an emergency wildlife ramp. A permit for beneficial use from DNRC Water Resources would be required prior to use of the water for stockwater. Water quality would also be checked to make sure it was suitable for livestock.

Pinnacle Gas Resources could pursue a secondary option for discharge to state waters. This option could be considered if adjoining lands are developed in the future. If Pinnacle Gas Resources wants to pursue this option they would apply to Montana DEQ for a discharge permit to allow discharge of water to Tongue River, Waddle Creek, and/or Hanging Woman Creek.

Another secondary option for disposal of the water would be a subdrip irrigation system. No irrigation would take place on state land because of wildlife concerns and soils don't meet the agencies criteria for breaking new ground. Next to the Waddle Creek POD there are approximately 500 acres of hayground developed on deeded lands. This landowner could have an interest in a BeneTerra subdrip irrigation system. This system would involve treatment of the water with amendments. This system is being used in Wyoming with coal bed natural gas water.

Pinnacle Gas Resources would have to apply to the EPA for a Class V Underground Injection Control permit to authorize the irrigation system. The Underground Injection Control (UIC) Program, created under authority of the Safe Drinking Water Act, is a preventative program aimed at protecting existing and future underground sources of drinking water. In addition, Pinnacle Gas Resources would submit an application for beneficial use to the DRNC Water Resources Division.

Injection is another means of water management for coal bed natural gas production. In this option water would be stored in storage ponds and then would be injected through an approved well injection system to an approved injection zone. Pinnacle Gas Resources would have to find a suitable shallow coal or sand formation that would accommodate the water that is produced. Water injection wells are under the authority of BOGC and they would conduct the appropriate level of review prior to authorizing disposal into an injection well.

All secondary management options would require review and approval from the appropriate permitting agency.

Cumulative: The primary water management method proposed under Alternative B is that untreated water would be contained in lined evaporation pits. The pits would be designed to handle all of the water produced from the state wells. In addition, Pinnacle Gas Resources would have the ability to shut wells in temporarily to help manage and control the amount of water produced at any one time. Secondary management options such as beneficial use for stockwater; discharge to Tongue River, Waddle Creek, and/or Hanging Woman Creek; sub drip irrigation; and injection wells would receive review through the appropriate permitting agencies.

4.3.4 Predicted Effects on Lands and Realty (Issue #4)

4.3.4.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Direct and Indirect: There would be no direct or indirect impacts to lands and realty as a result of state activity under this alternative. The existing surface grazing lease would not be impacted and there would be no effects to the available grazing land. Grazing patterns would not change.

Cumulative: Under this alternative, no cumulative impacts would occur as a result of state activities.

4.3.4.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

Direct and Indirect: Under this alternative, the existing surface grazing lease would remain in effect. There would be 40 acres disturbed during construction on Waddle Creek POD and 42 acres disturbed on Fork's Ranch POD. Total lands available for grazing purposes would be reduced by approximately 82 acres during the construction phase. However, this would be short term. After the wells have been completed and the temporary disturbance reclaimed, the area unavailable for grazing on Waddle Creek POD would be 14 acres and 15 acres on Fork's Ranch POD. This would be approximately 29 total acres.

Cumulative: Under this alternative, no cumulative impacts would occur to the lands and realty as a result of state activity. The increase in produced water could serve as a beneficial use to our surface lessee. If such beneficial use was proposed for the state section, that proposal would have to be reviewed and approved by the Department.

4.3.5 Predicted Effects on Soils (Issue #5)

4.3.5.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Direct and Indirect: Under this alternative, no coal bed natural gas development would occur on state lands. As a result, no impacts to soils would occur. The existing surface grazing lease would remain in effect which would allow for the continuing harvest of vegetation on state lands.

Cumulative: Under this alternative, no cumulative impacts would occur as a result of state activities

4.3.5.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

Direct and Indirect: Under this alternative, the project area would be developed as proposed in each POD. Eight separate well pads would be constructed on each of the two PODs. There would be two wells per pad site for a total of thirty-two coal bed natural gas wells. Each pad site would be approximately 120 ft by 120 ft. The pad

sites would be mowed. A 20' by 40' pit would be constructed on each well pad to contain drilling fluids. Upon completion of a productive well, any soil disturbance outside of well would be reclaimed according to the Coal Bed Natural Gas Operating and Reclamation Requirements located in Appendix A of this report. When the wells are plugged and abandoned, any remaining soil disturbance would be reclaimed according to these same guidelines.

Drilling and completion of the wells under Alternative B could cause minimal compaction, erosion, and soil quality degradation. Topsoil removal reduces the soil quality on the wellsites. The longer the soil remains exposed to the atmosphere and adverse weather conditions, the more likely erosion would occur (Muckel, 2004). All of the soils present in the state section have moderate to high erosion hazards. The erosion rate is increased when accompanied by high winds and rain periods. The following mitigation measures would be enforced to minimize soil damage and erosion:

- Construction would be restricted to dry or frozen conditions.
- Excavating the well pad and pits would be done immediately before construction instead of exposing the soil for long durations.
- Disturbed soils would be covered with vegetation or mulch as soon as possible
- All evaporation pits, roads, and pads would not be constructed in or near drainages.
- Other requirements are outlined in Appendix A.

In addition to the sixteen well pads, nine two track trails would be constructed off the existing two track trails. The water, gas, and underground power lines would be installed in a common corridor to reduce the potential for erosion, compaction, and soil quality deterioration. In all cases, the utility corridors would lie along the two track trails and existing roads. Total new land disturbance during the construction phase for the two track trails and utility corridor would be approximately 26.49 acres on Waddle Creek POD and 27.55 acres on Fork's Ranch POD. New two track trails would continue to encumber 5.13 acres on Waddle Creek POD and 5.51 acres on Fork's Ranch POD after the corridors are reclaimed upon completion of the construction phase. In general, vehicle travel could compact the soil. Depending on the amount of compaction, infiltration could be decreased and the potential for runoff and erosion could increase. Compaction potential is increased in wet conditions. The following mitigation measures would be enforced:

- Vehicle travel would be restricted to dry or frozen conditions.
- Vehicle travel would be limited to approved routes only.

Additional mitigation measures can be found in the Coal Bed Natural Gas Field Operating and Reclamation Requirement in Appendix A of this report.

<u>Cumulative:</u> State and local laws and the Clean Water Act require erosion and sediment control plans be developed prior to construction. Montana Department of Environmental Quality has the regulatory authority over water quality issues and they would address specific issues when necessary. Mitigation measures that would restrict construction and travel to dry or frozen conditions, in addition to reseeding areas as soon as possible would minimize erosion and soil damage.

4.3.6 Predicted Effects on Vegetation (Issue #6)

4.3.6.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Direct and Indirect: No direct or indirect effects on vegetation would occur to state land as a result of this alternative. Use of the existing county roads and two tracks would continue, but no additional impacts to vegetation would occur as a result of vehicle travel on the existing roads. Livestock grazing would continue in a similar fashion to existing management.

Cumulative: No cumulative impacts to vegetation would occur as a result of state activities under this alternative.

4.3.6.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

Direct and Indirect: Well pad construction, road construction, and infrastructure would require that the vegetation and topsoil be disturbed and /or removed on approximately 82 acres on the two state sections. This would temporarily reduce the amount of vegetation available to livestock and wildlife. The impacts to vegetation from vehicle travel would include plant growth restriction due to soil compaction and the increased potential for introduction of noxious weeds to the surface. In addition, the well pad disturbance would remove vegetation temporarily until reseeding is complete. However, approximately 53 acres of the total disturbance would be short term and reclaimed upon completion of the construction phase. Disturbed areas would be reseeded to native grass species and the CBNG Operating and Reclamation Requirements (Appendix A) would provide the seed mix and seeding guidelines. The seed would have to be noxious weed free and Pinnacle Gas Resources would be responsible for prevention and control of noxious weeds and weeds of concern on all areas of surface disturbance within the PODs.

Cumulative: A proposed increase in surface disturbance would reduce the number of acres of land available for grazing and the amount of vegetation. However, some disturbance would be short term and minimal. The total number of AUMs available for grazing would decrease from 283 to 277.

4.3.7 Predicted Effects on Wildlife (Issue #7)

4.3.7.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Direct and Indirect: No direct or indirect impacts would occur as a result of state activities under this alternative.

Cumulative: There would be no cumulative impacts as a result of state activity under this alternative.

4.3.7.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

4.3.7.2.1 Raptors

Direct and Indirect: There was an inactive raptor nest located adjacent to the Waddle Creek POD in (T9S, R42E; Section 35). Raptors that were seen in the area of the Waddle Creek POD were Golden Eagles, Red-tailed Hawk, and Northern Harrier.

No bald eagle nest sites were located within the Waddle Creek or Fork's Ranch PODs or their one mile buffer.

In order to mitigate impacts to raptors, the following stipulation would be enforced:

- All above ground power electrical poles and lines would be raptor proofed to avoid electrocution following the criteria outlined in the Avian Power Line Interaction Committee (APLIC) (1994) and APLIC (1996).

Cumulative: The cumulative impacts to raptors from the development of the project area could include direct habitat loss and displacement due to infrastructure and human disturbance. After the initial period of drilling wells and constructing the infrastructure, activity on the PODs will be minimized because of remote monitoring of the wells.

4.3.7.2.2 Prairie Dogs

Direct and Indirect: A black-tailed prairie dog colony is located adjacent to the northeast corner of the Waddle Creek POD (T9S, R42E, Section 36). No prairie dog colonies are located on Waddle Creek POD or Fork's Ranch POD.
Cumulative: The cumulative impacts to prairie dogs would be from development that caused a direct loss of habitat or displacement from surface disturbing activities.

4.3.7.2.3 Mountain Plover

Direct and Indirect: Mountain Plover generally inhabit areas with a slope less than 5% with short and sparse vegetation (less than 4 inches tall and at least 30% bare ground). The terrain in the Waddle Creek and Fork's Ranch PODs is either too steep or rugged or the vegetation is too tall and dense to provide good habitat.
Cumulative: There are no cumulative impacts expected since these sections don't provide conducive habitat.

4.3.7.2.4 Greater Sage Grouse and Sharp Tailed Grouse

Direct and Indirect: There is a sharp tailed grouse lek located within the Waddle Creek POD (T9S, R42E; Section 36). It is in the southwest quarter and there would be a ¼ mile no surface occupancy requirement. In addition there would be a timing restriction that would not allow new surface disturbing activities on state land from March 1 to June 30 within ½ mile of a sharp tailed lek.

There were no sage grouse leks located on the Waddle Creek POD or within one mile of the boundary of this lek. There is one lek located within the one to two mile boundary of the lek. There would be a timing restriction that would not allow new surface disturbing activities on state land from March 1 to June 30.

There were no sage grouse or sharp tailed grouse leks found during field reviews of the Fork's Ranch POD. No leks were identified within the a two mile boundary of the POD.

The most common impacts to sage grouse and sharp tailed grouse due to CBNG development are human disturbance and habitat alteration. The following

mitigation measures would be enforced on state land to minimize the impacts to sharptail and sage grouse leks:

- A No Surface Occupancy (NSO) activities within ¼ mile of the sharptail lek.
- A No Surface Occupancy (NSO)) for new surface disturbing activities between March 1 and June 30 in sage grouse nesting habitat within 2 miles of an active sage grouse lek.
- A No Surface Occupancy (NSO)) for new surface disturbing activities between March 1 and June 30 in sharp tailed grouse nesting habitat within ½ mile of an active sharptail lek.

Cumulative: Increased activity in the vicinity of sage grouse leks and sharp tailed grouse leks may affect this species through human disturbance and habitat alteration. The NSO and timing restrictions proposed on these PODs would minimize impacts to these species.

4.3.7.2.5 Big Game

Direct and Indirect: The state sections lie within good habitat for wintering, summering, and parturition for mule deer, elk and antelope.

There were mule deer and pronghorn antelope observed throughout the survey area on Waddle Creek (T9S, R42E; Section 36) and the Fork's Ranch (T9S, R43E; Section 36) PODs. On the Fork's Ranch POD there was also elk sign (droppings) in the northeast quarter. This was in an area with a north facing slope containing a mixture of ponderosa pine and juniper.

Mule deer, elk, and antelope could be impacted by habitat fragmentation, habitat disturbance, and human disturbance. The state sections do not lie within crucial winter range habitat. Most big game utilize the area during transition from more favorable habitat. The impacts to big game would be short term while well drilling and infrastructure construction is occurring. The loss of vegetation as a result of construction operations could also impact populations. As the production phase is implemented and restoration of the disturbed well sites is complete, big game species would likely return to the area.

Cumulative: Disturbance by activity and construction activities would be short term for big game and the populations would be affected only temporarily. It is anticipated that populations would return to the area in the production phase of this project.

4.3.7.2.6 West Nile Virus

Direct and Indirect: West Nile Virus is a mosquito borne disease that could cause encephalitis and other brainstem diseases in humans and a major impact on vertebrate wildlife populations (Bureau of Land Management, 2005). It is spread when mosquitoes feed on infected birds and then people or other birds or animals. It is not spread by person to person contact and there is no evidence that people can contract the virus by handling infected animals.

Mosquitoes could potentially breed in any standing water that lasts for more than 4 days. Surface water availability has increased with CBNG development in the Powder River Basin, which includes the project area. West Nile Virus has been identified in mosquitoes trapped in and around CBNG produced water reservoirs in the vicinity of sage grouse mortalities (Bureau of Land Management, 2005). Other factors that may influence West Nile Virus are stock water reservoirs and troughs, natural wetlands, and various environmental influences.

There is a potential to increase mosquitoes habitat with this alternative through the use of evaporation/containment ponds. As a result, cases of West Nile Virus could increase. However, many other factors could also affect the spread of disease, such as irrigation adjacent to the Tongue River, natural wetlands, stock water impoundments, and environmental influences.
The following mitigation measures would be implemented on state land to minimize water sources that support breeding mosquitoes:

- The evaporation/containment ponds would be fenced to restrict access by livestock and other wild ungulates that trample and disturb shorelines, and create habitat suitable for mosquitoes.
- Evaporation/containment ponds would have evaporators with a multi-stage propeller system that would create a ripple effect that would dissuade mosquitoes from laying eggs.

In the event that state and/or county health and human service and/or public pest management agencies indicate that mosquito control is needed, TLMD would require Pinnacle Gas Resources to take adequate control measures.
Cumulative: The increase in standing water may provide habitat that could lead to an increase in mosquito populations and subsequently an increase in West Nile Virus. Mitigation measures would be implemented to dissuade the water sources from being ideal habitat that support breeding mosquitoes.

4.3.8 Predicted Effects on Social and Economic Factors (Issue #8)

4.3.8.1 Alternative A: No Coal Bed Natural Gas Development (No Action)

Direct and Indirect: Under this alternative, state minerals would not be developed. As a result, no economic contribution to the school trust would occur above the current lease rentals and license fees in this section. This would have a direct effect upon the TLMD's fiduciary obligation to generate revenue for the beneficiaries of the school trust fund. Development may continue around the state section, allowing drainage of state minerals. This would reduce or eliminate the potential for development of state minerals in the future.
Cumulative: There may be development of fee minerals adjacent to the state land that could increase state and local taxes. There would be little difference in employment opportunities between the two alternatives.

4.3.8.2 Alternative B: Coal Bed Natural Gas Development (Proposed Action)

Direct and Indirect: Under this alternative, up to thirty two wells would be drilled on the two state sections. This would positively impact local and state tax revenue. The state school trust could receive royalty revenue equivalent to 12.5% of the gross value

of the produced natural gas from the state tract. Based upon performance of wells in the CX and Dietz fields, which are west of this project, this could generate over $4 million to the Common School Trust over the life of the project.

Cumulative: There would be an increase in the state and local taxes due to coal bed natural gas development of state minerals. The increase in production would create a minimal increase in the number of jobs relating to the activity.

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CHAPTER 5
AGENCY CONSULTATION AND PUBLIC COMMENT

The following agencies were consulted throughout the development of this Environmental Assessment:

- Pinnacle Gas Resources, Inc.
- Bureau of Land Management – Miles City, MT Office
- Montana Board of Oil and Gas
- Montana Fish Wildlife and Parks
- Western Land Services
- BeneTerra
- Hydrometrics, Inc.
- Environmental Protection Agency

Public comment has been solicited via press release, website posting, and mail out to interested parties.

Prepared by: Sharon Moore, Land Use Specialist, Minerals Management Bureau

/s/

January 30, 2008

Approved by: Monte Mason, Chief, Minerals Management Bureau

/s/

March 4, 2008

PUBLIC COMMENTS

Comment: Tongue River Water Users Association

Because the 2003 Statewide EIS was found unlawful, the Tongue River Water Users do not think that tiering to that document is proper.

Comment: Northern Plains Resource Council

Since the DNRC and BOGC signed an ROD on the 2003 FEIS, several studies have been released that have discounted information found in the 2003 FEIS. We find that state agencies that tier to the inadequate 2003 FEIS do not fully consider all potential impacts of coal bed methane, and would suggest not making further permitting decisions until the ROD for the Final Supplemental Environmental Impact is issued.

Response: The Montana Statewide Final Oil and Gas EIS (FEIS, January 2003), has been adopted and remains in effect for state actions.

Comment: Tongue River Water Users Association

We ask that you check your facts on the time-frame for development and the life of wells in the CX field. Recent information indicates that the lives of the wells in the CX field are averaging about 5-12 years, and that the CX field is nearing completion. Based on a 5-12 year production life for the wells in the CX field, there will probably not be 30 years of development.

Response: While TLMD agrees with your comment regarding the production life of existing wells within CX field, additional development could occur in the future in areas outside of the existing CX field boundary. Depending on when the projects are initiated, time to initial gas production, and time to reach economic limit, CBNG development in and around the CX field could total 30 years.

Comment: Tongue River Water Users Association

Production from the formations for these proposed projects is unproven. The coal seams that are targeted in these projects are different from those in the CX and Dietz fields. These projects target the deeper, thinner coal seams. It is therefore difficult to project revenue for these projects based on revenue generated from CBM development from entirely different coal seams.

Response: The economics for this project are based on estimated recoverable reserves underlying the project area combined with data available for well in the same zones in Wyoming.

Comment: Tongue River Water Users Association

Table 3 does not state the date or place where the data in table 3 was collected. Water quality on the Tongue River varies depending on the flows of the river, and depending on where on the river samples are taken. Notably, the water quality of the Tongue River has declined since CBM development first began in Montana in late 1998. These numbers

are high compared with pre-CBM water quality data averages for the upper Tongue River.

Response: The information in the table 3 of the EA was presented to DNRC as part of the Pinnacle Gas Resources Dietz POD. The sample was taken on 07/29/2004 from a discharge site in Township 8 South, Range 41 East, Section 7, NESW.

Comment: Tongue River Water Users Association

Water quality analyses are available for the targeted coal seams. The United States Geological Survey (USGS) performed an analysis of water quality for nearly all of the aquifers in the Hanging Woman Basin in May 1989. The information is contained in USGS Water Resources Report No. 89-4047 entitled Water Resources and Effects of Potential Surface Coal Mining on Dissolved Solids in the Hanging Woman Creek Basin, Southeastern Montana.

Response: The above referenced report focused on areas within the Tongue River Member of the Fort Union formation in areas of surface minable coal. Thirty of the referenced wells in the paper were completed in coal beds. Of these 30, 18 were completed in the Anderson coal bed, 4 in the Canyon coal bed, and 1 in the Smith coal bed. Seven of the wells were completed in the Dietz, which is not a proposed producing formation for this project. Section 3.2.3.2 of the EA provides representative numbers for pH, TDS, and SAR for the Anderson, Canyon, and Cook coal seams in areas surrounding this project proposal. The EA stated that no sample analyses were available for the King, Upper Wall, Lower Wall, Knoblach, and Kendrick coal seams, which are all target formations in this proposal. The referenced paper does not provide any additional information relative to any of these coal seams.

Comment: Northern Plains Resource Council

Since little is known about the water quality of the coal seams that will be developed upon approval of these projects, and given that each of these coal seams is unique in nature, and may vary significantly in terms of water quality, we would ask that a water quality analysis be done prior to the development of these coal seams. We would also suggest that any water that is above 4000 TDS be injected into an aquifer of equal or lesser quality. Any water with such high concentrations is considered dangerous for livestock, and would likely create a liability for any livestock that may occupy the land with existing grazing leases, and especially since the beneficial use of this water for stock watering is referred to several times as a method for managing the produced groundwater in the EA.

Response: The first wells to produce effluent from each of the target coal seams or combination seams within the proposed project will be designated as one of the four POD reference wells, and will be sampled within 30-60 days of initiation. The information in the USGS report 89-4047 entitled Water Resources and Effects of Potential Surface Coal Mining on Dissolved Solids in the Hanging Woman Creek Basin, Southeastern Montana that was referenced in the comment

letter outlines the highest levels of TDS were in the Anderson and Dietz coal beds (the Dietz is not a target formation in this POD). The Smith sample indicated excellent to good quality based on the classification system developed by Montana State University and outlined in the USGS report. Forty-two total samples were taken from the 30 coal bed wells in the study area. Of the 42, 27 samples fell within the excellent to good quality based on the classification system outlined in the report. Two samples indicated fair water quality, 4 samples indicated poor water quality, and 9 samples were unfit for livestock based on the classification system. Of the 9 unfit samples, 4 were from the Dietz coal bed which is not a target formation in this proposal. Therefore, most of the samples indicate that the Anderson, Canyon, and Smith target formations produce water of suitable if not excellent quality for livestock watering. Additional sampling of the target formations, including those with no data, will determine suitability for livestock watering as a beneficial use. This information would be made available to individuals interested in using the water for beneficial use.

Comment: Tongue River Water Users Association

The coal bed aquifers are the primary source of stock and domestic water in Southeastern Montana. The Tongue River Water Users take issue with evaporating and wasting this water instead of treating it and making it available for use. While the Tongue River Water Users are grateful that the water is not being discharged to surface waters, evaporating water in water-scarce southeastern Montana is a waste of a precious resource. In the Hanging Woman Basin the coal seam aquifers provide the best quality water that is readily available for domestic purposes. This coal aquifer water is essential for basic sanitation and livestock watering for those living in the region. Alluvial waters are for the most part not suitable for domestic and livestock use. According to USGS Report 89-4047 cited above, "[t]he water from the alluvium is unsuitable for domestic use according to the secondary drinking water standards established by the US Environmental Protection Agency (1986). All water samples from the alluvium greatly exceeded these standards."

Additionally, the coal seam, sandstone, and clinker aquifers have a very slow rate of recharge, making protection of these aquifers even more essential. Recharge to coal, sandstone, and clinker aquifers is from percolation of precipitation. The average rate of recharge to coal and sandstone aquifer is very small, because of the small annual precipitation relative to evapotranspiration and the generally small permeability of the fine-grained sediments of the Tongue River Member. Mean annual recharge to the shallow coal and sandstone aquifers is estimated to be in the range of 0.01 and 0.1 inches, based on the calculated rates of discharge from the aquifers.

Response: Some water depletion is necessary to reduce the pressure in the coal seams to retrieve the gas. We require a water well mitigation agreement for all wells and springs within one mile radius of development. Under the agreement, if a well or spring becomes impaired, the coal bed natural gas producer must restore the quantity and quality of the water to a level that will offset the impairment and is stable and sustainable over the long term.

Comment: Northern Plains Resource Council

We find no reason to support this water management method because it does not put the water to beneficial use, and instead wastes valuable groundwater that is not easily replenished.

Response: The water that is produced from this project would be available for beneficial use pending additional analysis and agency approval.

Comment: Northern Plains Resource Council

The other problem associated with using impoundments is the potential of concentrating metals and other elements found in the water that may impact wildlife and significantly increase the cost of reclaiming the impoundment site. A study released by USFWS discussed ecological concerns about this problem, and noted the following as it relates to selenium, "Regulators and CBM operators should not allow the discharge of CBM produced water with selenium concentrations >2μg/L into closed containment pits or ponds to minimize or prevent eventual increases in selenium concentrations through evaporative concentration. Closed containment ponds characterized by high selenium water may present a risk to aquatic birds using these ponds where a food source in the form of submerged aquatic vegetation or aquatic invertebrates is present. This report noted similar concerns with high TDS and SAR found in the groundwater.

Response: There will be no risk to aquatic birds because there will be no food sources available. Since the impoundments would be lined, there will be no opportunity for aquatic vegetation or aquatic invertebrates to be present. The containment pond would be fenced to prevent wildlife usage. In addition, this project would incorporate the reclamation requirements found in appendix A of the EA. These requirements outline the company's obligation to provide a method and schedule for periodic disposal of precipitated solids.

Comment: Tongue River Water Users Association

Additionally, section 85-2-505, MCA, prevents water right holders from wasting and contaminating groundwater. Pinnacle, however, is wasting a large amount of water pumped from the same aquifers where nobody else is allowed to waste such waters.

Response: Pinnacle Gas Resources does not need a water right to produce the water as a by-product of CBNG activities. In addition, groundwater contamination is not anticipated as a result of this project. The containment ponds would be lined and water discharge is not authorized.

Comment: Tongue River Water Users Association

The Governor's Drought Advisory Committee urges Montana citizens to conserve water, which is the right thing to do. Water right holders in the coal aquifers are to conserve water by taking shorter showers, among other water conservation measures. Nonetheless, if the Land Board approves this Plan of Development at least 228 gallons of precious water per minute of 414,720 gallons per day will be wasted from aquifers that

are a precious resource and that have very little recharge. The mere offer of a water well mitigation agreement cannot replace the water that is probably thousands of years old.

Response: Water well mitigation agreements are made available to all water rights users within a one mile area of influence of the project. The state accepted mitigation agreements provide assurance to the water rights holders that if their wells or developed springs become impaired, the company will provide replacement water and also restore the water quality and quantity that is sustainable over the long term. The age of the water in any particular aquifer does not affect quality or quantity.

Comment: Tongue River Water Users Association

The Yellowstone Compact lawsuit against Wyoming is based in part on the loss of water to Montana's surface water caused from CBM development. By approving this Plan of Development as written, the Land Board will lower itself to the same level as Wyoming.

Response: This project would not involve surface water as no discharge is proposed.

Comment: Tongue River Water Users Association

How much money is the State School Trust Fund receiving for surface damage and use? Specifically, is the state receiving land rental fees for evaporation pits, pipelines, power lines, compressor stations, roads, and lands that are no longer available for grazing? Will Pinnacle be charged for irreparable damage to soils on state lands that provide habitat for wildlife in addition to grazing land?

Response: The company pays lease rentals ranging from $1.50 to $4.00 per acre per year. The company compensated the state and surface lessee for surface damages based on the area utilized. In addition, the company pays a royalty of 12.5% of the gross value of all the gas produced.

Comment: Tongue River Water Users Association

The Tongue River Water users believe that all of the water that is pumped from the ground during Pinnacle's development should be put to beneficial use, and the water should be put into stock tanks where it will not degrade soils. Alternatively, the water should be treated for beneficial uses. Furthermore, the state of Montana should receive the water right to any water that is put to beneficial use, and any water right should be for groundwater. All people with groundwater rights in the area should be notified and provided an opportunity to object in accordance with the Montana Water Use Act. Pinnacle should not be granted a water right for water that is a by-product of its CBM development.

Response: The produced water from these PODs would be placed in containment ponds for storage. These ponds will be lined to prevent soil degredation. The department requires any water rights filed on state land to be in the State of Montana name, as long as the place of use is on state land. If the point of diversion (the containment pond) is on state land but the place of use is on private or federal lands, the water

right would be held by the individual or public agency involved. Regardless of the water right, Pinnacle would need to secure approval from TLMD to develop the point of diversion on state land.

Comment: Northern Plains Resource Council

The development of multiple coal seams with varying water quality presents some concern about how groundwater produced with one coal seam will interact with another. There is nothing in the EA that explains this potential interaction or how, if such interaction occurred, it could be mitigated.

Response: The Fort Union formation is one hydrologic unit. There may be some variation in individual components but not a significant enough difference in water quality to cause negative interaction between produced groundwater.

Comment: Northern Plains Resource Council

The FEIS established a 0.25 mile No Surface Occupancy (NSO) buffer for sage grouse; however, recent studies suggest that such a minimum distance is ineffective, and suggested that a 4 mile buffer be considered.

Response: TLMD utilizes the mitigation standard called for in the 2005 Montana Sage Grouse Management Plan, which was produced by the Sage Grouse Work Group, an interagency and interdisciplinary group of wildlife biologists, resource managers, and stakeholders. The Sage Grouse Work Group that developed the current management plan has not been reconvened so that agencies and stakeholders can collectively review all research now available. DNRC therefore believes the 2005 Montana Sage Grouse Management Plan continues to represent a responsible and collaborative effort by wildlife biologists, resource managers, and stakeholders.

Comment: Northern Plains Resource Council

Section B of the reclamation plan states "All pits would be lined with a minimum 12 mil thickness liner." This identifies a discrepancy with the EA, since page EA-28 states that the liners must be a minimum of 20 mil thickness for ponds on state lands. We hope that this discrepancy is addressed by requiring the impoundments to be lined with a minimum 20 mil thickness in the reclamation plan.

Response: The state requires a minimum 12 mil thickness liner for CBNG evaporation pits as part of the Operating and Reclamation Requirements. Per the POD, Pinnacle is installing 20 mil thickness liners.

Comment: Northern Plains Resource Council

Additional concerns for reclamation include future water management practices that may be considered in the future of this project. Even though it is stated several times in the EA that these future water management methods are not going to be the subject to the final ROD, it's important to point out the problems associated with Land Application

Disposal (LAD) and atomization, both of which are described in detail with the Waddle Creek and Fork's Ranch POD.

Response: Secondary management options have not been proposed by Pinnacle, have not been reviewed in this document, and would not be authorized by any record of decision issues pursuant to this document.

REFERENCES

Montana Natural Heritage Program. (2006) Montana Plant Species of Concern.

Montana Natural Heritage Program. (2006) Montana Animal Species of Concern.

Muckel, Gary B. (ed). Understanding Soil Risks and Hazards: Using Soil Survey to Identify Areas With Risks and Hazards to Human Life and Property. Retrieved from Natural Resource Conservation Service website: http://soils.usda.gov/use/risks.html

Western Land Services (2006). Waddle Creek Plan of Development

Western Land Services (2006) Fork's Ranch Plan of Development.

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APPENDIX A

COAL BED NATURAL GAS FIELD OPERATING AND RECLAMATION REQUIREMENTS

*DNRC refers to DNRC Trust Land Management Division (TLMD)

A. Notifications

a. Notify the DNRC, Southern Land Office at least 32 hours prior to beginning any construction and/or drilling operations (406-247-4400).
b. Any variances from the following guidelines or the site specific stipulations must be approved by DNRC.
c. The lessee (lessee includes lessee, operator, contractors, or any other agent conducting activities on lease premises pursuant to authority conveyed by the state lessee) shall obtain approval prior to construction of any new surface disturbing activities that are not specifically addressed in the approved operating plan or POD Surface Use Plan.
d. Phased reclamation plans would be submitted to DNRC for approval prior to individual POD facility abandonment.
e. A notice of Intent to Abandon must be submitted for approval. Upon completion of plugging, a copy of the Subsequent Report of Abandonment must also be submitted.
f. If any cultural values (sites, artifacts, human remains) are observed that were not previously addressed, reviewed, and approved by DNRC, they would be left intact, operations stopped, and the DNRC notified immediately. The lessee is responsible for informing all persons in the area who are associated with this project that they would be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. DNRC would conduct an evaluation of the cultural values to establish appropriate mitigation, salvage, or treatment. If additional archaeological survey work is required, lessee would be responsible for this expense.

B. Construction

a. <u>Vehicle Travel</u>:
    i. Construction and other project related traffic would be restricted to approved routes. Cross country vehicle travel would not be allowed.
    ii. Maximum speed on all lessee constructed and maintained roads would not exceed 25 miles per hour.
    iii. The lessee shall restrict travel on unimproved two-track roads during periods of inclement weather or spring thaw when the possibility exists for excessive surface resource damage (e.g. rutting in excess of 4 inches, travel outside two-track roadway, etc). This applies to pre-approval APD-POD planning (surveying, staking), drilling, production, and reclamation operations.
b. Construction activities can only occur pursuant upon DNRC written approval of the operating plan.

c. All construction activities for off wellpad facilities would be addressed in an operation plan submitted by the operator.
d. <u>Soil:</u>
    i. Stockpiled topsoil and pit material must be stored to prevent material from entering drainages.
    ii. Equipment cannot be stored on the topsoil stockpile.
    iii. The lessee would limit vegetation removal and the degree of surface disturbance, utilizing all practicable measures to minimize erosion and stabilize disturbed soils.
    iv. Topsoil would be salvaged for use in reclamation on all areas of surface disturbance (roads, locations, pipelines, etc). Clearly segregate topsoil from excess spoil material.
    v. The lessee would not push soil material and overburden over side slopes or into drainages. All soil material disturbed would be placed in an area where it can be retrieved without creating additional undue surface disturbance and where it does not impeded watershed and drainage flows.
    vi. Construct the backslope no steeper than ½:1, and construct the foreslope no steeper than 2:1 unless otherwise directed by DNRC.
    vii. Maintain a minimum 20 foot undisturbed vegetative border between toe of fill pad and/or pit areas and the edge of adjacent drainages, unless otherwise directed by DNRC.
e. Drilling, casing, and cementing operations shall be designed and conducted as requested by MBOGC.
f. Construction and drilling activity would not be conducted using frozen or saturated material during periods when watershed damage or excessive rutting is likely to occur.
g. With the overall objective of minimizing surface disturbance and retaining land stability and productivity, the lessee shall use equipment that is appropriate to the scope and scale of work being done for roads and well pads (use equipment no larger than needed for the job).
h. To minimize electrocution potential to birds of prey, all overhead electrical power lines would be constructed to standards identified by the Avian Power Line Interaction Committee (1996).
i. The lessee shall use wheel trenches or ditch witches to construct all pipeline trenches, except where extreme topography or other environmental factors preclude their use.
j. <u>Reserve pits:</u>
    i. Reserve pits would be adequately fenced during and after drilling operations until pit is reclaimed so as to effectively keep out wildlife and livestock. Adequate fencing is defined as follows:
        1. Construction materials would consist of steel or wood posts. Three or four strand wire (smooth or barbed) fence or hog panel (16 foot length by 50 inch height) or plastic snow fence must be used with connectors such as fence staples, quick-connect clips, hog rings, hose clamps, twisted wire, etc.

2. Construction standards: Posts shall be firmly set in ground. If wire is used it must be taut and evenly spaced, from ground level to top wire, to effectively keep out animals. Hog panels must be tied and sturdy. Fence must be at least 2 feet from edge of pit. Three sides must be fenced prior to commencing drilling, and the fourth side of the fence immediately upon completion of drilling, prior to rig release. Fence must be left up and maintained in adequate condition until pit is closed.

ii. The reserve pit would be oriented to prevent collection of surface runoff. After the drilling rig is moved, the lessee may need to construct a trench on the uphill side of the reserve pit to divert surface drainage around it. If constructed, the trench would be left intact until the pit is closed.

iii. The reserve pit would be lined with an impermeable liner if required by the DNRC or MBOGC. An impermeable liner is any liner having a permeability less than 10-7 cm/sec. The liner would be installed so that it would not leak and would be chemically compatible with all substances that may be put in the pit. Liners made of any man-made synthetic material would be of sufficient strength and thickness to withstand normal installation and pit use. In gravelly or rocky soils, a suitable bedding material such as sand would be used prior to installing the liner.

iv. The reserve pit would be constructed so that at least half of its total volume is in solid cut material (below natural ground level).

v. The only fluids/waste materials which are authorized to go into the reserve pit are RCRA exempt exploration and production wastes:
   1. Drilling muds and cutting
   2. Rigwash
   3. Excess cement and certain completion and stimulation fluids defined by EPA as exempt

vi. It may not include drilling rig waste, such as:
   1. Hydraulic fluids
   2. Engine oil
   3. Oil filters
   4. Cement, drilling mud, or other product sacks
   5. Paint, pipe dope, chemical, or other product container.
   6. Chemicals and chemical rinsate.

vii. Any evidence of non-exempt wastes being put into the reserve pit may result in the DNRC requiring specific testing and closure requirements.

k. <u>Evaporation Pits and Storage Ponds:</u>

i. Applicant would submit the following information with their pit proposal:
   1. A map and drawings of the site on a suitable scale that show the pit dimensions, cross section, side slopes, leak detection system, and a location relative to other site facilities.
   2. The daily quantity of water to be disposed of (maximum daily quantity shall be cited if major fluctuations are anticipated) and a water analysis that includes the concentrations of chlorides,

sulfates, pH, Total Dissolved Solids (TDS), and other toxic constituents.

3. Criteria used to determine the pit size
4. The average monthly evaporation and average monthly precipitation for the area.
5. The method and schedule for periodic disposal of precipitated solids and a copy of the appropriate disposal permit, if any.
6. They type, thickness, and life span of material to be used for lining the pit and the method of installation. The manufacturer's guidebook and information for the product shall be included if available.

ii. All pits would be lined with a minimum 12 mil thickness liner.
iii. A minimum 2 feet of freeboard is required on all pits and ponds.
iv. Applicants shall submit water quality analysis on an annual basis for each pit or pond.
v. All evaporation pits and storage ponds must be fenced.
vi. All evaporation pits and storage ponds shall be constructed away from established drainage patterns, including intermittent/ephemeral drainage ways, and unstable ground or depressions in the area.
vii. Upon the department's request, lessee shall contract a soil scientist to determine suitability of each pit location.

l. Culverts:
   i. Culverts would be placed on channel bottoms on firm, uniform beds, which have been shaped to accept them, and aligned parallel to the channel to minimize erosion. Backfill would be thoroughly compacted.
   ii. All culverts would be appropriately sized.

m. Pipelines:
   i. Pipeline construction shall not block nor change the natural course of any drainage. Pipelines shall cross perpendicular to drainages. Pipelines shall not be run parallel in drainage bottoms. Suspended pipelines shall provide adequate clearance for maximum runoff.
   ii. Pipeline trenches shall be compacted during backfilling. Pipeline trenches shall be routinely inspected and maintained to ensure proper settling, stabilization, and reclamation.

n. During construction, emissions of particulate matter from well pad and road construction would be minimized by application of water or other non-saline dust suppressants with at least 50 percent control efficiency. Dust inhibitors (surfacing materials, non-saline dust supressants, and water) would be used as necessary on unpaved roads that present a fugitive dust problem. The use of chemical dust suppressants on state surface would require prior approval from DNRC.

o. Lessees are required to obtain a National Pollution Discharge Elimination System (NPDES) Storm Water Permit from MDEQ as required prior to any suface disturbing activities.

p. If in the process of air drilling the wells there is a need to use mud, all circulating fluids would be contained either in an approved pit or in an aboveground containment tank. The pit or containment tank would be large enough to safely

contain the capacity of all expected fluids without danger to overflow. Fluid and cuttings would not be squeezed out of the pit, and the pit would be reclaimed in an expedient manner.

q. Production facilities (including dikes) must be placed on the cut portion of the location and a minimum of 15 feet from the toe of the back cut unless otherwise approved by DNRC.
r. A complete copy of the Application for Permit to Drill (APD), including conditions, stipulations, and the H2S contingency plan (if required) shall be available for reference at the well site during the construction and drilling phases.
s. This drilling permit is valid for either one year from the approval date or until lease expiration, whichever comes first.

C. Operations/Maintenance

a. Waste Disposal:
    i. Trash or other debris must not be disposed of on the pad.
    ii. Burning of materials or oil is not allowed.
    iii. All waste, other than human waste and drilling fluids, would be contained in a portable trash cage. This waste would be transported to a State approved waste disposal site immediately upon completion of drilling operations. No trash or empty barrels would be placed in the reserve pit or buried on location. All state and local laws and regulations pertaining to disposal of human and solid waste would be complied with.
    iv. Sewage shall be placed in a self-contained, chemically treated porta-potty on location.
    v. The lessee and their contractors shall ensure that all use, production, storage, transport, and disposal of hazardous materials associated with the drilling, completion, and production of these wells would be in accordance with all applicable existing and hereafter promulgated federal, state, and local government rules, regulations, and guidelines. All project related activities involving hazardous materials would be conducted in a manner to minimize potential environmental impacts. In accordance with OSHA requirements, a file would be maintained onsite containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds, and/or substances which are used in the course of construction, drilling, completeion, or production operations.
b. The lessee shall complete CBNG wells (case, cement, and under ream), or abandon as soon as possible, but no later than 30 days after drilling operations, unless an extension is given by DNRC.
c. Confine all equipment and vehicles to the access road(s), pad(s), and area(s) specified in the approved APD or POD.
d. Rat and mouse holes shall be filled and compacted from the bottom to the top immediately upon release of the drilling rig from the location.
e. Noxious Weeds:
    i. The lessee would be responsible for prevention and control of noxious weeds and weeds of concern on all areas of surface disturbance associated with this project (well locations, roads, water management facilities, etc.)

Use of pesticides shall comply with the applicable State laws. Pesticides shall be used only in accordance with their registered uses and within limitations. Lessee shall monitor disturbed areas for the presence of noxious weeds from June through September throughout the life of the field.

ii. Control efforts must be done as necessary and as specified by DNRC once noxious weeds are identified with the intent of erradicating and preventing seed production.

f. All permanent above-ground structures (e.g. production equipment, tanks, etc.) not subject to safety requirements would be painted to blend with the natural color of the landscape. The paint used would be a color acceptable to DNRC.

g. Lessees are advised that prior to installation of any oil and gas well production equipment which has the potential to emit air contaminants, the owner or lessee of the equipment must notify the Montana Department of Environmental Quality (MDEQ) to determine permit requirements. Examples of pertinent well production equipment include fuel-fired equipment (e.g. diesal generators), separators, storage tanks, engines, and dehydrators.

h. <u>Fire Safety:</u>

i. During the fire season (June-October), the lessee shall institute all necessary precautions to ensure that fire hazard is minimized, including, but not limited to, mowing vegetation on the access route(s) and well location(s), keeping fire fighting equipment readily available when drilling, etc. DNRC may also require additional measures for fire prevention.

ii. If a fire is started by lessee activities, the lessee may be liable for suppression costs by 50-63-103, MCA.

i. <u>Erosion:</u>

i. Upgrade and maintain access roads and drainage control (e.g. culverts, drainage dips, ditching, crowning, surfacing, etc.) as necessary and as directed by DNRC to prevent soil erosion and accommodate safe, environmentally sound access.

ii. DNRC may direct additional control measures for roads, pipelines, drainages, or other surface disturbances as needed.

j. Any spilled or leaked oil, produced water, or treatment chemicals must be reported in accordance with MBOGC requirements and immediately cleaned up in accordance with DNRC requirements. This includes cleanup and proper disposition of soils contaminated as a result of such spills/leaks.

k. Changes in operational and/or environmental conditions may require additional or modified requirements.

l. No construction or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment creates ruts in excess of 4 inches deep, the soil shall be deemed too wet to adequately support construction equipment.

m. All water discharge must comply with State law and must have permit prior to commencing.

n. Landscape those areas not required for production to the surrounding topography as soon as possible. The fluids and mud must be dry in the reserve pit before recontouring pit area. The lessee would be responsible for recontouring and reseeding of any subsidence areas that develop from closing a pit.

D. Dry Hole/Reclamation

a. When individual facilities such as well locations, pipelines, discharge points, impoundments, etc. are no longer needed, they need to be addressed in a reclamation plan and approved by the DNRC. Individual items that would need to be addressed in reclamation plans include, but are not limited to:
   i. Configuration of reshaped topography, drainage systems, and other surface manipulations.
   ii. Waste disposal
   iii. Revegetation methods, including specific seed mix (pounds pure live seed/acre) and soil treatments (seedbed preparation, fertilization, mulching, etc.).
   iv. Other practices that would be used to reclaim and stabilize all disturbed areas, such as water bars, erosion fabric, hydro-mulching, etc.
   v. An estimate of the timetables for beginning and completing various reclamation operations relative to weather and local land uses.
   vi. Methods and measures that would be used to control noxious weeds, addressing both ingress and egress to the individual well or POD.
   vii. Decommissioning/removal of all surface facilities.
   viii. Closure, reclamation, or approved transfer of areas utilized for produced CBNG water, including discharge points, reservoirs, off-channel pits, land application areas, livestock/wildlife watering facilities, surface discharge stream channels, etc.

b. For abandonment, surfacing material and culverts must be removed unless requested to remain in place by DNRC. The roads and ditches must be recontoured and seeded in accordance with DNRC requirements.

c. <u>Pit reclamation</u>:
   1. All pit(s) must be emptied of all fluids within 90 days after completion of drilling operations. The pit must be closed properly to assure protection of soil, water, and vegetation.
   2. Squeezing of pit fluids and cuttings is prohibited. Pits must be dry of fluids or they must be removed via vac truck or other environmentally acceptable method and disposed of in a State approved location prior to backfilling, recontouring, and replacement of topsoil.
   3. The pit may not be cut or trenched.
   4. Pit mud/sludge material may be buried onsite after the material has dried.
   5. The pit material must be covered with a minimum of 1 ½' of soil.
   6. The lessee would be responsible for recontouring any subsidence areas that develop from closing a pit.

7. The plastic pit liner (if any) may be folded in with prior BOGC approval.

d. The reclamation effort would be evaluated as a success if the previously disturbed area is stabilized, all potential water erosion is effectively controlled and the vegetative stand is established with at least 70% cover.
e. All disturbed lands associated with this project, including the pipelines, access roads, water management facilities, etc. would be expediently reclaimed and reseeded in accordance with the surface use plan and any pertinent site-specific reclamation.
f. Disturbed lands would be recontoured back to conform with existing undisturbed topography. No depressions would be left that trap water or form ponds.
g. Before the location has been reshaped and prior to redistributing the topsoil, the lessee would rip or scarify the drilling platform and access road on the contour, to a depth of at least 12 inches. The rippers are to be no further than 24 inches apart.
h. Topsoil shall be evenly distributed.. Prepare the seedbed by disking to a depth of 4 to 6 inches following the contour.
i. Waterbars are to be constructed at least one foot deep, on the contour with approximately two feet of drop per 100 feet of waterbar to ensure drainage, and extended into established vegetation. All waterbars are to be constructed with their berm on the downhill side to prevent the soft material from silting in the trench. The initial waterbar should be constructed at the top of the backslope. Subsequent waterbars should follow the following general spacing guidelines:

Slope (Percent)	Spacing Interval (Ft)
<2	200
2-4	100
4-5	75
>5	50

j. The lessee would drill seed on the contour to a depth of 0.5 inch, followed by cultivation to compact the seedbed, preventing soil and seed losses.
    i. Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed. To be effective, complete spring seeding after the frost has left the ground and prior to May 15. Fall or dormant seedings must be completed according to NRCS timing recommendations.
k. A Final Abandonment Notice must be submitted prior to a final abandonment evaluation by DNRC.
l. Soil fertility testing and the addition of soil amendments may be required to stabilize some disturbed lands.
m. Reduce the backslope to 2:1 and the foreslope to 3:1 unless otherwise directed by DNRC. Reduce slopes by pulling fill material up from foreslope into the top of cut slopes
n. The lessee shall seed all disturbed areas, using an agreed upon method suitable for the location. Seeding shall be repeated if a satisfactory stand is not obtained as determined by DNRC upon evaluation after the following growing season. The

lessee shall seed all disturbed areas with the seed mixture(s) listed below unless otherwise approved by DNRC area office. The seed mixture(s) shall be planted in the amounts specified in pounds of pure live seed (PLS)/acre. There shall be no primary or secondary noxious weed seed in the seed mixture. Seed shall be tested and the viability testing of seed shall be done in accordance with State law(s) and within six months prior to purchase. The seed mixture container shall be tagged in accordance with State law(s) and available for inspection by DNRC.

o. Seed shall be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture shall be evenly and uniformly planted over the disturbed area. Smaller/heavier seeds have a tendency to drop to the bottom of the drill and are planted first. The lessee shall take appropriate measures to ensure this doesn't occur. Where drilling is not possible, seed shall be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre noted below are to be doubled. The seeding would be repeated until a satisfactory stand is established as determined by DNRC. Evaluation of growth would not be made before completion of the second growing season after seeding. DNRC is to be notified a minimum of seven days prior to seeding of the project.

i. **Seed Mixture** (silty, clayey, or silt clay loams)

a) The combination must include at least four of the following species. Western wheatgrass must be included in the mix. Thickspike wheatgrass may be substituted for wheatgrass only when western wheatgrass in unavailable. Species and variety substitution may be approved by the DNRC Area Office.

Species of Seed	Variety	Common Name	Pound/acre PLS)*
Pascopyrum smithii	Rosanna	Western Wheatgrass	3.00
Pseudoroegneria spicata	Goldar	Bluebunch wheatgrass	2.00
Stipa viridula	Lodom	Green needlegrass	2.00
Elymus trachycaulus	Pryor	Slender wheatgrass	2.00
Stipa comata		Needle and thread	1.00
Bouteloua curtipendula		Sideoats Grama	2.00
Schizachyrium scoparium		Little bluestem	2.00

p. ** Pure live seed (PLS) formula: % of purity of seed mixture times % germination of seed mixture = portion of seed mixture that is PLS.*