

CHAPTER 2

ALTERNATIVES

MONTANA

CHAPTER 2: ALTERNATIVES

Introduction

The Council on Environmental Quality regulations require that an environmental impact statement (EIS) “rigorously explore and objectively evaluate all reasonable alternatives....” This chapter presents in detail the No Action Alternative (Existing coal bed methane [CBM] Management) and four action alternatives for managing oil and gas resources—specifically CBM exploration and production—throughout the planning area state-wide, with emphasis in the Bureau of Land Management’s (BLM’s) Powder River and Billings Resource Management Plan (RMP) areas. Other alternatives were considered but eliminated without detailed analysis. A description of these alternatives and reasons for elimination are provided in the Alternatives Considered But Not Analyzed in Detail section.

This chapter is presented in five sections: Alternatives Development, Alternatives Considered But Not Analyzed in Detail, Management Common to All Alternatives, Management Actions Specific to Each Alternative, and Comparison of Impacts.

Alternatives Development

The purpose of developing and presenting alternatives is to allow the decision maker an opportunity to address and resolve issues recognized during the scoping process. Alternatives meet the purpose and need for doing the plan, and balance ways to address different resource issues. The resolution of key issues forms the framework of an alternative, with the resolution of lesser issues included around the alternative’s central idea. This section describes how those key issues led to the development of the alternatives. The development of alternatives for this EIS centered on addressing regulatory issues in seven general areas:

- Air quality
- Coal mines
- Coal bed methane
- Hydrology
- Realty
- Indian trust resources
- Environmental mitigation

Although other relevant issues were considered, these key issues played a major role in defining the alternatives to be analyzed in detail.

Air Quality

Alternatives were developed by considering potential changes in ambient air quality from CBM activities, such as reduced visibility, air quality emissions, dust emissions, harmful gases, and changes in climate. Alternatives vary by limiting the number of wells connected to each compressor, the type of fuel required to power compressors (diesel, electric, or gas-fired), and whether noise suppression measures would be required.

Coal Mines

The alternatives address buffer zone requirements around active coal mines, as well as the ability for adjacent or nearby coal companies to recover bonds and determine the effects on aquifer reconstruction. Alternatives also include CBM water discharge affecting new coal mines, the effects on oil and gas development, loss of coal production resources from CBM development, loss of methane resources because of venting, and subsurface coal fires. Alternatives vary by the use of a buffer zone around active coal mines.

Coal Bed Methane

Restrictions on CBM exploration and production activities were considered in developing the alternatives. Alternatives vary by directional-drilling

What has Changed in Chapter 2 Since the Draft EIS?

Chapter 2 lists the alternatives development process and describes the features of each alternative in detail. Based on public comment, a new section was added to Chapter 2 that describes the development of the alternatives. The mitigation measures common to all alternatives previously mentioned in Chapter 4 have been moved to Chapter 2 and are presented in Table 2-1. Some additional mitigation measures, including measures specific to the Native American Tribes were incorporated into Alternative E—Preferred Alternative. Table 2-2, presents the various alternative management approaches and was revised for simpler and more direct presentation. Table 2-3, which compares the impact of the alternatives by resource area, includes the results of the additional mitigation measures. In the DEIS, this table was in Chapter 4. It was moved here for the Final EIS. Text throughout the chapter was revised for simpler presentation.

requirements; the number of coal seams per well bore, and chronological seam development. Whether a Project Plan of Development is required in consultation with tribes, surface owners, and other agencies is also addressed differently under each alternative. Other matters considered are drainage of methane from federal minerals, methane quantities, and the effect of over-pumping water.

Hydrology

Hydrology issues used in developing alternatives include inspection, treatment, storage, and conveyance of CBM-produced water. Short- and long-term effects on groundwater and surface water, impacts on water quality, and water rights were considered. The alternatives differ by requirements for site-specific Water Management Plans, treatment, conveyance methods, and the beneficial use of exploration and production water. Farmers, ranchers, irrigators, coal mines, light industry, transportation departments, local county governments, and others could beneficially reuse production waters.

Realty

Realty matters center on requirements for ROW corridors, powerline placement, and use of or abandonment of roads from CBM development. The alternatives vary by whether roads would be open to public use, closed and returned to a natural vegetative state, or maintained at the discretion of the surface owner. Other differences between the alternatives include requirements for buried powerlines, installation of raptor safety equipment, and multiple utility corridor use.

Indian Trust Resources

The Crow Tribe of Indians, Fort Belknap Indian Community, and the Northern Cheyenne Tribe are located within the emphasis area for CBM development and therefore, were given special consideration with regard to potential impacts from off-reservation operations. Issues considered include the potential drainage of Reservation groundwater and CBM by off-reservation wells, impacts to sacred sites and resources, water rights, water quality preservation agreements, stress to reservation infrastructure, cultural sites, and socioeconomic status. To address these issues, the use of a federal buffer zone as well as monitoring requirements were included in various alternatives.

The Northern Cheyenne Tribe has proposed a series of mitigation measures, in which the BLM has

incorporated into a table, a copy of which can be found in the Northern Cheyenne Mitigation Appendix attached to this EIS. The BLM has considered these measures for implementation and have developed corresponding requirements that are included in Alternative E—Preferred Alternative.

Environmental Mitigation

Environmental mitigation measures to address resources were presented in the scoping comments. The mitigation measures have been incorporated into the management actions of the various alternatives. These include commercially harvesting trees within rights-of-way (ROWs); implementation of high fire danger restrictions; road use enforcement; road placement restrictions; wellhead camouflage requirements; conducting wildlife surveys; and the use of early successional species along with appropriate late seral stage native species for revegetation. The environmental mitigation measures are applied to the various alternatives based on their general themes for either protection of existing resources or emphasis on CBM development.

Alternatives Considered But Not Analyzed in Detail

The alternatives below were considered for resolving planning questions or issues, but were not analyzed in detail because of technical, legal, or other constraints.

Leasing

BLM oil and gas leasing decisions and lease stipulations, including those applicable to CBM, were previously analyzed in the BLM 1992 *Final Oil and Gas RMP/EIS Amendment* (BLM 1992). Those decisions were approved in the project's *Record of Decision* (ROD) published in February 1994. During that process, the public was invited and encouraged to participate. The existing lease stipulations approved in the 1994 ROD continue to be applicable to all CBM development and have been included in Table MIN-5 of the Minerals Appendix. CBM is part of the oil and gas estate. Existing oil and gas leases include the right to explore and develop CBM. Issuing separate leases for conventional oil and gas and separate leases for CBM would require a regulatory change.

The purpose of this document is to analyze levels of conventional oil and gas and CBM development that are greater than those analyzed in the BLM 1992 *Final Oil and Gas RMP/EIS Amendment*. Analyzing

new federal lease decisions such as closing federal areas of oil and gas estate in the Powder River and Billings RMP areas, are therefore beyond the scope of this plan. This plan will identify necessary mitigation measures that would be applied during the permitting process. The environmental analysis conducted for federal permits can influence where and what level of CBM development can occur.

Bonding

Establishment of bond amounts specifically for CBM development activities that cover the full cost of CBM development. This alternative is not analyzed in detail because the MBOGC and BLM regulations set minimum amounts of bonding required before approving drilling permits. The regulations allow agencies to raise the bond amount required depending on such factors as the number and type of wells, type and amount of reclamation necessary, and operator history. Bond increases cannot exceed the total of estimated costs of plugging and reclamation, the amount of uncollected royalties due and monies owed because of outstanding violations.

Omega Alternative

The Omega Alternative to drill a large-diameter well through the coals and from the base of that shaft to directionally drill upward into the various coal seams in a circular pattern is an experimental technology not yet proven for CBM. If this technology becomes viable for CBM extraction in the future, further consideration would be given to it.

Alternate Sources of Energy

The purpose of this EIS is to consider management requirements for CBM and conventional oil and gas development. Considering alternate sources of energy such as wind power and fuel cells is therefore beyond the scope of the EIS.

Re-Injection of Produced Water into the Same Aquifer Alternative

Re-injection of produced formation water is an accepted practice in conventional oil fields but its use in CBM fields would be counterproductive if the produced water was re-injected or could migrate into the CBM producing formation. In conventional oil fields, operators have re-injected produced water since the 1920s to help maintain reservoir energy and to increase ultimate production efficiency, or to move oil preferentially to producing wells. When produced

water is re-injected, original reservoir pressures are maintained; this can significantly increase the percentage of original oil in place that is produced before the field's economic limit is reached (Thomas et al. 1987). Re-injection can also sweep oil out of the reservoir toward producing wells in a waterflood, also increasing production efficiency. In these scenarios, water production is neither desired nor absolutely necessary; it is a nuisance that can be minimized with standard engineering practice. In the history of many oil fields, oil is produced water-free for months or even years before water is seen in producing wells.

In CBM production, formation water must be produced before reservoir pressures are sufficiently reduced for the adsorbed methane to be liberated. Water production is unavoidable and pre-requisite to CBM production. As water is produced from the coal seam, the pressure in the seam is reduced. Research by the BLM's Casper, Wyoming, Field Office suggests that methane production begins after 20 percent of the virgin reservoir pressure is depleted; significant production does not begin until 40 percent of the pressure is depleted (Crockett and Meyer 2001). Work by Jones et al. (1992) corroborates this relationship. If methane production is directly related to depletion of reservoir pressure, then re-injection of produced water within the confines of the CBM field will directly result in the decrease of methane production. Re-injection of CBM-produced water into the producing formation is not a reasonable option for management of produced water. When and if this technology becomes viable, a more detailed analysis would be conducted for further consideration.

It would be reasonable to inject produced water into non-productive coal seams that were geologically separated from the CBM field. Separation could be the result of faulting or erosion, isolating coals in the injection area even from stratigraphically equivalent productive coal seams in the CBM field. Under Alternative B the injection of produced water into either non-productive coal seams or aquifers with water of lesser quality is analyzed.

This type of injection results in preservation of the produced water resource, whether of high or low quality. The permit process could mitigate impacts to groundwater so that the quality of the injected water is matched to the quality of the formation water in the prospective injection zone.

Phased Development

Staged or phased development was presented to BLM during scoping in several ways. First, the number of rigs operating in the emphasis area could be controlled and leases would be developed in stages. Second, companies would be allowed to develop production in one geographic area at a time and when complete, move to another. Lastly, corridors could be left undeveloped to allow for wildlife movement.

BLM has a legal obligation to ensure that leased federal minerals are reasonably developed and that federal minerals are not drained by production that occurs on non-federal leases. The State of Montana and private parties own much of the minerals and surface in the emphasis area, resulting in a checkerboard pattern that could compromise the BLM's legal obligation to protect federal minerals.

This alternative is not reasonable in the case of oil and gas leases because each lessee has an investment-backed expectation that its applications for permits to drill will be considered in a timely manner and approved absent unacceptable site-specific impacts. See the Supreme Court decision in *Mobil Oil Exploration and Producing Southeast, Inc. v. United States*, 530 U.S. 604, 620 (2000), which found a breach of contract when the Minerals Management Service, pursuant to a later adopted statute, would not review and make a timely decision on development plans per the regulations. In addition, the Mineral Leasing Act and 43 CFR 3100 require maximum ultimate economic recovery of oil and gas from leased lands. In light of the broad geographic distribution of leases in the Powder River Basin, phased development in any fashion would not allow compliance with the above requirements.

Although, BLM must balance these mandates with its responsibility to use multiple use principles to prevent unnecessary or undue degradation in managing the public lands pursuant to FLPMA. This document does not support a finding that these competing responsibilities would be in conflict.

Management Common to All Alternatives

Management common to all alternatives are the management practices for conventional oil and gas, as well as CBM lease operations, that are the same in each alternative, including the Preferred Alternative.

Bureau of Land Management

The BLM has primary responsibility for managing the federally owned oil and gas estate. After lease issuance, operations may be conducted with an approved permit. Proposed drilling and associated activities must be approved before beginning operations. The operator must file an Application for Permit to Drill (APD) or Sundry Notice (SN) that must be approved according to (1) lease stipulations; (2) onshore oil and gas orders; and (3) regulations and laws. The steps required to obtain approval to drill and conduct surface operations are summarized in Appendix A of the 1992 Final Oil and Gas RMP/EIS Amendment and in the Minerals Appendix of the BLM's Big Dry Resource Management Plan/Environmental Impact Statement for the Big Dry Resource Area of the Miles City District (Big Dry RMP/EIS) (1995). The process described therein is common to all alternatives.

In addition, under requirements of the Clean Air Act (CAA) and the Federal Land Policy and Management Act (FLPMA), any activity the BLM authorizes (including oil and gas development) must comply with all applicable local, state, tribal, and federal air quality laws, regulations, standards, increments, and implementation plans. Therefore, land use authorizations will specify that operating conditions (i.e., air pollutant emissions limits, control measures, effective stack heights, etc.) are consistent with the applicable air regulatory agency's requirements.

State of Montana

State agencies that have authority over oil and gas activities include the Department of Natural Resources and Conservation (DNRC), which includes the Montana Board of Oil and Gas Conservation (MBOGC), the Trust Land Management Division (TLMD) and the Water Resources Division; and the Montana Department of Environmental Quality (MDEQ). Each of these agency's roles and responsibilities were discussed in Chapter 1. Current oil and gas development is managed under the guidelines developed in the MBOGC's Oil and Gas Drilling and Production in Montana: Final Programmatic Environmental Impact Statement (1989). This document outlines how to incorporate any necessary environmental review into its rules and permitting process in an effort to comply with the Montana Environmental Policy Act (MEPA). In conducting environmental reviews for new permits, MBOGC works with other state agencies that may become involved in the process.

Mitigation Measures

Management practices common to all alternatives include numerous mitigation measures categorized by resource topic. These mitigation measures are derived from current leasing stipulations, standard operating procedures, and MBOGC field orders. A list of the mitigation measures considered common to all alternatives is provided in Table 2-1.

Not all mitigation measures are applicable under all leases; do to the variances between Federal, State and private surface and mineral ownership. MEPA compliance by state agencies may result in site-specific mitigation measures being developed that are not listed in Table 2-1. Specific mitigation measures to be applied depend upon the ownership of both surface and minerals and upon the land management agency and regulatory agency involved. The TLMD is the land manager for state owned lands; BLM is both land manager and regulatory agency on BLM land; and private land owners are managers of the private land. The Board of Oil and Gas is the regulatory agency for state and private lands. Note, current leasing stipulations are not being amended under this EIS, but can be found in tabular form in the Minerals Appendix, Table MIN-5.

Management Actions Specific to Each Alternative

Five alternatives have been developed to evaluate the impacts related to the various development scenarios associated with CBM exploration and production. Each alternative represents a different approach for resolving the issues identified during scoping. Alternative A, the No Action Alternative, would continue existing management. Alternative B would allow CBM development while emphasizing resource protection. Alternative C would emphasize CBM development with minimal environmental restrictions. Alternative D would encourage CBM exploration and development while maintaining existing land uses. Alternative E is the Preferred Alternative and would allow for CBM exploration and development while sustaining resource and social values, and existing land uses.

Each alternative was structured to stress different development emphasis, such as resource protection, CBM development, and existing land uses.

Alternative A—No Action (Existing Management)

This section describes the current management practices used by the BLM and the state to manage the exploration, development, and operation of CBM wells in Montana.

BLM

The BLM issues oil and gas leases that include the right to explore for and develop CBM. The Final Oil and Gas RMP/EIS Amendment allowed for the drilling of test wells and initial small-scale development of CBM. Under existing management, APDs for CBM wells would be approved on a case-by-case basis, only in specific geographic areas where little or no CBM data is available. The APDs would only authorize the drilling and testing of wells and associated construction activities. CBM production would not be authorized nor would the operator be allowed to discharge waters into State or U.S. streams or drainages. All current leasing stipulations regulating mitigation measures would be applied to new leases and enforced on current leases. APDs for CBM exploration and testing would be considered for possible approval, on a case by case basis, under an evaluation criterion that would include, but not be limited to, areas where the following apply:

- The proposal is in conformance with the Powder River and Billings RMPs
- Data for coal, gas or groundwater does not exist
- Data for coal, gas or groundwater is limited
- Data for coal, gas or groundwater might be dated or unreliable
- Data for coal, gas or groundwater is only available from certain coal seams
- The proposed placement of wells would optimize data collection
- The well, if not productive, could be useful for monitoring

APDs for coal bed methane wells would not be considered for approval in areas where the following apply:

- The proposal is not in conformance with the Powder River or Billings RMPs

**TABLE 2-1
MITIGATION MEASURES COMMON TO ALL ALTERNATIVES**

Resource Topic	Mitigation Measure	Applicability by Surface Ownership		
		BLM	State	Private
Air Quality	Access roads, well pads and production facility sites constructed on soils susceptible to wind erosion will be appropriately surfaced to reduce fugitive dust emissions	X	X	
	Dust inhibitors will be used as necessary on unpaved collector, local, and resource roads to reduce fugitive dust emissions to the air and resources adjacent to the road	X	X	
Cultural Resources	Cultural resource reviews/surveys will be conducted as required by BLM or TLMD prior to the commencement of construction or other surface disturbing activities authorized by BLM or TLMD. Results of the survey will be presented as part of the permit review or approval process. Decisions regarding relocation of proposed access roads or well pads, data recovery, and excavation will be made to protect the cultural or historical sites	X	X	
	Surface occupancy and use is prohibited within sites or areas designated for conservation use, public use, or sociocultural use	X		
Geology and Minerals	No Surface Occupancy stipulations are placed on new oil and gas leases which are issued for lands that have existing coal leases	X		
	Reclamation is required on areas of surface disturbance during the production and abandonment phases of development	X	X	
Hydrological Resources	Water well and spring mitigation agreements will be used to facilitate the replacement of groundwater lost to drawdown. Replacement water may require supply from offsite sources	X	X	X
	The Montana and Wyoming Water Quality Agreement pending final approval will preserve the current water quality in the Tongue River and prevent Wyoming operators from discharging poor-quality production water into the Tongue River	X	X	X
Lands and Realty	Surface disturbance on federal lands will be reclaimed following the BLM seeding policy (BLM 1999c)	X		
	Roads and utility ROW impacts experienced prior to reclamation are mitigated by requirements for repair or replacement in the site-specific review, or through compensation for actual damages	X	X	X
	Property damage would be repaired or replaced according to landowner agreements at the operator expense	X	X	X
Livestock Grazing	Repair or replace damaged gates and fences according to landowner requirements at operator's expense	X	X	X
	When working on or near grazing lands, project-related construction equipment and vehicle movement will be minimized to avoid disturbance of grazing lands	X	X	

**TABLE 2-1
MITIGATION MEASURES COMMON TO ALL ALTERNATIVES**

Resource Topic	Mitigation Measure	Applicability by Surface Ownership		
		BLM	State	Private
Livestock Grazing, 'cont.	Responsibilities for fence, gate, and cattle guard maintenance; and noxious weed control will be defined in APDs, Agency Approvals, or ROW grants	X	X	
	Facilities will be placed to avoid or minimize impacts on livestock water	X	X	X
Paleontological Resources	The BLM APD contains guidance for notifying and mitigating damage to paleontological resources discovered during oil and gas construction activities. Limitations include restricted use of explosives for geophysical exploration, monitoring requirements, and work stoppages for discovered damaged resources	X		
	Surface occupancy and use is prohibited within designated paleontological sites	X		
	The Bridger Fossil Area is a designated Area of Critical Environmental Concern (ACEC) is not available for oil and gas development	X		
Recreation	Surface occupancy and use is prohibited within established recreation areas and undeveloped recreation areas receiving concentrated use on lands administered by BLM	X		
	Exploration activities would be coordinated for timing to minimize conflicts during peak use periods	X		
Social and Economic Values	Economic impacts on groundwater users would be mitigated by the mandatory offering of water well and spring mitigation agreements	X	X	X
Soils	Areas with steep topography will be developed in accordance with the BLM Gold Book (USDI and USDA 1989) requirements	X		
	Federal leases with slopes in excess of 30 percent will be required to obtain approval for occupancy from the BLM based on mitigation of erosion, surface productivity after remediation, and mitigation to surface water quality	X		
	Riparian zones will be protected by federal lease stipulations and permit mitigation measures	X		
	Lease roads and constructed facilities will be limited based on the Surface Use Program in the APD	X		
	In areas of construction, topsoil will be stockpiled separately from other material, and be reused in reclamation of the disturbed areas	X	X	X
	The BLM Seeding Policy will be followed for all reclamation and reseeding activities	X		

**TABLE 2-1
MITIGATION MEASURES COMMON TO ALL ALTERNATIVES**

Resource Topic	Mitigation Measure	Applicability by Surface Ownership		
		BLM	State	Private
Soils, 'cont.	Surface owners or surface lessee will be consulted regarding the location of new roads and facilities related to oil and gas lease operations	X	X	X
	Unused portions of the drill location will have topsoil spread over it and reseeded	X	X	
	Construction activities will be restricted during wet or muddy conditions	X	X	
	Construction activities will be designed following Best Management Practices (BMPs) to control erosion and sedimentation	X		
	If porous subsurface materials are encountered during drilling, all onsite fluid pits will be lined	X		
	During road and utility ROW construction, surface soils will be stockpiled adjacent to the sides of the cuts and fills	X		
	Stream crossings will be designed to minimize impacts and impede stream flow	X	X	
	Erosion control measures will be maintained and continued until adequate vegetation (defined by BLM or TLMD on a case by case basis) cover is re-established	X	X	
	Vegetation will be removed only when necessary	X		
	Water bars will be constructed on slopes of 3:1 or steeper	X		
Solid and Hazardous Wastes	Solid and Hazardous wastes generated as a result of oil and gas lease operations will be disposed of in a manner and at a site approved by the appropriate regulating agency.	X	X	X
	Site clearance surveys would be conducted prior to surface disturbance commencement	X	X	
Vegetation	Additional lease stipulations applicable to either the state or BLM are listed in Table MIN-5 of the Minerals Appendix	X	X	
	Surface occupancy and use is prohibited within designated Visual Resource management Class I areas	X		
Visual Resource Management	All surface-disturbing activities and semi-permanent and permanent facilities in Visual Resource Management Class II areas require special design, including location, painting, and camouflage, to blend with natural surroundings and meet the visual quality objectives of the classification	X		

**TABLE 2-1
MITIGATION MEASURES COMMON TO ALL ALTERNATIVES**

Resource Topic	Mitigation Measure	Applicability by Surface Ownership		
		BLM	State	Private
Visual Resource Management, 'cont.	Laws and regulations established to protect Wilderness Study Areas (WSA) prohibit leasing of designated WSA lands for resource extraction	X		
	Existing oil and gas leases in WSAs will be developed in accordance with the BLM policy for interim management of WSAs			
Wilderness Study Areas	An extensive list of no surface occupancy and no surface use stipulations by species is presented in the Wildlife section of Chapter 4. These stipulations limit and exclude use within designated distances from known species' specific nesting areas and habitat	X		
Wildlife	Other restrictions governing development timing, controlled surface use, and avoidance measures are listed in Table MIN-5 of the Minerals Appendix	X	X	
	Surface occupancy and use is prohibited within 1/4 mile of designated reservoirs with fisheries	X		
Aquatic Resources	Surface occupancy and use is prohibited within 1/4 mile of designated reservoirs with fisheries	X		

CHAPTER 2 Alternatives

- Sufficient and accurate data exists for coal, gas, and groundwater
- Other coal bed methane wells are being drilled, including the 200 CBM wells the MBOGC can approve for exploration
- Other coal bed methane wells are producing
- Monitoring wells are in place or not needed

Water produced during the testing phase would not have to be treated and would be contained at the well site in either a pit or a steel tank. The water would be available for beneficial use by industry (for example, pipelines, dust abatement) and landowners. Wells drilled on federal minerals would be shut-in or plugged after completion of the testing phase.

Coal seams targeted for exploration would be determined by industry and not by the government. Vertical wells producing from a single coal seam would be allowed. Vertical wells producing from multiple coal seams would not be required. Operators would be required, when technologically and economically feasible, to drill several wells from a single well pad, which may require directional drilling. The placement of wells would not be restricted through the use of buffer zones around active coal mines or Indian reservations.

Transportation corridors for vehicles would not be required; however, operators would be encouraged to use existing routes, corridors, or previously disturbed areas when feasible or as required by the surface owner. Powerlines would be either aboveground or buried according to operator plans. Placement of roads and powerlines or other utilities requiring ROW are subject to environmental review and agency approval. Diesel, electric, or gas-fired engines would power generators used during the testing phase of CBM wells. The number of wells connected to each compressor would be dependent on the operator's development circumstances. Equipment would have to be removed at the end of the testing phase or at the time of abandonment. Areas of surface disturbance associated with lease operations would have to be reclaimed at the completion of activities in accordance with surface owner requirements. Upon abandonment, roads providing legal access to BLM-administered surface would be open to the public.

State

The MBOGC would manage CBM plan of developments based on the Stipulation and Settlement Agreement reached in the First Judicial District Court,

Lewis and Clark County, between the MBOGC and the Northern Plains Resource Council, Inc., on June 19, 2000. In this agreement, the MBOGC may, upon proper application by the operator, issue 200 CBM permits for water quality, quantity, and for testing the coals. An additional restriction limits the number of wells per pod to nine and pods per township to one, and prohibits the discharge of any water into the waters of Montana or the U.S. In addition to these exploration wells, the agreement specifies that Fidelity Exploration and Production (formerly Redstone Gas Partners) could apply to the MBOGC for up to 90 additional wells for its CX Field Pilot Project in southeastern Big Horn County. The total producing wells in the CX Pilot Field cannot exceed 250. In addition to these, Fidelity can drill another 75 exploration wells for a total of 325 wells. Discharge of production water has been arranged through the MDEQ, via a Montana Pollutant Discharge Elimination System (MPDES) permit. The current Fidelity MPDES permit allows for up to 1,600 gallons per minute (gpm) to be discharge into the Upper Tongue River from up to 11 discharge points.

Testing of CBM wells that have been previously drilled would continue, provided no water is discharged to the waters of Montana or the U.S. No commercial production of methane would occur from any of the wells. For each landowner where test wells are drilled, the operator conducting the drilling would enter into a water well mitigation agreement. All wells drilled under the terms of the settlement agreement would be required to comply with the MBOGC's regulations. After test wells are completed, they would be abandoned or plugged according to the MBOGC's regulations.

The development of CBM wells also would be subject to the same regulatory requirements outlined in the Management Common to All Alternatives section for conventional oil and gas. These include following current lease stipulations and mitigation measures. The stipulation and settlement agreement remains in effect until a Record of Decision (ROD) is formulated and signed for this EIS.

Alternative B—Emphasize Soil, Water, Air, Vegetation, Wildlife, and Cultural Resources

This alternative would allow CBM development while emphasizing the protection of natural and cultural resources.

The following measures would be required to reduce environmental impacts.

All generators and compressors would have to be powered by natural gas-fired engines. The number of wells connected to each compressor would be maximized to reduce the overall number of field compressors.

To the extent agency authority allows, buffer zones would be established around Indian lands and active coal mines. Until a reservation approves production of CBM on their lands, a 2-mile buffer would be enforced around reservations in Montana. A 1-mile buffer would be enforced around active coal mines where no CBM production would be permitted.

Water from exploration wells would be stored in tanks, or other approved non-discharging storage facilities. Water from producing wells would be injected into a different aquifer with the same or lesser quality water. Class V permits for injection of produced water with less than 3,000 milligrams per liter (mg/l) total dissolved solids (TDS) would need to be obtained from the EPA Region VIII. If the produced water has dissolved solids in excess of 10,000 mg/l, it would need to be disposed of via the Class II UIC program maintained by the MBOGC. Produced water between 3,000 and 10,000 parts per million (ppm) TDS can be disposed of in a Class II well permitted by MBOGC with concurrence from EPA. Regardless of the water quality or class of well, the produced water would not be injected into the same coal seam that the methane was being extracted from unless there was some form of geological separation to prevent migration of the injected water into the area of methane production.

There are several potential limitations to injecting all the water in this alternative. Since certain geological conditions are desirable for injection and they are not always present in the near surface, it is conceivable that in some cases deep injection into the Madison limestone would be required. Formations that are potential zones for injection may also have limited capacity to accept large volumes of water. Due to the high cost of injection and the uncertain success in disposing of all produced water over the life of a group of CBM wells, injection has not yet been shown to be commercially viable for the CBM industry in the PRB.

Co-location by spacing unit, of single-seam development wells on the same well pad would be required. Multiple seam completions in a single well bore would be encouraged to the extent technology permits. CBM production could occur simultaneously from multiple seams or staggered over time from separate seams. Directional drilling would be required for deeper coal seams to avoid excess surface use or disturbance.

Roads to wells and compressor sites would be limited to single lane width with turnouts. Exploration wells would not have permanent gravel access roads. Utilities would be placed along the road routes, using the transportation network as utility corridors. Powerlines would be buried in the utility corridors; no overhead lines would be permitted. Produced water flowlines and gas flowlines would be buried in the same trench when feasible. When the well had reached the end of its useful life, new access roads on BLM and state surface would be rehabilitated if closed.

The following paragraphs address environmental mitigation measures envisioned to reduce impacts on various resource topics.

During the construction of ROWs and roads, commercially valuable trees would be harvested and the proceeds paid to the resource owner. Long-term loss of commercial timber production on these lands would be negotiated with the TLMD and private landowners.

Use of CBM-related roads would be limited to industry and enforcement would be increased through the use of additional fences and gates to reduce public access and overuse. This effort would help educate residents that these roads are not part of the public road network. Speed limits would be posted and enforced to reduce fugitive dust emissions. Road placement would be limited to tract boundaries where practical to reduce impacts on residential and agricultural lands.

Operators will be required to comply with agency imposed conditions during times of high fire danger. Such conditions may include restrictions on types of activities allowed, hours of operation, and requirements for maintaining certain fire suppression equipment at the work site. Operators must maintain a current fire suppression.

To reduce noxious weeds from spreading during CBM-related activities, operator's weed prevention plans must include measures to prevent the spread of weed seeds from any vehicle or equipment. Additionally, during reclamation activities, early succession plants would be used for revegetation to provide a quick cover before noxious weeds can take root.

Wildlife surveys required by BLM to identify special status species would be conducted prior to the approval of APDs. Qualified wildlife biologists would conduct the surveys and results would be reported to MFWP for consultation regarding avoidance and/or other wildlife protective measures.

Alternative C—Emphasize CBM Development

This alternative would emphasize CBM exploration and development with minimal restrictions.

Operators could use diesel engines with Best Available Control Technology (BACT) to reduce emissions. Operators would not be required to connect a minimum number of CBM wells to a field compressor nor limit the number of field compressors delivering gas to a sales compressor.

Roads and utility corridors would be positioned to use existing disturbances as much as possible. Powerlines would be aboveground or buried per the operator's plans. Gas and water lines would be buried. Upon abandonment, new BLM and state surface oil and gas roads would be rehabilitated and closed.

Operators would not be required to drill directional or horizontal CBM wells. Wells would be located by the operator, and agencies would not require multiple wells to be located on the same well pad.

Water management would be based on a combination of beneficial use and surface discharge. Beneficial uses would include stock water, coal mine dust suppression, irrigation, constructed wetlands, domestic water supply, produced water as drilling fluid, de-icing of road aggregate storage piles, industrial needs, and agricultural reuse. Surface discharge would be subject to MDEQ permit requirements MPDES and limitations established for discharge into identified watersheds. Water discharge via a transportation pipeline into a drainage system would not be required. The operator must obtain 401 Certification from the MDEQ if the disposal action needs BLM approval. Injection of produced CBM water would not be required.

A CBM production buffer zone would not be imposed around Indian reservations or coal mines.

Alternative D—Encourage Exploration and Development While Maintaining Existing Land Uses

This alternative would encourage CBM development while maintaining existing land uses and protecting downstream water consumers. The following paragraphs address environmental mitigation measures envisioned to balance development with resource protection.

The number of wells connected to each compressor would be maximized to reduce the overall number of field compressors required. Natural gas engines with electric boosters would be required for all compression operations. Operators would be required, when technologically and economically feasible, to drill several wells from a single well pad, which may require directional drilling. Multiple seam completions in a single well bore would be encouraged. The transportation network also would serve as a utility corridor. Roads and utilities would be constructed with one way in and out. All powerlines and water and gas flowlines would be buried. Upon abandonment, new oil and gas roads on BLM and state surface would be rehabilitated if closed. Roads would remain open or closed at the surface owner's discretion.

To the extent agency permitting allows, buffer zones for production would be established around Indian lands (2 miles) and active coal mines (1 mile). The buffer zone around Indian lands would remain in effect until the tribe approves production on its own lands.

All produced water (depending on water quality) would be treated prior to surface discharge or pumping into holding facilities such as impoundments, pits, and ponds. Transportation of treated water for discharge would be via a constructed drainage system or pipeline to the nearest perennial watercourse if possible. The method of treatment is unrestricted, provided the effluent meets standards established by the MDEQ for downstream use. Beneficial use of produced water would be allowed and treatment would vary based on industrial, municipal, or agricultural uses such as power plant cooling water, coal slurry pipeline, field irrigation, livestock or wildlife watering, or municipal power turbines. The operator must obtain 401 Certification from the MDEQ if the disposal action needs BLM approval. Surface storage of produced waters would also require an MPDES permit issued by MDEQ.

Use of CBM-related roads would be limited to industry and enforcement would be increased through the use of additional fences and gates to reduce public access and overuse. This effort would help educate residents that these roads are not part of the public road network. Speed limits would be posted and enforced to reduce fugitive dust emissions on BLM administered surface.

Operators will be required to comply with agency imposed conditions during times of high fire danger. Such conditions may include restrictions on types of activities allowed, hours of operation, and requirements for maintaining certain fire suppression equipment at the work site. Operators must maintain a current fire suppression plan.

To reduce noxious weeds from spreading during CBM-related activities, operator's weed prevention plans must include measures to prevent the spread of weed seeds from any vehicle or equipment. Additionally, during reclamation activities, early succession plants would be used for revegetation to provide a quick cover before noxious weeds can take root.

Wildlife surveys to identify special status species would be conducted prior to the approval of APDs. Qualified wildlife biologists would conduct the surveys and results would be reported to MFWP for consultation regarding avoidance and/or other wildlife protective measures.

Camouflage of all wellheads in Class II Visual Resource Management Areas would be required to preserve the view shed. Camouflage would consist of paint chosen to blend in with the background and placement of wellheads to reduce visual obstructions.

Alternative E—Preferred Alternative

Alternative E is the BLM's proposed RMP amendment and would provide management options to facilitate CBM exploration and development, while sustaining resource and social values, and existing land uses.

Exploration and development of CBM resources on BLM, state, and/or fee minerals are allowed subject to agency decisions, lease stipulations, permit requirements, and surface owner agreements. Operators would be required to submit a Project Plan of Development outlining the proposed development of an area when requesting CBM well densities greater than 1 well per 640 acres. The Project Plan of Development would be developed in consultation with the affected Tribes, affected surface owner(s), and other involved permitting agencies.

A step-by-step guideline for preparation of the Project Plan of Development would be developed by BLM and the MBOGC. The Project Plan of Development would be submitted in draft form so that it can be reviewed and any changes made prior to allowing surface disturbing activities. At a minimum, the Project Plan of Development would have to contain the following:

- A cover letter naming the project area and requesting approval
- An APD (form 3160-3) for each federal well in the project area
- An application for permit form for all state and private wells

- A list of all other permitting agencies involved in the project and the name for a point-of-contact for each office
- A list of all existing wells in the project area, including monitoring wells
- Maps submitted in paper or digital format (CD map with any digital GIS coverages used to create the map), showing proposed roads, compressor stations, pipelines, powerlines, CBM well locations, all existing wells, current and proposed monitoring wells, surface ownership, mineral ownership, surface features, and existing structures
- Master drilling information as required by Onshore Order No. 1 (for BLM lands)
- Master surface use information as required by Onshore Order No. 1 (for BLM lands)
- A Reclamation Plan for surface disturbance
- A wildlife monitoring plan demonstrating how the project will meet the needs of the BLM Wildlife Monitoring and Protection Plan (WMPP) for BLM lands (See Wildlife Appendix for a complete copy of the WMPP)
- A Water Management Plan for the project area
- Surface owner agreements, including water well agreements (or notice that the Surface Owner Damage and Disruption Compensation Act applies and surface owner agreements are pending settlement or court action)
- A list of all potentially affected surface owners within the project area
- A cultural resource plan addressing identification strategies commensurate with the level of the proposed development (for BLM lands). This may include a cultural resource location and significance model for identifying areas of critical concern.
- Any additional information as required by the rules of the MBOGC
- BLM will also require compliance with Onshore Oil and Gas Order Number 7

The Preferred Alternative combines water management options so that there would be no unnecessary or undue degradation as defined by the MDEQ of water quality allowed in any watershed. The preferred water management option of water produced with CBM is for beneficial use. Other produced water management

CHAPTER 2 Alternatives

options include, but are not limited to, injection, treatment, impoundment, and discharge. The operator must obtain 401 Certification from the MDEQ if the disposal action needs BLM approval. A Water Management Plan for Exploration would be required for exploratory wells and for each Project Plan of Development. The Water Management Plan for Exploration would be required for CBM exploration wells drilled under statewide spacing rules. At a minimum, the Water Management Plan would be part of an Application for Permit to Drill and include a water well or spring mitigation agreement with the owner of any water well/spring within 1/2 mile; identify any proposed uses of the water (beneficial if possible); and a map showing all wells within 1 mile of the proposed exploratory CBM well.

Water Management Plans developed as part of a Project Plan of Development could include the following additional requirements:

- A cover letter identifying the Project Plan of Development for which the Water Management Plan has been developed and the watershed(s) affected by the project
- A 7.5 minute topographical map indicating the location(s) of any proposed storage ponds and/or discharge points
- Water quality data for the produced water
- Anticipated rate of water production per well and the calculated amount of annual water production for the field
- Proposed beneficial uses of the produced water addressed in surface owner agreements
- Operator's approach to ensure no undue degradation of the surface water quality within the designated watershed(s)
- A copy of any MPDES discharge permit(s) issued by the MDEQ, if required; or a copy of the letter of compliance for MDEQ's General Discharge Permit; or UIC permit issued by the MBOGC or disposal permit issued by the EPA
- A water monitoring plan for the area that meets the requirements of MBOGC Rules and the Controlled Groundwater Area as outlined in the Monitoring Appendix
- A statement indicating whether a 401 Certification is required, and if so, a copy of the certificate
- A copy of the most current soil map available for the project area

- Site-specific stratigraphy for any infiltration basin(s) location that is proposed

Produced water management plans and permits would be approved by the appropriate agency in consultation with affected surface owners. Surface storage of produced waters would also require an MPDES permit issued by MDEQ. Impoundments proposed as part of the Water Management Plan would be designed and located to minimize or mitigate impacts on soil, water, vegetation, and channel stability. There would be no discharge of produced water (treated or untreated) into the watershed unless the operator has an approved MPDES permit and can demonstrate in the Water Management Plan how discharge could occur in accordance with water quality laws without damaging the watershed.

Shallow coal seams would have vertical wells installed while directional wells may be drilled to the deeper coal seams. Directionally drilled wells would be drilled from the same well pad as the vertical wells, unless the operator can demonstrate why directional drilling is not needed or feasible.

Development of coal seams would be done either one coal seam at a time or multiple coal seams at the same time. Production of CBM would be from one coal seam per well or multiple coal seams per well. During production of CBM from multiple coal seams from multiple wells, the wells would be collected on the same well pad. Well spacing rules would set a limit of one well per coal seam per designated spacing unit.

With regards to air quality, the objectives of this alternative are the same as for Alternative B (the number of wells connected to each compressor would be maximized and natural gas-fired engines for compressors and generators would be required), except in areas with sensitive resources, including people, where noise is an issue. In those areas, the decibel level would be required to be no greater than 50 decibels measured at a distance of 1/4 mile from the compressor. This may require the installation of an electrical booster at these locations. Operators of federal leases would be required to post and enforce speed limits to reduce fugitive dust emissions.

Transportation corridors would not be required; however, proposed roads, flowline routes, and utility line routes would be located to follow existing routes or areas of previous surface disturbance when possible. The operator would also address in the Project Plan of Development how the surface owner was consulted for input into the location of roads, pipelines, and utility line routes.

Powerlines are also a Project Plan of Development consideration. The operator would demonstrate in the Project Plan of Development how the proposal for power distribution would mitigate or minimize impacts on affected wildlife. For example, on BLM lands the operator may be required to bury a portion of the powerlines near sage grouse habitat to safely eliminate use by raptors and any aboveground lines be designed following raptor-safe specifications.

When wells are abandoned, the associated oil and gas roads would remain open or be closed at the surface owner's discretion. If the roads were requested to be closed they would be rehabilitated. This includes leaving BLM and state surface roads open if access is desirable.

There would be no buffer zone for CBM production around active coal mines (IM-2000-053).

The BLM would require federal lease operators to protect Crow and Northern Cheyenne groundwater and CBM from loss or degradation.

Mitigation measures that would be applied to protect Northern Cheyenne Tribal resources are described in the Northern Cheyenne Mitigation Appendix.

In addition to the requirements outlined in the Project Plan of Development and in the Water Management Plan, the following general environmental mitigation measures would be implemented to further reduce potential impacts:

- The air permitting process would include analyses of equipment emissions and associated ambient impacts. Emission sources that may violate ambient standards will not be issued a permit.
- Road placement would be limited to track boundaries where practical to reduce impacts on residential and agricultural lands.
- Displaced farmland, whether in crop production or not, will be reclaimed to original soil productivity through adoption of standard reclamation procedures.
- Operators will be required to comply with agency imposed conditions during times of high fire danger. Such conditions may include restrictions on types of activities allowed, hours of operation, and requirements for maintaining certain fire suppression equipment at the work site. Operators must maintain a current fire suppression plan.
- During reclamation activities, early succession plants will be used for revegetation to provide a quick cover before noxious weeds can take root.

Operators would be required to include plans to prevent the spread of noxious weeds as part of their development plans. The noxious weed prevention plans must include measures to prevent the spread of weed seeds from any vehicles and equipment from or prior to mobilizing it to the project area.

- Operator reclamation plans would be developed in consultation with the surface owner. Reclaimed areas reseeded with native species would be required to be reseeded with a certified weed-free seed mix determined by the surface owner, and would usually require at least two growing seasons to ensure a self-sustaining stand of seeded species.
 - Camouflage of all wellheads in federal surface Class II Visual Resource Management Areas will be required to preserve the viewshed. Camouflage will consist of paint chosen to blend in with the background and placement of wellheads to reduce visual intrusions.
 - Wildlife surveys on state lands to identify special status species will be conducted on potential habitat near drilling and production sites prior to the approval of federal APDs. Qualified wildlife biologists would conduct surveys and results will be reported to MFWP for consultation regarding avoidance and/or other wildlife protective measures.
 - On BLM lands impacts to wildlife will be monitored and addressed in the Wildlife Monitoring and Protection Plan (WMPP) in addition to the mitigating measures for wildlife that are part of the standard APD review and approval process. Impacts to wildlife, including those species on public lands and on and adjacent to the Reservations, would be monitored and addressed in accordance with the *Wildlife Monitoring and Protection Plan* (see wildlife appendix).
- The affected Tribes would be invited to participate in the "steering group" that would evaluate information gathered during the inventory and monitoring phases of the Wildlife Monitoring and Protection Plan.
- The results of the *Wildlife Monitoring and Protection Plan* may be used to adjust conditions of approval on federal APDs. This includes measures needed to protect public lands Reservation wildlife from the impacts of CBM development.

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The following special survey activities would be conducted for the Gray Wolf, Canada Lynx and Grizzly Bear on BLM lands as needed:

- Gray Wolf—Prior to APD approval, surveys would be conducted specifically for this animal, occupied dens, or scat. The corridor would be surveyed in the spring, before construction, by a wildlife biologist for scat. If scat is found, the site would be surrounded by a buffer zone recommended through consultation with a FWS biologist. If wolves or other wolf indicators are found, FWS would be consulted and proper protocols followed.
- Canada Lynx—Any construction areas or drilling pads located in high elevation, old growth forested areas, especially areas with populations of hares or rabbits, would be surveyed prior to APD approval for scat and individual lynx following established protocols. If found, the site would be avoided and surrounded by a buffer zone recommended by FWS biologists.
- Grizzly Bear—Garbage and other human refuse would be removed from drilling and construction sites on a daily basis in potential bear habitat to avoid attracting bears. Surveys for scat and other sign of grizzly bears in remote areas would be conducted prior to APD approval. If found, protocol would be established after consultation with FWS biologists.

In addition, the following measures as prescribed in the FWS Biological Opinion will be implemented on BLM lands:

- Bald Eagles
 - If a dead or injured bald eagle is located during construction or operation, the FWS Montana Field Office (406- 449-5225), or the Billings Suboffice (406-247-7367) and the Service's Law Enforcement Office (406-247-7355) will be notified within 24 hours of the next working day.
 - Implementation of the Coal Bed Methane Programmatic Wildlife Monitoring and Protection Plan for the Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans (Wildlife Monitoring and Protection Plan, Wildlife Appendix).
 - Power lines would be built to standards identified by the Avian Power Line Interaction

Committee (1996), and additional standards as outlined in the Wildlife Monitoring and Protection Plan, to minimize electrocution potential.

- Surveys for active raptor nests and winter roost sites would be conducted prior to APD approval within a 0.5-mile width for bald eagles and bald eagle nests and within a 1-mile width for roosts. If the proposed CBM site is found to be within a nesting or winter foraging area, CBM work will be halted until the nest is no longer active or until winter has passed and the foraging eagles have migrated.
- BLM leasing stipulations pertaining to bald eagles apply and will be implemented. This includes No Surface Occupancy (NSO) within 0.5 mile of nests active in the last 7 years and 0.5 mile of roost sites.
- Raptor inventories will be conducted over the entire CBM project area every 5 years by BLM and MFWP. These inventories will be repeated every 5 years (in areas with less than four well locations per section) thereafter for the Life-of-the-Project (LOP) to monitor trends in habitat use.
- Nest productivity would be conducted by the BLM or a BLM approved biologist in areas with high levels of development (i.e., areas with greater than or equal to four well locations per section) and within 1 mile of the project area. Active nests located within 1 mile of project-related disturbance areas will be monitored between March 1 and mid-July to determine nesting success (i.e., number of nestlings or fledglings per nest).
- A seasonal minimum disturbance-free buffer zone of 0.5 mile would be established for all bald eagle nest sites (February 15 to August 15). These spatial and timing restrictions may be adjusted based on site-specific criteria after written approval from the FWS.
- Signing, speed limits, or speed bumps would be placed on all project access roads to reduce mortality caused by vehicle traffic.
- Mountain Plover
 - The FWS shall provide operators and the BLM with educational material illustrating and describing the mountain plover, its habitat needs, life history, threats, and gas development activities that may lead to

incidental take of eggs, chicks, or adults. These materials will be provided with the requirement that they will be posted in common areas, circulated in a memorandum, and discussed among all employees and service providers.

- If a dead or injured mountain plover is located during construction or operation, the FWS Montana Field Office (406- 449-5225), or the Billings Suboffice (406-247-7367) and the Service's Law Enforcement Office (406-247-7355) will be notified within 24 hours of the next working day.
- The BLM, FWS, and MFWP will estimate potential mountain plover habitat across the CBM area using a predictive habitat model. During the next 5 years, information will be refined by field validation using most current Service mountain plover survey guidelines (FWS 2002c) to determine the presence or absence of potentially suitable mountain plover habitat. In areas of suitable mountain plover habitat, surveys will be conducted by the BLM or a BLM-approved Operator biologist using the FWS protocol at a specific project area, plus a 0.5 mile buffer. Efforts will be made to identify mountain plover nesting areas that are not subject to CBM development to be used as reference sites. Comparisons will be made of the trends in mountain plover nesting occupancy between these reference areas and areas experiencing CBM development.
- Surveys for nesting mountain plovers will be conducted by appropriately trained personnel if ground-disturbing activities are anticipated to occur between April 10 and July 10. A disturbance-free buffer zone of 1/4 mile will be established around all mountain plover nesting locations between April 1 and July 31.
- No ground-disturbing activities shall occur in suitable nesting habitat prior to surveys conducted in compliance with the Service's Mountain Plover Survey Guidelines (FWS 2002c or more recent version), regardless of the timing of the disturbance. If occupied mountain plover nesting habitat is located, the BLM shall reinitiate consultation with the Service on any project-related activities for

such habitat. The amount and nature of ground-disturbing activity shall be limited within identified nesting areas in a manner to avoid the abandonment of these areas.

Because of the potential for CBM development to uncover Tribal culturally significant sites, the BLM would provide the tribes a copy of their annual cultural resources report, which would summarize CBM-related cultural resource activities.

Comparison of Alternatives

The differences between alternatives by development theme are shown in Table 2-2. The variations for development by theme are compared for the five alternatives carried forward for detailed analysis.

A range of potential issues affecting development has been analyzed in the context of the themes described for each alternative. The comparison focuses on the various techniques typically used to develop CBM fields. The variations between alternatives reflect the different potential drilling technologies, water disposal methods, transportation corridor construction, compressor engines, socioeconomic issues, etc. These alternatives represent the majority of development techniques commonly used with CBM operations. There are general and specific assumptions as to percentages of use per theme within each alternative. These assumptions are presented in Chapter 4, Environmental Consequences.

Table 2-3 shows a comparison summary of the impacts expected under each alternative.

TABLE 2-2
ALTERNATIVE MANAGEMENT FOR CBM

Issue Topic	Management Action	Alternative A— No Action (Existing CBM Management)	Alternative B— CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife, and Cultural Resources	Alternative C— Emphasize CBM Development	Alternative D— Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E— Preferred CBM Development Alternative
Air	Maximize the number of wells connected to each compressor	No	Yes	No	Yes	Yes
	Type of fuel to power compressors	Diesel, electric, or gas-fired	Gas-fired	Diesel, electric, or gas-fired	Gas-fired with electric boosters	Gas-fired or electric boosters
	Noise suppression required	No	No	No	No	Yes
	Implementation of a speed limit on CBM roads on BLM	No	Yes	No	Yes	Yes
	Air permit analysis	Yes	Yes	Yes	Yes	Yes
Coal Mines	Buffer zone (1 mile) around active coal mines	No	Yes	No	Yes	No
Coal Bed Methane	APD to be filed and approved prior to drilling	Yes	Yes	Yes	Yes	Yes
	CBM exploration limits	Yes	No	No	No	No
	CBM production limits	Yes	No	No	No	No
	Project Plan of Development required in consultation with tribes, surface owners, and other agencies	No	No	No	No	Yes
	Directional drilling required	No	Yes	No	Yes	Yes, unless exempted
	Multiple coal seams developed per well bore required	No	Yes	No	Yes	No

TABLE 2-2
ALTERNATIVE MANAGEMENT FOR CBM

Issue Topic	Management Action	Alternative A— No Action (Existing CBM Management)	Alternative B— CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife, and Cultural Resources	Alternative C— Emphasize CBM Development	Alternative D— Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E— Preferred CBM Development Alternative
Coal Bed Methane, 'cont.	Simultaneous coal seam development required	No	Yes	No	Yes	No
	Wellhead camouflage required by BLM	No	No	No	Yes	Yes
Hydrology	Exploration water disposal	Untreated and stored, except for CX Ranch	Untreated and stored	Untreated surface discharge	Treated and conveyed	Exploration Water Management Plan required
	Production water disposal	CX Ranch only	Injection	Untreated surface discharge	Treated and conveyed	Various Methods Water Management Plan Required
	Site-specific Water Management Plan required	Yes	No	No	No	Yes
	Exploration/production water available for beneficial use	Yes	No	Yes	Yes	Yes
Realty	Corridors required	No	Yes	No	Yes	No, with surface owner consultation
	Powerline placement	Aboveground or buried	Buried	Aboveground or buried	Buried	Aboveground or buried
	Abandoned access roads	Agency/Surface Owner Discretion	Agency/Surface Owner Discretion	Agency/Surface Owner Discretion	Agency/Surface Owner Discretion	Agency/Surface Owner Discretion
	High fire danger restrictions	No	Yes	No	Yes	Yes
	Road use enforcement on BLM	No	Yes	No	Yes	No

TABLE 2-2
ALTERNATIVE MANAGEMENT FOR CBM

Issue Topic	Management Action	Alternative A— No Action (Existing CBM Management)	Alternative B— CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife, and Cultural Resources	Alternative C— Emphasize CBM Development	Alternative D— Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E— Preferred CBM Development Alternative
Realty, 'cont.	Road placement on boundaries on BLM	No	Yes	No	No	Yes
Indian Trust and Native American Concerns	Buffer zone (2 miles) around reservations	No	Yes	No	Yes	No
	Monitoring wells required on BLM-administered minerals that abut reservations	No	No	No	No	Yes
	Resource protection protocols	No	No	No	No	Yes
	Air quality mitigation measures	No	No	No	No	Yes
	Special cultural resources protection measures	No	No	No	No	Yes
Vegetation	Commercially harvest ROW trees on BLM	No	Yes	No	No	Agency or Surface Owner Discretion
	Revegetate with early successional and late seral stage plants on BLM	Agency or Surface Owner Discretion	Agency or Surface Owner Discretion	Agency or Surface Owner Discretion	Agency or Surface Owner Discretion	Agency or Surface Owner Discretion
	Noxious weed control by operator	Yes	Yes	No	Yes	Yes

TABLE 2-2
ALTERNATIVE MANAGEMENT FOR CBM

Issue Topic	Management Action	Alternative A— No Action (Existing CBM Management)	Alternative B— CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife, and Cultural Resources	Alternative C— Emphasize CBM Development	Alternative D— Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E— Preferred CBM Development Alternative
Wildlife	Wildlife surveys required by BLM	Yes	Yes	Yes	Yes	Yes
	Gray wolf, Canada lynx and grizzly bear surveys by BLM	As needed	As needed	As needed	As needed	Yes
	FWS biological opinion mitigation measures on BLM	No	Yes	Yes	Yes	Yes

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Resource Topic	Alternative A No Action (Existing CBM Management)	Alternative B CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C Emphasize CBM Development	Alternative D Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E Preferred CBM Development Alternative
<p>Air Quality <i>Existing air quality throughout most of the analysis area is in attainment with all ambient air quality standards. However, three areas have been designated as federal nonattainment areas where the applicable standards have been violated in the past: Lame Deer (PM₁₀—moderate) and Laurel (SO₂—primary), Montana; and Sheridan, Wyoming (PM₁₀—moderate).</i></p>	<ul style="list-style-type: none"> • Localized short-term increases in CO, NO_x, SO₂, PM_{2.5} and PM₁₀ concentrations. • Maximum concentrations are expected to be below applicable state and National Ambient Air Quality Standards and PSD increments for near-field and far-field modeling. • Potential direct impact on visibility within one mandatory federal PSD Class I, one Class II Area and the Class II Crow IR. • Cumulative Impacts: <ul style="list-style-type: none"> – Potentially exceed the 24-hour PM₁₀ NAAQS and PSD Class II increments south of Spring Creek Mine. – Potentially exceed PSD Class I increments for 24-hour PM₁₀ on the Northern Cheyenne Reservation. – Potentially exceed atmospheric deposition thresholds in the very sensitive Upper Frozen Lake in the PSD Class I Bridger Wilderness Area. 	<ul style="list-style-type: none"> • Localized short-term increases in CO, NO_x, SO₂, PM_{2.5} and PM₁₀ concentrations. • Maximum concentrations are expected to be below applicable state and NAAQS and PSD increments for near-field and far-field modeling. • Potential direct visibility impacts within seven mandatory federal PSD Class I Areas and the Northern Cheyenne Reservation. Additional visibility impacts to seven federal PSD Class II areas including the Crow and Fort Belknap Indian Reservations and three Wilderness Areas and one National Recreation Area and one National Monument. • Cumulative Impacts: <ul style="list-style-type: none"> – Potentially exceed the 24-hour PM₁₀ and PM_{2.5} NAAQS south of Spring Creek Mine. – Potentially exceed the PSD Class II increments for 24-hour PM₁₀ south of Spring Creek Mine. – Potentially exceed PSD Class I increments for 24-hour PM₁₀ on the Northern Cheyenne Reservation and at Washakie. – Potentially exceed PSD Class I increments for annual NO₂ on the Northern Cheyenne Reservation. 	<ul style="list-style-type: none"> • Impacts under Alternative C are expected to be comparable to those describe for Alternative B but somewhat increased in severity due to the lack of control over operators choose for compressor fuel, reduced limits on compressor hook ups and the lack of enforceable control measures. • Cumulative Impacts: <ul style="list-style-type: none"> – Same as Alternative B. 	<ul style="list-style-type: none"> • Localized short-term increases in CO, NO_x, SO₂, PM_{2.5} and PM₁₀ concentrations. • Maximum concentrations are expected to be below applicable state and NAAQS and PSD increments for near-field and far-field modeling. • Potential direct visibility impacts within one mandatory federal PSD Class I Areas. Additional visibility impacts to three PSD Class II areas including the Crow Indian Reservation, one Wilderness Area and one National Recreation Area. • Cumulative Impacts: <ul style="list-style-type: none"> – Potentially exceed the 24-hour PM₁₀ and PM_{2.5} NAAQS south of Spring Creek Mine. – Potentially exceed the PSD Class II increments for 24-hour PM₁₀ south of Spring Creek Mine. – Potentially exceed PSD Class I increments for 24-hour PM₁₀ on the Northern Cheyenne Reservation and Washakie WSA. 	<ul style="list-style-type: none"> • Impacts under Alternative E would be comparable to those describe for Alternative B but are somewhat decreased in severity due to the use of gas-fired compressors and maximized compressor hook ups. • Although the air quality modeling shows the potential for certain standards to be exceeded, these impacts would not occur. The air quality permitting process would be used to analyze emission sources at the project level. Emission sources that would violate standards would not be permitted by the agencies and therefore, residual impacts would remain within standards. • Cumulative Impacts: <ul style="list-style-type: none"> – Same as Alternative B.

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Resource Topic	Alternative A No Action (Existing CBM Management)	Alternative B CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C Emphasize CBM Development	Alternative D Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E Preferred CBM Development Alternative
Air Quality (cont'd.)	<ul style="list-style-type: none"> - Potential visibility impacts in 10 of 17 federal PSD Class I including the Crow and Fort Peck Indian Reservations. Additional visibility impacts to 7 of 13 PSD Class II sensitive areas including the Crow and Fort Belknap Indian Reservations. 	<ul style="list-style-type: none"> - Potentially exceed atmospheric deposition thresholds in the very sensitive Upper Frozen Lake in the PSD Class I Bridger Wilderness Area and Florence Lake in the Class II Cloud Peck Wilderness Area. - Potential visibility impacts in all federal PSD Class I and II sensitive areas including the N. Cheyenne, Fort Peck, Fort Belknap and Crow Indian Reservations. 		<ul style="list-style-type: none"> - Potentially exceed atmospheric deposition thresholds in the very sensitive Upper Frozen Lake in the PSD Class I Bridger Wilderness Area. - Potential visibility impacts in 14 of 17 federal PSD Class I and all Class II sensitive areas including the N. Cheyenne, Fort Peck, Fort Belknap and Crow Indian Reservations. 	

Cultural Resources

Approximately 73,600 cultural resource sites exist above known coal resources within the CBM emphasis area

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| <ul style="list-style-type: none"> • An estimated 17 cultural resource sites could be identified during foreseen CBM activities. Of these only one or two would likely be eligible for the NRHP. • Cumulative Impacts: <ul style="list-style-type: none"> - An estimated 4,285 cultural sites would be identified, resulting in 430 to 612 sites likely eligible for the NRHP. - Identification of TCPs would increase with the development of CBM. | <ul style="list-style-type: none"> • The number of cultural resource sites identified would be practically the same for Alternatives B, C, D, and E based on the level of development, associated area of disturbance and minor differences between the alternative realty management actions. An estimated 630 cultural resource sites would be identified, of these sites, 120 to 170 could be found eligible for the NRHP. • Cumulative Impacts: <ul style="list-style-type: none"> - An estimated 5,135 cultural sites could be identified resulting in 515 to 735 sites that could be eligible for the NRHP. - Identification of TCPs would increase with the development of CBM. |
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TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Resource Topic	Alternative A No Action (Existing CBM Management)	Alternative B CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C Emphasize CBM Development	Alternative D Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E Preferred CBM Development Alternative
Environmental Justice	<i>Executive Order 12898 requires the non-discriminatory treatment of minority and low-income populations for projects under the jurisdiction of a federal agency</i>				
	<ul style="list-style-type: none"> No adverse impacts with the exception of the undetermined Wyoming discharge influence. It is concluded that no adverse human health or environmental effects would be expected to fall disproportionately on minority or low-income populations from this alternative. 	<ul style="list-style-type: none"> No adverse human health impacts are foreseen from these environmental changes. The influence of Wyoming's discharge on Montana river's would constitute a potential environmental justice issue if unresolved. No adverse human health or environmental effects would be expected to fall disproportionately on minority or low-income populations from this alternative. 	<ul style="list-style-type: none"> Same as B except for adverse environmental effects would be expected from downstream water quality changes resulting in limitations to subsistence living styles. These limitations would fall disproportionately on minority or low-income populations from this alternative. Wyoming Discharge issues same as Alternative B. 	<ul style="list-style-type: none"> No adverse human health or environmental effects would be expected to fall disproportionately on minority or low-income populations from this alternative. Wyoming Discharge issues same as Alternative B. 	<ul style="list-style-type: none"> No adverse human health or environmental effects would be expected to fall disproportionately on minority or low-income populations from this alternative. Impacts would be mitigated as described under the <i>Environmental Justice</i> section, <i>Alternative A</i> and by implementation of the Project Plan of Development requirements.
Geology and Minerals	<i>Montana's mineral resources are intimately tied to the complex geologic framework of the state. Locatable minerals and conventional Oil and Gas resources are found throughout the planning area in various recoverable and non-recoverable amounts</i>				
	<ul style="list-style-type: none"> Federal: <ul style="list-style-type: none"> Only minor loss of CBM during testing operations. 	<ul style="list-style-type: none"> Federal: <ul style="list-style-type: none"> Irretrievable commitment of CBM resources from production, magnitude and complexity to reflect increase scale of development. Potential mineral drainage between Federal mineral estates and state, fee and Tribal developments depending on site-specific conditions. The presence of shallow CBM production could delay or interfere with certain types of seismic prospecting for conventional oil and gas reservoirs. 	<ul style="list-style-type: none"> Federal: <ul style="list-style-type: none"> Same as Alternative B with the addition of increased water drawdown and potential operational interference within and adjacent to coal mines without the 1-mile buffer zone. 	<ul style="list-style-type: none"> Federal: <ul style="list-style-type: none"> Same as Alternative B. 	<ul style="list-style-type: none"> Federal: <ul style="list-style-type: none"> Same as Alternative B with the addition of increased water drawdown and potential operational interference within and adjacent to coal mines without the 1-mile buffer zone. Protection of potential Tribal CBM from drainage because of resource protection protocols.

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Resource Topic	Alternative A No Action (Existing CBM Management)	Alternative B CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C Emphasize CBM Development	Alternative D Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E Preferred CBM Development Alternative
Geology and Minerals (cont'd.)	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – Irretrievable commitment of CBM resources from CX Ranch Field production. – Delayed development or expansion of conventional oil and gas, coal mining, and surface mineral mining in minor instances with no interruption to existing activities. – CBM production dewatering at nearby coal seams, in rare occurrences can cause underground coal fires, methane seeps, and the liberation of methane to water wells. • Cumulative Impacts: <ul style="list-style-type: none"> – Reduction in Coal resources from current and planned surface mine operations. – Potential CBM drainage along Wyoming Montana State Line. 	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – Increased commitment of CBM resources due to increased level of CBM. – Mineral drainage and seismic interference issues same as for Federal under this alternative. • Cumulative Impacts: Increase in wells and infrastructure could impact existing mine expansion greater possibility of CBM drainage than A. 	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – Same as Alternative B. – Potential mineral drainage between federal mineral estates and state, fee, or Tribal developments depending on site-specific conditions. • Cumulative Impacts: Impacts increased over alternative B. 	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – Same as Alternative B. – Potential mineral drainage between Federal mineral estates and state, fee, or Tribal developments depending on site-specific conditions. • Cumulative Impacts: <ul style="list-style-type: none"> – Same as Alternative B. 	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – Same as Alternative B. – Potential mineral drainage between federal mineral estates and state, fee, or Tribal developments depending on site-specific conditions. • Cumulative Impacts: Similar to Alternative B. <ul style="list-style-type: none"> – Potential mineral drainage between federal mineral estates and state, fee, or Tribal developments depending on site-specific conditions.
<i>Number of wells predicted for analysis purposes:</i>	<ul style="list-style-type: none"> • Federal/State – up to 925 CBM and 1720 Conventional wells. • Cumulative – up to 925 CBM and 1775 Conventional wells. 	<ul style="list-style-type: none"> • Federal/State – up to 18,275 CBM and 1720 Conventional wells. • Cumulative – up to 26,475 CBM and 1775 Conventional wells. 	<ul style="list-style-type: none"> • Federal/State – up to 18,275 CBM and 1720 Conventional wells. • Cumulative – up to 26,475 CBM and 1775 Conventional wells. 	<ul style="list-style-type: none"> • Federal/State – up to 18,275 CBM and 1720 Conventional wells. • Cumulative – up to 26,475 CBM and 1775 Conventional wells. 	<ul style="list-style-type: none"> • Federal/State – up to 18,275 CBM and 1720 Conventional wells. • Cumulative – up to 26,475 CBM and 1775 Conventional wells.

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Hydrological Resources	<p><i>Surface water: The Tongue River has generally good quality water with a seasonal flow consistent from year to year and is frequently used for irrigation. The Powder and Little Powder Rivers are characterized as having fair to poor quality water and can and do go dry, the waters are used for stock and limited irrigation.</i></p> <p><i>Groundwater: Regional groundwater is available in stream bottoms and alluvium, but becomes scarce away from the water course. Coal beds and interlayered sands are the most commonly used aquifers away from riparian areas. Groundwater quality is variable and affects taste and beneficial uses.</i></p> <p><i>Beneficial Reuse: The southeastern region of Montana is classified as a high plains desert environment and has experienced drought conditions for the past seven years</i></p>				
	<ul style="list-style-type: none"> • Federal: <ul style="list-style-type: none"> – No impacts to surface or groundwater resources. – No beneficial reuse. • State: <ul style="list-style-type: none"> – Negligible increase in surface water flow and quality changes in the Tongue River. No change in other waterways. – Groundwater drawdown within the immediate vicinity of the CX Ranch. – Continued beneficial reuse of produced water at the CX Ranch. 	<ul style="list-style-type: none"> • Surface Water <ul style="list-style-type: none"> – Surface water quality and quantity changes should be the same as Alternative A due to injection control. 	<ul style="list-style-type: none"> • Surface Water <ul style="list-style-type: none"> – Surface water quality in some watersheds would be noticeably altered, resulting in restricted downstream uses. – Surface water flow would be considerably increased in some watersheds causing persistent riparian erosion, changes in watercourses and increased sedimentation. 	<ul style="list-style-type: none"> • Surface Water <ul style="list-style-type: none"> – Surface water quality would not be altered due to required treatment prior to discharge – Surface water flow would be similar to Alternative C but with slight increase in volume due to reduced conveyance loss. 	<ul style="list-style-type: none"> • Surface Water <ul style="list-style-type: none"> – Surface water quality would be slightly altered, however downstream uses would not be diminished. – Surface water flow would be moderately increased causing some riparian erosion, as well as increased sedimentation.

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Resource Topic	Alternative A No Action (Existing CBM Management)	Alternative B CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C Emphasize CBM Development	Alternative D Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E Preferred CBM Development Alternative
Hydrological Resources (cont'd.)		<ul style="list-style-type: none"> • Groundwater: <ul style="list-style-type: none"> – Groundwater will be drawn down over time in the Powder River Basin. – Isolated areas of development would experience an increased drawdown effect. – Immediate drawdown of coal seam aquifers would be minor and limited in horizontal extent. As CBM production matures, coal seam aquifer drawdown could exceed 20 feet and reach as far as 4 to 5 miles from the edge of production. – No change in groundwater quality. • Beneficial Reuse: <ul style="list-style-type: none"> – Same as Alternative A. 	<ul style="list-style-type: none"> • Groundwater: <ul style="list-style-type: none"> – Drawdown same as Alternative B. – Alluvial groundwater quality would be altered due to infiltration of untreated production water. • Beneficial Reuse: <ul style="list-style-type: none"> – Same as Alternative A. 	<ul style="list-style-type: none"> • Groundwater: <ul style="list-style-type: none"> – Drawdown same as Alternative B – No groundwater quality impacts. • Beneficial Reuse: <ul style="list-style-type: none"> – Increased availability of treated water for a variety of downstream and increased beneficial uses, estimated at 20% of production. 	<ul style="list-style-type: none"> • Groundwater: <ul style="list-style-type: none"> – Drawdown would be the same as Alternative B. – Minor impacts to shallow groundwater quality from impoundment infiltration and surface discharge of some untreated production water. • Beneficial Reuse: <ul style="list-style-type: none"> – Required Water Management Plans from all operators would result in increased beneficial reuse of production water, estimate at 20%.

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Resource Topic	Alternative A No Action (Existing CBM Management)	Alternative B CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C Emphasize CBM Development	Alternative D Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E Preferred CBM Development Alternative
Hydrological Resources (cont'd.)	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> – Surface Water: Wyoming’s discharge of CBM production water would increase surface water flow in Montana rivers depending on the season and watershed from minor to noticeable amounts. The surface water quality in the three-shared rivers between Montana and Wyoming would be slightly altered, however downstream uses will not be diminished. – Groundwater: Drawdown of groundwater from Wyoming CBM operations could extend several miles north into Montana. Groundwater quality in Montana would not be impacted by Wyoming CBM operations. Drawdown from the CX Ranch may extent out several miles from the development. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> – Surface water flow and quality will be the same as Alternative A. – CBM production in Montana coupled to nearby Wyoming wells would noticeably increase the drawdown of groundwater aquifers. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> – Surface water quality in some watersheds would be noticeably altered, resulting in restricted downstream uses. – Surface water flow would be considerably increased in some watersheds causing persistent riparian erosion, changes in watercourses and increased sedimentation. – Impacts to groundwater drawdown, quality and beneficial reuse would be the same as in Alternative B. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> – Surface water quality would not be degraded and minor impacts from Wyoming would be diluted. – Surface water flow impacts would be similar to Alternative C with added volume due to reduced conveyance loss. – Impacts to groundwater drawdown and quality would be the same as in Alternative B. – Increased beneficial reuse, estimated at 20% of production. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> – Cumulative impacts would be dependent on WDEQ/MDEQ Water Quality Agreement and MDEQ non-degradation numerical standards. – Surface water quality would be slightly altered however downstream uses would not be diminished. – Surface water flows would be moderately increased in some watersheds and provide a source of flow in some rivers that would otherwise have gone dry seasonally. – Impacts to groundwater drawdown would be the same as Alternative B. – Shallow groundwater quality would be slightly altered due to impoundment infiltration and surface discharge of untreated production water. – Use of Water Management Plans and agency approval would result in increased beneficial reuse, estimated at 20%.

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Hydrological Resources (cont'd.)					
	<ul style="list-style-type: none"> - Beneficial Reuse: Due to the increased water volumes from Wyoming's discharge there would be added opportunities for irrigation, stock watering and other uses from waterways, depending on the water quality. 				

Indian Trust and Native American Concerns

Indian Trust Assets (ITAs) are official interests in assets held in trust by the federal government for Indian tribes or individuals. The U.S. Department of the Interior (DOI) Departmental Manual 303 DM 2 defines ITAs as lands, natural resources, money, or other assets held by the federal government in trust or that are restricted against alienation for Indian tribes and individual Indians.

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| <ul style="list-style-type: none"> • Federal: <ul style="list-style-type: none"> - No measurable impacts to Indian trust assets would occur from the CBM activities. | <ul style="list-style-type: none"> • Federal: <ul style="list-style-type: none"> - No surface water quality impacts foreseen. - Potential CBM drainage, dependent on specific site conditions, delayed by buffer zone. - Visibility impacts. - Wildlife Adaptation resulting in changes. - Potential cultural resource impacts to TCPs. | <ul style="list-style-type: none"> • Federal: <ul style="list-style-type: none"> - Potential for surface water quality and quantity impacts. - Potential CBM drainage, same as Alternative B. - Cultural Resource impacts same as B. - Visibility impacts. | <ul style="list-style-type: none"> • Federal: <ul style="list-style-type: none"> - Groundwater drawdown same as Alternative B. - Surface water quality impacts reduced by source treatment, increased availability of surface waters for irrigation and other beneficial uses. - Increased surface water flow could result in increase riparian erosion. - Potential CBM drainage, same as Alternative B. - Cultural Resource impacts same as B. - Visibility impacts. | <ul style="list-style-type: none"> • Federal: <ul style="list-style-type: none"> - Effects from groundwater drawdown mitigated because of resource protection protocols. Potential CBM drainage mitigated through the use of resource protection protocols. - Surface water quality impacts reduced with increased availability of surface waters for irrigation and other beneficial uses. - Increased surface water flow could increase riparian erosion. - Air Quality and visibility impacts alleviated through site specific permits and mitigation. |
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TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Resource Topic	Alternative A No Action (Existing CBM Management)	Alternative B CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C Emphasize CBM Development	Alternative D Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E Preferred CBM Development Alternative
Indian Trust and Native American Concerns (cont'd.)					
	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – No measurable impacts to Indian trust assets would occur from the CBM activities. • Cumulative Impacts: <ul style="list-style-type: none"> – Reduction in Coal resources from the Absaloka Mine operation. – Surface water quality and quantity in the Tongue River would not be noticeable altered from Wyoming CBM development. – Drawdown of groundwater from Wyoming CBM operations has the potential to lower aquifer levels on the Crow Reservation. – Potential CBM drainage along southeastern corner of Crow Reservation from Wyoming operations. 	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – Groundwater drawdown inward from reservation boundaries. – Limited short-term surface water impacts from spills and ruptures adjacent to Reservations. – Potential CBM drainage, dependent on specific site conditions, no delay due to adjacent development. • Cumulative Impacts: <ul style="list-style-type: none"> – Same as Alternative A. – Reduction of CBM resources if developed by Tribes, coupled with land disturbances and associated water impacts. – Changes in visibility. – Air Quality changes. – Potential air quality impacts to PSD class I 24-hour PM10 increments. – Potential air quality impacts to PSD Class I annual NO₂ increments. 	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – Groundwater drawdown same as Alternative B. – Surface water quality and quantity impacts. – Potential CBM drainage, same as Alternative B. • Cumulative Impacts: <ul style="list-style-type: none"> – Same as Alternative B. 	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – Groundwater drawdown same as Alternative B. – Surface water quality impacts reduced. – Potential CBM drainage, same as Alternative B. • Cumulative Impacts: <ul style="list-style-type: none"> – Same as Alternative B except no potential air quality impacts to PSD Class I annual NO₂ increments. 	<ul style="list-style-type: none"> • State: <ul style="list-style-type: none"> – Surface water quality protected. • Cumulative Impacts: <ul style="list-style-type: none"> – Same as Alternative B.

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Lands and Realty					
	<i>Emphasis Area Land Ownership: Private 65%, Federal 20%, Tribal 10%, State 5%</i>		<i>Miles of Road: Interstate, 440; US; 845; State, 430; Off-System, 13,550</i>		
	<i>Total Acreage: 25,551,308</i>		<i>Miles of Railroad: BNSF, 420; MT Rail Link, 190</i>		
	<ul style="list-style-type: none"> • Federal: <ul style="list-style-type: none"> – Minimal land area displaced by roads. – 400 acres disturbed short term during CBM exploration drilling. • State: <ul style="list-style-type: none"> – Increased motorized access on the CX Ranch. – Increase motorized trespass. – 1,100 short term acres disturbed and 500 long term acres during CBM exploration and production activities. 	<ul style="list-style-type: none"> • Federal: <ul style="list-style-type: none"> – Increase fire hazard and motorized access during 20-year lease. – Limit public access. – Disrupt active logging operations. – 25,600 short term acres and 15,250 long term acres disturbed during CBM development activities. • State: <ul style="list-style-type: none"> – Displace agricultural lands and disrupt irrigation system, increase cost of farm operation. – Reduced property values. – Displace community and residential growth. – Increase dust and noise impacts on residential use. – Increase cost of county road maintenance. – Increase long-term motorized access. – invite illegal trespass activities. – Increase forest pests. – Disrupt active logging operations. – Increase motorized trespass. – 29,750 short term acres and 17,700 long term acres disturbed during CBM development activities. 	<ul style="list-style-type: none"> • All Federal and State impacts in Alternative B occur in Alternative C in addition to: <ul style="list-style-type: none"> – Impacts to adjacent mining operations The land use displacement from roads and utility lines lease operations is greatest in Alternative C. – Increased disturbances by CBM activities on private, state and federal estates. Short term disturbances 70,000 acres (Federal 32,400, State 37,600); long term disturbances 47,600 acres (Federal 22,000, State 25,600). 	<ul style="list-style-type: none"> • All Federal and State impacts in Alternative B occur in Alternative D in addition to: <ul style="list-style-type: none"> – Federal: Permanent loss of land use from road network. 	<ul style="list-style-type: none"> • Federal and State: <ul style="list-style-type: none"> – Levels of disturbance would be slightly increased due to use of impoundments for production water management (Short term 74,000 acres, long term 44,000 acres). – Impacts from powerlines, roads, pipelines, and other utilities not requiring transportation corridors would be the same as Alternative C.

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Lands and Realty (cont'd.)	<ul style="list-style-type: none"> Total cumulative long term disturbance including all foreseen projects such as coal mine expansion, transportation etc. is estimated at 34,000 acres. 	<ul style="list-style-type: none"> Total cumulative acres disturbed long term including all foreseen projects 81,000 	<ul style="list-style-type: none"> Total cumulative long term acres disturbed would be approximately 102,300. 		<ul style="list-style-type: none"> Total cumulative long term acres disturbed would be approximately 92,200.
Livestock Grazing	<p><i>AUM is equal to the amount of forage required to support one cow and her calf or 5 sheep for one month. The CBM Emphasis area has an estimated 1,207,400 acres of classified grazing and forested lands capable of supporting 323,941 AUMs.</i></p>				
	<ul style="list-style-type: none"> Exploration wells located within BLM-permitted rangelands would result in the temporary loss of 69 AUMs. State: <ul style="list-style-type: none"> The exploration wells and production wells located at CX Ranch would result in a maximum construction loss of 272 AUMs on state and private rangelands combined. Re-vegetating parts of the well pads during production would reduce the state-permitted losses to 194 AUMs. 	<ul style="list-style-type: none"> Exploration wells would result in the temporary loss of 413 AUMs (BLM 163, State 250). Production wells would result in a maximum construction loss of 11,960 AUMs (BLM 4,770, State 7,190). Re-vegetating parts of the well pads during production would reduce the losses to 6,904 AUMs (BLM 2,484, State 4,420). If all Alternative requirements were utilized fully, the area of surface disturbances could be reduced by an additional 35 percent during construction and 40 percent during production primarily because of required transportation corridors. 	<ul style="list-style-type: none"> Impacts to livestock grazing would be similar to but slightly greater than those in Alternative B due to the discharge of untreated production water on to the ground resulting in increased erosion and no requirements for transportation corridors. CBM discharge water could be used for livestock watering; increased erosion would result in increased surface disturbance, which could lead to disrupted grazing patterns, undermined fencing, and reduced forage; an increase of noxious weeds and a decrease in forage material could occur if discharged produced water is too high in saline content; and possible health effects to livestock if produced water that is unsuitable for livestock watering. 	<ul style="list-style-type: none"> Impacts would be similar to Alternative B with some exceptions: disturbed acreage would increase due to the piping of discharge water to the nearest disposal point. There would be a reduction to forage losses from increased land application of produced water; and there would be less soil and forage loss from erosion of soils. Transportation corridor and road impact causing reductions of surface disturbance would be similar to Alternative B. 	<ul style="list-style-type: none"> Impacts to livestock grazing would be similar to Alternative B. Suitable CBM discharge water could be used for livestock watering. Transportation corridor impacts would be the same as Alternative B. Not as much forage would be lost under this alternative because increased land application of produced water would allow more growth. There would also be less soil and forage loss from soils erosion because more vegetation would hold the soils in place.

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Paleontological Resources					
<i>Paleontological resources consist of fossil-bearing rock formations that underlie the entire planning area. Fossil outcrops are relatively rare throughout the emphasis area, but known areas are protected.</i>					
	<ul style="list-style-type: none"> It is unlikely that any of the 1,500 short term acres disturbed during CBM development activities would contain noteworthy paleontological resources. The 575-acre Bridger Fossil Area ACEC (only paleontological resource) would not be disturbed. Other impacts would include vandalism and removal of fossils by amateur fossil collectors resulting from minor increased accessibility to remote areas. 	<ul style="list-style-type: none"> Impacts for Alternative B, C, D, and E would be nearly the same based on level of disturbance, known locations of rich fossil areas, geological formation for paleontological features and protected ACECs. There would be between 55,400 and 74,000 short term acres disturbed during CBM development activities increasing the chances that a minor fossil discovery would be made. Cumulative impacts would disturb an additional 33,400 acres increasing the likelihood of additional fossil discoveries. Increased access would include increased vandalism and removal of fossils by amateur fossil hunters. 			
Recreation					
<i>Montana's natural features offer a variety of year-round recreational opportunities</i>					
	<ul style="list-style-type: none"> Minor loss of land for recreation purposes, and the disruption to recreation activities. Exploratory activities such as drilling and testing would temporarily displace game species locally. 	<ul style="list-style-type: none"> Moderate loss of land for recreation purposes and the disruption to recreational activities. Increased opportunities for access to remote areas. 	<ul style="list-style-type: none"> Impacts would be similar to Alternative B with the exception that increased erosion could lead to a reduced amount of land available for recreation activities and could disrupt habitat for game species. 	<ul style="list-style-type: none"> Impacts would be similar to Alternative B. 	<ul style="list-style-type: none"> Impacts would be similar to Alternative B with the exception that no requirements for transportation corridors would moderately increase access to remote areas.

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Socio-Economics					
<i>Socio-economics address the changes in demographics; social organization including housing attitudes, and lifestyles; economics such as employment, unemployment and per capita income; and, government revenue sources including taxes, state oil and gas lease income, federal mineral revenues and private landowner revenues.</i>					
	<ul style="list-style-type: none"> No social impacts (only small changes in employment, population, demand for services, etc.). Small impact on economic conditions as a result of new production wells. 	<ul style="list-style-type: none"> Social impacts would include new jobs and new population moving to the area. Economic impacts include generation of new personal and government income. Additional disposal costs associated with injection of produced water. Additional demands on public services. 	<ul style="list-style-type: none"> Social impacts same as Alternative B, with increase in impacts on lifestyles and values. Economic impacts same as Alternative B, with increase in impacts to water resource users. 	<ul style="list-style-type: none"> Social impacts same as Alternative B, with small increase in impacts on lifestyles and values. Economic impacts same as Alternative B, with small increase in impacts to water resource users. 	<ul style="list-style-type: none"> Social impacts same as Alternative B, with the exception that public burden to maintain roads may increase depending on landowner access decisions. Economic impacts same as Alternative B, except that oil and gas income may be less depending on water treatment costs.
Soils					
<i>Montana has a wide mix of geologic parent material, which produces a vast array of different soil types</i>					
	<ul style="list-style-type: none"> There would be minor occurrences of soil erosion, runoff, and sedimentation, mostly during construction activities. Approximately 1,500 acres would be disturbed short term during CBM exploration and construction activities. 500 acres would be disturbed longer term during production, with a majority of the land reclaimed after production is ceased. 	<ul style="list-style-type: none"> Soil disturbances could be reduced by 35 percent or higher on a per well basis over Alternative A. CBM activities would result in 55,400 short term acres being disturbed. 32,950 acres would be disturbed longer term during CBM production, with a majority of the land reclaimed after production is ceased. No impacts would occur made to soils from CBM waters. 	<ul style="list-style-type: none"> CBM development activities would disturb corridors. Approximately 70,000 short term acres of disturbed surface area during construction activities. Surface discharge and irrigation of produced water could result in approximately 47,600 acres disturbed in the long term. 	<ul style="list-style-type: none"> Impacts including levels of disturbance would be similar to Alternative B. One favorable side effect would be that more water would be available for irrigation. 	<ul style="list-style-type: none"> Impacts would be similar to Alternative B. There would be a slight increase in the level of disturbance due to increased use of impoundments to contain produced water. Short term acres disturbed would be approximately 74,000 while long term would be 44,000. Produced water would be available for beneficial use including irrigation. No impacts are expected to occur on irrigated lands or soils

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Resource Topic	Alternative A No Action (Existing CBM Management)	Alternative B CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C Emphasize CBM Development	Alternative D Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E Preferred CBM Development Alternative
Solid and Hazardous Wastes					
<i>Solid and hazardous wastes are under the jurisdiction of the MDEQ for RCRA wastes, MBOGC for RCRA exempt wastes, and the EPA for wastes generated on tribal lands</i>					
<ul style="list-style-type: none"> • Typical solid waste refuse can be disposed of in local landfills. • Drilling mud and cuttings can be disposed of onsite with the landowner's permission. • Minor impacts would also occur from the use of pesticides and herbicides during access and construction activities. • Cumulative impacts from other foreseen projects would result in increased waste generated at moderate levels for commercial disposal. 		<ul style="list-style-type: none"> • Impacts for Alternative B, C, D, and E would include increased quantities of waste requiring onsite disposal or transportation to commercial landfills. • Oil and gas developers are responsible for any damages to property, real or personal, resulting from the lack of ordinary care during operations. Operators are required to maintain SPCC plans and immediately remove and spilled or unused non-exempt wastes from the sites therefore no long term impacts to private, state or federal lands would occur from waste products associated with CBM development. 			
Vegetation					
<i>Emphasis area acreage by land classifications, overlying known coal reserves: Grasslands, 3.55 million; Shrublands, 1.8 million; Forests, 1.36 million; Riparian Areas, 378,000; Barren Lands, 372,000; and Other Areas, 700,000</i>					
<ul style="list-style-type: none"> • 1,144 acres of native habitat would be impacted under this Alternative, more than half (580 acres) in grasslands. • Potential minor loss of plant diversity with reclamation. • On non-federal land, Ute ladies'-tresses could be slightly impacted by disturbances. 	<ul style="list-style-type: none"> • 55,400 acres of native habitat could be impacted short term under this Alternative, more than half (21,450 acres) in grasslands. • Potential moderate loss of plant diversity with reclamation. • On non-federal land, Ute ladies'-tresses could be impacted by disturbances. 	<ul style="list-style-type: none"> • 70,000 acres of native habitat could be impacted short term under this Alternative, more than half (27,300 acres) in grasslands. • If SAR values exceed 10 in water, riparian vegetation would be impacted, affecting as many as 3,535 acres of riparian habitat. • Potential loss of plant diversity with reclamation. • On non-federal land, Ute ladies'-tresses could be impacted by disturbance, SAR values, and water level changes, particularly inundation. 	<ul style="list-style-type: none"> • Native habitat disturbances would be similar to those discussed under Alternative B. • Hydrology changes may affect as much as 2,776 acres of riparian habitat due to increased stream flow. • Potential loss of plant diversity with reclamation. • On non-federal land, Ute ladies'-tresses could be impacted by disturbance and water level changes, particularly inundation. 		<ul style="list-style-type: none"> • Impacts would be similar to those for Alternative D, however no riparian habitat would be affected. Short term impacts would be slightly increased (74,000 acres) due to the use of impoundments for water management practices.

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Visual Resource Management	<i>Visual resources include Montana features such as landform, water, vegetation, color, adjacent scenery, uniqueness, structures and man-made features of aesthetic value</i>				
	<ul style="list-style-type: none"> • Federal and State: <ul style="list-style-type: none"> – Dust emissions would reduce visibility to a small degree near active field operations. – Well pads, roads, and compressors would disrupt the visual landscape. Semi-permanent structures are designed to blend into the surrounding environment. – Drill rigs, two-track trails, heavy road-making equipment, and generators would disrupt the visual landscape short-term. 	<ul style="list-style-type: none"> • Federal: <ul style="list-style-type: none"> – There would be impacts to VRM BLM Class III and IV areas only. • Type of impacts common to Alternative A would occur with Alternative B, though at a scale commensurate with development. • View shed impacts from road network would last for 20 years and then reclaimed. 	<ul style="list-style-type: none"> • Impacts common to Alternative B would occur with Alternative C, in addition to the following: • Above ground powerlines would greatly impact skyline and viewshed. • Visual impacts from roads and utility lines is greatest with this alternative until reclamation. 	<ul style="list-style-type: none"> • Impacts common to Alternative B would occur with Alternative D, in addition to the following: • Production related roads that are not reclaimed and made part of the permanent road network would result in permanent visual impact. 	<ul style="list-style-type: none"> • Impacts would be reduced from Alternative C by the mitigation measures in the Project Plan of Development for visual resources. • Impacts would be mitigated as described under the Alternative B, <i>Mitigation</i> subsection.
Wilderness Study Areas	<i>There are 10 WSAs within the CBM emphasis area</i>				
	<ul style="list-style-type: none"> • BLM WSAs are closed to oil and gas leasing so there would be no direct impacts to WSAs. • Because there would be no production activities in BLM planning areas under this alternative, there would be no impacts. 	<ul style="list-style-type: none"> • There would be no direct impacts to WSAs from CBM development. 	<ul style="list-style-type: none"> • Same as Alternative B. 	<ul style="list-style-type: none"> • Same as Alternative B. 	<ul style="list-style-type: none"> • Same as Alternative B. • There would be no direct impacts to WSAs from CBM development. • Laws and regulations established for WSAs prohibit leasing of WSAs designated lands for resource extraction.

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COMPARISON SUMMARY OF IMPACTS

Resource Topic	Alternative A No Action (Existing CBM Management)	Alternative B CBM Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C Emphasize CBM Development	Alternative D Encourage CBM Exploration and Development While Maintaining Existing Land Uses	Alternative E Preferred CBM Development Alternative
Wildlife					
<i>Mammal Species:</i>		<i>Bird Species:</i>	<i>Reptiles and Amphibian species:</i>	<i>Species of Concern consist of 16 mammals, 6 reptiles and amphibians, and 22 birds, including:</i>	
- 10 bats		- 32 waterfowl	- 1 salamander	- Sage Grouse	- Mountain Plover - Bald Eagle
- 8 shrews		- 33 shore & wading birds	- 4 frogs	- Interior Least Tern	- Peregrine Falcon
- 34 small mammals and lagomorphs		- 18 diurnal &	- 4 toads	- Gray Wolf	- Black-tailed Prairie Dog
- 17 predators		- 11 nocturnal raptors	- 3 turtles	- Canada Lynx	- Black-footed Ferret
- 4 big game		- 8 gallinaceous	- 2 lizards	- Grizzly Bear	
		- 8 wood peckers	- 9 snakes		
		- 137 songbirds			
	<ul style="list-style-type: none"> • Direct and indirect impacts would occur at a level commensurate with the level of CBM development. • Direct impacts include habitat loss, death from vehicle collisions, and effects associated with greater human access into previously untraveled areas. • Indirect impacts on wildlife include disturbance and displacement, stress, power lines, noxious weed invasion, user-created roads, habitat fragmentation, water quality degradation from road runoff, and increased livestock grazing. • Indirect impacts on wildlife would occur on 33,840 to 84,000 acres. • Through mitigation, this Alternative would not directly impact any T&E listed wildlife species. Potential indirect impacts to T&E species, such as human disturbance, increased poaching or collisions with vehicles, would be low because of the limited number of CBM wells permitted. 	<ul style="list-style-type: none"> • Same as Alternative A but on a much larger scale. Twenty-five times as many wells, roads, and utility corridors as under Alternative A. • 6,680 miles of roads (2.9 to 8.8 miles per square mile). • 20,697 miles of utility corridors (9 to 27.1 miles per square mile). • Indirect impacts to wildlife on 884,000 to 4.7 million acres. • Additional types of impacts include loss of high value habitats such as prairie dog towns, sage grouse leks, and big game winter range. • Loss of intermittent wildlife habitat associated with streams because of groundwater withdrawal. Through mitigation, this Alternative would not directly impact any T&E listed wildlife species. 	<ul style="list-style-type: none"> • Direct and indirect impacts would occur at a level commensurate with the level of CBM development. Indirect impacts to wildlife on 884,000 to 4.7 million acres from: <ul style="list-style-type: none"> - 9,018 miles of roads (3.9 to 11.9 miles per square mile). - 27,917 miles of utility corridors (12.2 to 36.6 miles per square mile). - Discharge of untreated CBM water into drainages would impact riparian and wetland habitat and associated species because of poor water quality and erosion. - Increased livestock grazing within 2 miles of CBM discharges that occur in areas without summer water. • Through mitigation, this Alternative should not directly impact any T&E listed wildlife species. 	<ul style="list-style-type: none"> • Impacts would be similar to Alternative B. • Discharged treated CBM water would erode riparian and wetland habitat. • Increased livestock grazing within 2 miles of CBM discharges that occur in areas without summer water. • Through mitigation, this Alternative would not directly impact any T&E listed wildlife species. • Potential indirect impacts to T&E species, such as human disturbance, increased poaching or collisions with vehicles, would occur at a level less than Alternative C. • Potential indirect impacts to T&E species from hydrology changes caused by increased water levels may impact nesting Interior Least Terns. If hydrology changes from surface water runoff, cause riparian vegetation changes, other T&E species may be impacted as well, such as nesting Bald Eagles. 	<ul style="list-style-type: none"> • Direct and indirect impacts would occur similar to Alternative B. • Indirect impacts to wildlife would occur on 884,000 to 4.7 million acres depending on development spacing. • Loss of intermittent wildlife habitat associated with streams because of groundwater withdrawal. • Increased livestock grazing within 2 miles of CBM discharges that occur in areas without summer water. • Through implementation of WMPP & BO impacts to T&E listed species would be minimized. <ul style="list-style-type: none"> - Species of concern not federally protected may be impacted by habitat changes caused by vegetation removal or access roads that are not fully recovered with reclamation after well abandonment.

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Wildlife (cont'd.)	<ul style="list-style-type: none"> Species of concern that are not federally protected may be impacted by habitat changes caused by vegetation removal or access roads that are not fully recovered with reclamation after well abandonment. 	<ul style="list-style-type: none"> Potential indirect impacts to T&E species, such as human disturbance, increased poaching or collisions with vehicles, could occur. Impacts would be less than C or D with the restricting of utilities and roadways to the same corridor. All species of concern that are not federally protected may be impacted by habitat changes caused by vegetation removal or access roads that are not fully recovered with reclamation after well abandonment and by increased access through increased roads. 	<ul style="list-style-type: none"> Potential indirect impacts to T&E species, such as human disturbance, increased poaching or collisions with vehicles, are greater under this Alternative than any other because of the increased number of CBM wells permits.. Potential indirect impacts to T&E species from changes in riparian habitat due to increased SAR values and hydrology are likely to occur under this Alternative. Bald Eagles and Interior Least Terns may also be affected if SAR changes affect forage fish. Species of concern not federally protected may be impacted by habitat changes caused by vegetation removal or access roads that are not fully recovered with reclamation after well abandonment or by changing streambed hydrology and increased SAR and salinity values in water and soil. More water would be available for wildlife. 	<ul style="list-style-type: none"> Species of concern that are not federally protected may be impacted by habitat changes caused by vegetation removal or access roads that are not fully recovered with reclamation after well abandonment or by changing streambed hydrology. 	<ul style="list-style-type: none"> These impacts would be less than alternative B, C and D through the implementation of the Wildlife Monitoring and Protection Plan. More water would be available for wildlife as a result of CBM production.

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<p>Wildlife (Aquatic Resources) <i>Fish species vary between watersheds within the CBM emphasis area from 8 in the Little Big Horn River to 32 in the Musselshell River</i></p>	<p><i>Special Status Aquatic Species:</i> - Montana Arctic grayling - Pallid sturgeon - Warm spring zaitzevian riffle beetle</p>				
	<ul style="list-style-type: none"> • Minor short-term impacts on aquatic resources during CBM exploration and production may result from increased sediment delivery and its effects on aquatic habitat and organisms, possible impedance of fish movements, potential for accidental spills of petroleum products, and possibly increased fish harvest. • Relatively minor long-term increases in river flow and TDS concentration from production water discharge would not be expected to impact aquatic resources. • Conditions of MPDES Permits would provide legally enforceable assurances that water quality, aquatic resources, and the beneficial uses of receiving waters would not be degraded by production water discharges. • Impacts from CBM abandonment would be minor and subside over time. 	<ul style="list-style-type: none"> • The same types of impacts described for Alternative A (No Action) would occur under Alternative B. • The scale of potential impacts associated with sediment delivery, fish movements, petroleum spills, and fish harvest would be much greater under Alternative B because of the development of over 18,000 CBM wells across a much larger geographic area. • No CBM production water would be discharged to surface drainages under Alternative B and there would be no potential for impacting aquatic resources from this particular activity. • Based on fish species present, fisheries management policies, fisheries resource values, and the projected intensity of CBM development, the drainages most sensitive to the effects of CBM development would be the Lower Bighorn, Upper Tongue, and Little Bighorn; then the Lower Tongue, Little Powder, and Rosebud; followed by the Mizpah. • The potential for affecting aquatic resources in sensitive drainages would be less under Alternative B than under Alternatives C or D. 	<ul style="list-style-type: none"> • The same types of impacts described for Alternative A would occur under Alternative C, but they would occur on a far greater scale because of the development of over 18,000 CBM wells. • A total of 0.67 billion cubic feet of untreated CBM production water would be discharged to drainages each year. Resultant flow and TDS increases could potentially impact aquatic organisms, especially in smaller drainages during dry times of the year. • Conditions of MPDES Permits would provide legally enforceable assurances preventing the degradation of water quality, aquatic resources, and the beneficial uses of receiving waters. • The potential for affecting aquatic resources in the sensitive drainages would be greater under Alternative C than under Alternatives B or D. 	<ul style="list-style-type: none"> • The same types of impacts described for Alternative A would occur under Alternative D, but they would occur on a far greater scale because of the development of over 18,000 CBM wells. • The annual discharge of 2.24 billion cubic feet of treated CBM production water through pipelines or constructed water courses and resultant flow increases could impact aquatic resources in smaller drainages during dry times of the year. • The treatment of CBM production water prior to its discharge would greatly reduce the potential for elevated TDS and salinity impacts on aquatic resources. • MPDES Permits would provide legal assurances that water quality, aquatic resources, and beneficial uses of receiving waters would be protected. • The potential for affecting aquatic resources in the sensitive drainages would be greater under Alternative D than under Alternative B but less than under Alternative C. 	<ul style="list-style-type: none"> • Same as Alternative B. • Implementation of wildlife monitoring and Protection Plan would reduce impacts to aquatic habitat wildlife and invertebrates.