

CHAPTER 2

ALTERNATIVES

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CHAPTER 2: ALTERNATIVES

Introduction

The Council on Environmental Quality regulations require 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 natural gas [CBNG] Management) and seven action alternatives for managing oil and gas resources—specifically CBNG exploration and production—throughout the Planning Area, which includes 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 and Climate

Alternatives were developed by considering potential changes in ambient air quality from CBNG activities, such as reduced visibility, air quality emissions, dust emissions and harmful gases. 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. Potential air impacts, both project related and cumulative, were modeled for Alternatives A, B, C, D and E under the 2003 Final EIS. A new air quality model was conducted for this Final SEIS (FSEIS) to evaluate potential project and cumulative air impacts for Alternatives E, F and H. Potential air impacts for Alternative G were not modeled, as the only difference between Alternatives F and G is that Alternative G has 65 percent fewer wells.

Following the Draft Supplemental Environmental Impact Statement (DSEIS, BLM 2006), a Supplemental Air Quality Analysis (SAQA, BLM 2007) was prepared to augment the analysis conducted for the DSEIS. The SAQA provided additional information and analyses regarding the level of CBNG development with the potential to impact air quality within the Powder River and Billings RMP areas. It includes an analysis and comparison of the potential for CBNG development to impact air quality under different air quality emission rates under Alternative

What has Changed in Chapter 2 Since the DSEIS?

Chapter 2 lists the alternatives development process and describes the features of each alternative in detail. Updates include a general description of the Supplemental Air Quality Analysis, revisions to the preferred alternative and tables 2-2 and 2-3, as well as edits and clarifications. The preferred alternative has been revised based on public comment and agency collaboration. The preferred alternative includes revised air and wildlife screens. Tables 2-2 and 2-3 were revised based on the changes to the preferred alternative. Table 2-2 is a management comparison of alternatives for exploration and development of CBNG; table 2-3, compares impacts of alternatives.

H, the preferred alternative. It also included a revised air quality screen that replaces the air quality impact screen from the DSEIS. The information contained within the Supplemental Air Quality Analysis expands on the air quality information presented in the DSEIS and the Air Quality Technical Support Document (BLM 2007). An Analysis of climate change has been added to the to the Air Quality and Climate sections of the FSEIS. Best management practices (BMPs) for controlling methane emissions (greenhouse gases) are identified as part of the BMPs available under the preferred alternative.

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 CBNG water discharge affecting new coal mines, the effects on oil and gas development, loss of coal production resources from CBNG 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 CBNG exploration and production activities were considered in developing the alternatives. Alternatives A through E vary by restrictions such as directional-drilling requirements; the number of coal seams produced per well bore and chronological coal seam development. Whether a Plan of Development (POD) 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 by nonfederal wells; methane quantities; varying the amount of development based on the reasonably foreseeable development (RFD) range (low-high); the effects to groundwater from over-pumping water and the use of adaptive management. Alternatives F, G and H vary restrictions such as the number of federal producing CBNG wells based on ranges from the RFD, restricting the number of federal CBNG applications for permit to drill (APDs) that could be approved per year; varying the amount of development on a watershed-specific basis; use of adaptive management

Hydrology

Hydrology issues used in developing alternatives include inspection, treatment, storage and conveyance of CBNG-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. In addition, alternatives F, G and H incorporate water screens that include potential limits on the volume of untreated water that can be discharged. 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 right-of-way (ROW) corridors, powerline placement and use of or abandonment of roads from CBNG 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 and the Northern Cheyenne Tribe are located within the Planning Area for CBNG 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 CBNG 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 or consultation 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 has developed corresponding requirements that are included in Alternatives E, F, G and H.

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 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 early and 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, emphasis on CBNG development and phasing of CBNG 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 CBNG, 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. 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. The existing lease stipulations approved in the 1994 ROD continue to be applicable to all CBNG development and have been included in Table MIN-5 of the Minerals Appendix. CBNG is part of the oil and gas estate. Existing oil and gas leases include the right to explore and develop CBNG. Issuing separate leases for conventional oil and gas and separate leases for CBNG would require a regulatory change.

The purpose of this document is to analyze federal CBNG phased development in accordance with the U.S. District Court's directive for supplementing the BLM 2003 Final Montana Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings RMPs (Statewide Document). The alternatives analyze different levels of producing

CBNG wells between the low range in Alternative A to the high range in alternatives E, F and H. The alternatives also analyze different mitigation measures or restrictions that BLM can impose as requirements with approved permits. In addition, Alternatives F, G and H analyze phased mechanisms that BLM can use to affect the pace and place of CBNG development on federal leases, as well as the density and intensity of cumulative CBNG development. Mitigation measures and a process to evaluate projects to determine if restrictions are necessary to alter the pace or place of federal development are included in alternatives F, G and H (the Preferred Alternative). The evaluation would be conducted during the permit review process and during the production phase.

Bonding

Establishment of bond amounts specifically for CBNG development activities that cover the full cost of CBNG 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 CBNG. If this technology becomes viable for CBNG extraction in the future, further consideration would be given to it.

Alternate Sources of Energy

The purpose of this FSEIS is to consider federal CBNG phased development. Considering alternate sources of energy such as wind power and fuel cells is therefore beyond the scope of this FSEIS.

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

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in CBNG fields would be counterproductive if the produced water was re-injected or could migrate into the CBNG 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 CBNG 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 CBNG 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 CBNG field will directly result in the decrease of methane production. Re-injection of CBNG-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 CBNG 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 CBNG 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.

Recently there have been discussions suggesting the mandatory injection of all CBNG-produced water. In fact, a petition was forwarded to the Montana Board of Environmental Review (BER) for consideration of this topic. In preparation of this board debate, a report entitled the "Potential Effects to Ground Water Systems Resulting from Subsurface Injection of CBM Production Water" was drafted by the Montana Bureau of Mines and Geology (MBMG) (Wheaton and Reddish 2005). The report states that, overall, the approach of injecting water into Fort Union Formation aquifers of the Powder River Basin has not been widely tested. Areas where favorable conditions exist appear to be limited to approximately 9 percent of the total area. Mandating injection does not mean it is technically feasible, regardless of economics. In some areas that have suitable aquifers, injection may be technically and economically feasible, as well as a means of conserving the water resource. Injection cannot, however, be regarded as appropriate in all settings. Further, mandated injection may force the use of the deeper Madison Group geologic formation that has water of lower quality than the CBNG produced water. If CBNG produced water was injected into the Madison formation, the quality of the water might make it unsuitable for beneficial uses without treatment.

Phased Development (other than Alternatives F, G and H)

Comments received during the public scoping period varied substantially in their interpretation of what constitutes "phased development." While BLM has analyzed phased development under alternatives F, G and H, several proposed elements of phasing were not analyzed in detail. Those proposed elements and BLM's rationale for not analyzing them in detail are addressed below.

Fully develop one area while resting others. Subsequent development occurs as earlier areas are completed and restored.

While BLM could authorize development for one watershed or specific area at a time, the purpose would be defeated by state and private development occurring in all areas or specific areas, which is not controlled by BLM actions. In the FSEIS, Table Min-1 in the Minerals Appendix indicates that more than one half of the wells projected in the RFD would be State approved (9700 State approved to 8400 Federal

approved). The BLM does not control the approval or drilling of the state and private wells. This is illustrated by the number of state and private wells that have been drilled while the BLM was preparing the Statewide Plan (BLM 2003) and the SEIS (as of January 2008, approximately 950 CBNG wells have been developed under State authorization in Big Horn County, the most active CBNG county in the planning area). In addition, BLM has contacted the Montana Board of Oil and Gas Conservation in regard to CBNG management. They state:

"The Board of Oil and Gas has no underlying statutory authority to direct the development of oil and gas resources; those resources are managed by their owners. The Board does have a statutory mandate to prevent the drilling of unnecessary wells, prevent economic and physical waste, and protect the correlative rights of competing mineral owners by establishing well location and set-back rules, and reservoir spacing rules. We do not envision the implementation of a management technique that would be less protective of competing property rights and more likely to result in waste of natural gas, and the drilling of unnecessary wells."

Based on the projection of the number and location of wells, the mixed mineral ownership, and the statutory authority of the Montana Board of Oil and Gas Conservation it is reasonable to assume that development of state and private wells would not conform to specific areas identified for the development of federal wells. Therefore, it is not reasonable to fully develop one area while resting others followed by subsequent development in other specific areas when initial development areas are completed, because limiting state and private development to specific areas is not achievable.

Areas where CBNG development cannot avoid creating significant environmental impacts should be identified and closed to leasing. Those areas that require lease stipulations in order to reduce environmental impacts to an acceptable level should also be identified.

The rationale for not analyzing oil and gas leasing is provided in this section (see "Leasing" above). The Preferred Alternative (H) uses adaptive management to help prevent significant effects. The Monitoring Plan in the Monitoring Appendix identifies resources to be monitored and BLM's management options should a threshold be met.

Consider a phased development alternative that allows for the development of only certain coal seams at a time. When the initial zones have been depleted, produced water from other coal seams, developed in subsequent development phases could be re-injected into these depleted coal seams by converting the original wells into reinjection wells.

The rationale for not analyzing reinjecting produced water into the same aquifer is addressed in this section (see "Re-Injection of Produced Water into the Same Aquifer" above).

Stop issuing drilling permits during construction phases of other projects to reduce the effects of impacts associated with the other projects.

Much of the development occurring in Montana occurs in a phased manner. Practical constraints, especially infrastructure to get the product out and state and federal permitting requirements all dictate industry's proposed development occur in phases.

Management Common to All Alternatives

Management common to all alternatives are the management practices for conventional oil and gas, as well as CBNG lease operations that are the same in each 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 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

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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 Record of Decision: Statewide Coal Bed Methane Exploration and Development (March 26, 2003; <http://www.bogc.dnrc.state.mt.us/PDF/finalrod.pdf>). 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.

Surface Use Agreements

Oil and gas operators on federal leases must submit certification that a surface use agreement (SUA) has been reached with surface owners of split estate lands. These are lands involving private surface overlying federal minerals.

BLM does not consider an APD or sundry notice complete until the federal lessee or operator has certified that an agreement with the surface owner exists, or the lessee or operator complies with Onshore Oil and Gas Order 1 (Instruction memorandum No. 2003-131). Compliance with Onshore Oil and Gas Order 1 requires the federal mineral lessee or operator to enter into good-faith negotiations with the private surface owner to reach an agreement for protection of surface resources and reclamation of disturbed areas, or payment in lieu thereof, to compensate the surface owner for loss of crops or grazing and damages to tangible improvements, if any. If such an agreement between the surface owner and lessee or operator could not be reached, a bond would be required to protect against covered damages in the absence of an agreement.

The Stockraising Homestead Act of December 29, 1916 (SRHA) (43 U.S.C. 299) and regulations at 43 CFR 3814.1(c) clearly limit covered damages to grazing and associated tangible improvements. The effective Onshore Oil and Gas Order 1 states that compensation is based on the law that reserved the mineral estate. It also states the amount of such a bond must be a minimum of \$1,000 and be sufficient to: 1) pay for loss or damages; or 2) comply with the provisions of the law that reserved the mineral estate.

Water Well Mitigation Agreements

CBNG development has the potential to impact groundwater by decreasing the pressure within the coal aquifers (drawdown). As such, it is the subject of Montana Code Annotated 82-11-175, which was enacted by the Montana Legislature in 2003 and MBOGC Order 99-99. This order describes the authorities that pertain to CBNG development. A copy of the order is included as an appendix to the Water Resources Technical Report (ALL 2001b). The order outlines water rights issues, mitigation, monitoring plans and jurisdiction.

Montana Code Annotated (MCA) 82-11-175 requires CBNG operators offer a reasonable mitigation agreement to each appropriator of water who holds an appropriation right or a permit to appropriate groundwater. This requirement is in effect if the point of diversion is within 1 mile of the CBNG well, or 0.5 mile of a water source that is adversely affected by the coal bed natural gas well.

Mitigation agreements must address the reduction or loss of water resources and must provide for prompt supplementation or replacement of water from any natural spring or water well adversely affected by the coal bed natural gas well. An example water mitigation agreement is included in the Hydrology Appendix.

For development on federal minerals, BLM would require operators to certify that water well mitigation agreements for the proposed federal wells have been offered in accordance with MCA 82-11-175. These water mitigation agreements would also have to contain language addressing how an operator would respond to water wells being rendered unusable or unsafe due to methane migration and how health- and safety-related impacts would be monitored and mitigated.

3104 Bonds

Current regulations set minimum amounts (financial) of bonding required. BLM may require an increase to any bond (43 CFR 3104.5B), whenever it was determined the operator posed a risk due to factors including, but not limited to, the number and type of

wells, type and amount of reclamation necessary and operator history. The increase in bond amount can be to any level BLM specifies, but it cannot exceed the total estimated costs of the total estimated amount of uncollected royalties due, monies owed because of outstanding violations and estimated well plugging and reclamation costs.

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; due 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-administered lands; 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 FSEIS, but can be found in tabular form in the Minerals Appendix, Table MIN-5.

Management Actions Specific to Each Alternative

Eight alternatives have been developed to evaluate the impacts related to the various development scenarios associated with CBNG 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 CBNG development while emphasizing resource protection. Alternative C would emphasize CBNG development with minimal environmental restrictions. Alternative D would encourage CBNG exploration and development while maintaining existing land uses. Alternative E would allow for CBNG exploration and development while sustaining resource and social values and existing land uses. Alternatives F, G and H would allow exploration and phased development of federal CBNG by applying multiple screens and mitigation measures designed to protect the other resource values through the pace and place of CBNG development. Alternative H would allow for exploration and development coupled with a monitoring feedback loop that would provide information for adaptive management decisions.

In Alternatives A through E, crucial habitat for wildlife would be managed in accordance with the current BLM policies and with the use of mitigation measures outlined in the FSEIS and Wildlife Monitoring and Protection Plan (WMPP). In Alternatives F and G, conditions would be placed on any proposed CBNG federal mineral development within crucial sage-grouse habitat areas with the goal of avoiding the displacement of sage-grouse from crucial habitat areas. For Alternative H, results of recent research related to sage-grouse would be applied. In addition adaptive management would be applied to sage-grouse habitat, allowing BLM to alter surface disturbance thresholds, adopt new BMPs and work with the state to apply BMPs universally to protect sage-grouse habitat.

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

TABLE 2-1
MITIGATION MEASURES COMMON TO ALL ALTERNATIVES
(Applies to BLM Managed Oil and Gas Estate)

Resource Topic	Mitigation Measure
Air Quality	<p>Access roads, well pads and production facility sites constructed on soils susceptible to wind erosion will be appropriately surfaced to reduce fugitive dust emissions</p> <p>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</p>
Cultural Resources	<p>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</p> <p>Surface occupancy and use is prohibited within sites or areas designated for conservation use, public use, or sociocultural use</p>
Geology and Minerals	<p>No Surface Occupancy stipulations are placed on new oil and gas leases which are issued for lands that have existing coal leases</p> <p>Reclamation is required on areas of surface disturbance during the production and abandonment phases of development</p>
Hydrological Resources	<p>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</p> <p>Montana's water quality standards for the Tongue and Powder Rivers are being challenged by court actions that are not yet resolved. The states of Montana and Wyoming are in negotiation on appropriate state-line standards and the methods used to manage CBNG discharges in Wyoming to meet the standards that are eventually adopted.</p> <p>Oil and gas leases issued for lands that contain floodplains, wetlands, or riparian areas have stipulations regarding No Surface Occupancy (NSO) attached.</p>
Lands and Realty	<p>Surface disturbance on federal lands will be reclaimed following the BLM-Miles City Field Office (MCFO) seeding policy (BLM 1999c) or future revisions</p> <p>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</p> <p>Property damage would be repaired or replaced according to landowner agreements at the operator expense</p> <p>Surface owners or surface lessee will be consulted regarding the location of new roads and facilities related to oil and gas lease operations</p>
Livestock Grazing	<p>Repair or replace damaged gates and fences according to landowner requirements at operator's expense</p> <p>When working on or near grazing lands, project-related construction equipment and vehicle movement will be minimized to avoid disturbance of grazing lands</p> <p>Responsibilities for fence, gate and cattleguard maintenance; and noxious weed control will be defined in APDs, Agency Approvals, or ROW grants</p> <p>Facilities will be placed to avoid or minimize impacts on livestock water</p>

TABLE 2-1
MITIGATION MEASURES COMMON TO ALL ALTERNATIVES
(Applies to BLM Managed Oil and Gas Estate)

Resource Topic	Mitigation Measure
Paleontological Resources	<p>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</p> <p>Surface occupancy and use is prohibited within designated paleontological sites</p> <p>The Bridger Fossil Area is a designated Area of Critical Environmental Concern (ACEC) is not available for oil and gas development</p>
Recreation	<p>Surface occupancy and use is prohibited within established recreation areas and undeveloped recreation areas receiving concentrated use on lands administered by BLM</p> <p>Exploration activities would be coordinated for timing to minimize conflicts during peak use periods</p>
Social and Economic Values	<p>Economic impacts on groundwater users would be mitigated by the mandatory offering of water well and spring mitigation agreements</p>
Soils	<p>Construction activities will be conducted in accordance with the BLM Gold Book (USDI and USDA 2006; http://www.blm.gov/bmp/goldbook.htm) requirements</p> <p>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</p> <p>Riparian zones will be protected by federal lease stipulations and permit mitigation measures</p> <p>Lease roads and constructed facilities will be limited based on the Surface Use Program in the APD</p> <p>In areas of construction, topsoil will be stockpiled separately from other material and be reused in reclamation of the disturbed areas</p> <p>Unused portions of the drill location will have topsoil spread over it and reseeded</p> <p>Construction activities will be restricted during wet or muddy conditions</p> <p>Construction activities will be designed following Best Management Practices (BMPs) to control erosion and sedimentation</p> <p>If porous subsurface materials are encountered during drilling, all onsite fluid pits will be lined</p> <p>During road and utility ROW construction, surface soils will be stockpiled adjacent to the sides of the cuts and fills</p> <p>Stream crossings will be designed to minimize impacts and impede stream flow</p> <p>Erosion control measures will be maintained and continued until adequate vegetation (defined by BLM on a case by case basis) cover is re-established</p> <p>Water bars will be constructed on slopes of 3:1 or steeper</p>
Solid and Hazardous Wastes	<p>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.</p>
Vegetation	<p>Site-specific surveys for Special Status Plant Species would be conducted prior to surface disturbance commencement</p>

TABLE 2-1
MITIGATION MEASURES COMMON TO ALL ALTERNATIVES
(Applies to BLM Managed Oil and Gas Estate)

Resource Topic	Mitigation Measure
Vegetation (cont.)	The BLM Seeding Policy (Miles City BLM Seeding Policy, dated October 27, 1999(c)) and any future revisions will be followed for all reclamation and reseeding activities Vegetation will be removed only when necessary
Visual Resource Management	Surface occupancy and use is prohibited within designated Visual Resource management Class I areas 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
Wilderness Study Areas	Laws and regulations established to protect Wilderness Study Areas (WSA) prohibit leasing of designated WSA lands for resource extraction
Wildlife	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. Measures could also include Conditions of Approval, as authorized by IM-2005-069 for on-site and off-site mitigation for APDs and ROWs. After implementation of the BMPs, impacts to the wildlife resources will be evaluated through the use of the wildlife screen. Other restrictions governing development timing, controlled surface use and avoidance measures are listed in Table MIN-5 of the Minerals Appendix
Aquatic Resources	Surface occupancy and use is prohibited within 1/4 mile of designated reservoirs with fisheries

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 CBNG wells in the Planning Area.

The BLM issues oil and gas leases that include the right to explore for and develop CBNG. The Final Oil and Gas RMP/EIS Amendment allowed for the drilling of test wells and initial small-scale development of CBNG. Under existing management, APDs for CBNG wells would be approved on a case-by-case basis, only in specific geographic areas where little or no CBNG data is available. The APDs would only authorize the drilling and testing of wells and associated construction activities. CBNG 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 CBNG 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 natural gas 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

- Sufficient and accurate data exists for coal, gas and groundwater
- Other coal bed natural gas wells are being drilled
- Other coal bed natural gas 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 CBNG 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.

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

This alternative would allow CBNG 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 CBNG 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 CBNG 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 Underground Injection Control (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 the Environmental Protection Agency (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 CBNG wells, injection has not yet been shown to be commercially viable for the CBNG industry in the Powder River Basin (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. CBNG production could occur simultaneously from multiple seams or staggered over time from

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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 pipelines and gas pipelines 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 CBNG-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 plan.

To reduce noxious weeds from spreading during CBNG-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, both native and non-native early succession plants, along with sterile cover crops, would be used for revegetation to provide a quick cover before noxious weeds can take root.

Wildlife surveys required by BLM would be conducted prior to the approval of APDs. Qualified wildlife biologists would conduct the surveys and results would be reported to Montana Fish, Wildlife, and Parks

(MFWP) for consultation regarding avoidance and/or other wildlife protective measures.

Alternative C—Emphasize CBNG Development

This alternative would emphasize CBNG 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 CBNG 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 CBNG 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, Montana Pollutant Discharge Elimination System (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 CBNG water would not be required.

A CBNG 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 CBNG 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 pipelines would be buried. Upon abandonment, new oil and gas roads on BLM-administered 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 CBNG-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 CBNG-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 would be conducted prior to the approval of APDs. Qualified wildlife biologists and botanists would conduct the surveys and results would be reported to MFWP (animals) and the Montana Natural Heritage Program (MNHP) (plants) for consultation regarding avoidance and/or other wildlife and plant 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—CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses

Alternative E would provide management options to facilitate CBNG exploration and development, while sustaining resource and social values and existing land uses.

Exploration and development of CBNG resources on BLM-administered minerals are allowed subject to agency decisions, lease stipulations, permit requirements and surface owner agreements. Operators would be required to submit a project POD outlining the proposed development of an area when requesting CBNG well densities greater than 1 well per 640 acres. The project POD 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 POD developed by BLM is available online at <http://www.mt.blm.gov/mcfo/cbm/GuidanceMan/index.html> (CBNG APD and Project POD Guidance Manual, May 28, 2003f). The project POD 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 POD would have to contain the following:

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- A cover letter naming the project area and requesting approval
- An APD (form 3160-3) for each federal well in the project area
- 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 (electronic map with any digital geographic information system (GIS) coverages used to create the map), showing proposed roads, compressor stations, pipelines, powerlines, CBNG 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-administered lands)
- Master surface use information as required by Onshore Order No. 1 (for BLM-administered lands)
- A Reclamation Plan for surface disturbance
- A wildlife monitoring plan demonstrating how the project will meet the needs of the BLM WMPP for BLM-administered lands (See Wildlife Appendix for a complete copy of the WMPP)
- A Water Management Plan for the project area
- Certification of surface use agreements or surface owner protection bond, certification of water well mitigation agreements (or notice that the Surface Owner Damage and Disruption Compensation Act applies and surface owner agreements are pending settlement or court action). (See Management common section for detailed explanation of agreements)
- 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-administered lands). This may include a cultural resource location and significance model for identifying areas of critical concern.
- BLM would also require compliance with Onshore Oil and Gas Order Number 7 for Disposal of Produced Waters.

Alternative E 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 CBNG is for beneficial use. Other produced water management 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 POD. The Water Management Plan for Exploration would be required for CBNG 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 certification that a water well or spring mitigation agreement with the owner has been ratified for any water well/spring within 1 mile; identify any proposed uses of the water (beneficial if possible); and a map showing all wells within 1 mile of the proposed exploratory CBNG well.

Water Management Plans developed as part of a project POD could include the following additional requirements:

- A cover letter identifying the project POD 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 location that is proposed

Produced water management plans and permits would be approved by BLM or 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 CBNG would be from one coal seam per well or multiple coal seams per well. During production of CBNG 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, pipeline 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 POD

how the surface owner was consulted for input into the location of roads, pipelines and utility line routes.

Powerlines are also a project POD consideration. The operator would demonstrate in the project POD how the proposal for power distribution would mitigate or minimize impacts on affected wildlife. For example, on BLM-administered 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-administered surface roads open if access is desirable.

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

The BLM would require federal lease operators to protect Crow and Northern Cheyenne groundwater and CBNG 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 POD 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.

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- 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-administered lands impacts to wildlife will be monitored and addressed in the 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 land adjacent to the reservations, would be monitored and addressed in accordance with the WMPP (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 and reservation wildlife from the impacts of CBNG development.

The following special survey activities would be conducted for the Gray Wolf, Canada Lynx and Grizzly Bear on BLM-administered 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 U.S. Fish & Wildlife Service (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-administered 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 Wildlife Monitoring and Protection Plan (Wildlife Appendix) of the Powder River and Billings Resource Management Plans.
- 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 CBNG site is found to be within a nesting or winter foraging area, CBNG 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 CBNG project area every 5 years by BLM and MFWP.
- Nest productivity **monitoring** would be conducted by the BLM or a BLM approved biologist in areas with **one or more** 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 CBNG area using a predictive habitat model. During the next 5 years, information will be refined by field validation using the most current FWS mountain plover survey guidelines (FWS

2002c, **Wildlife Appendix, Biological Assessment**) 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 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 CBNG development to be used as reference sites. Comparisons will be made of the trends in mountain plover nesting occupancy between these reference areas and areas experiencing CBNG development.

- 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 FWS Mountain Plover Survey Guidelines (FWS 2002c or more recent version, **Wildlife Appendix, Biological Assessment**), regardless of the timing of the disturbance. If occupied mountain plover nesting habitat is located, the BLM shall reinstate 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 CBNG development to uncover Tribal culturally significant sites, the BLM would provide the tribes a copy of their annual cultural resources report, which would summarize CBNG-related cultural resource activities.

Alternative F—Phased Development Multiple Screens (High Range)

Under this alternative, development of CBNG on federal leases in the Billings and Powder River RMP areas would be done in a phased manner through restrictions imposed by BLM. BLM would limit the number of federal APDs approved each year cumulatively (both state and federal APDs combined) and in each fourth order watershed. BLM would also limit the percentage of disturbance on BLM-administered surface or on private surface overlying

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federal minerals within each identified crucial habitat area. Finally, BLM would place a limit on the volume of untreated water discharged to surface waters from federal CBNG wells within each fourth order watershed. The fourth order watershed level was adopted for this alternative because it provides a geographic perspective consistent with the analysis completed for the Statewide Document and is appropriate for the FSEIS analysis.

The cumulative limit placed on federal APDs would be based on 5 percent (910 wells) of the total number of state, private and federal wells (18,225 wells) predicted to be drilled in the Planning Area. Alternative F uses the high range as identified in the RFD scenario from the Statewide Document. This means if the total (private, state and federal) number of APDs issued at any time during a calendar year exceeded 910, then BLM would not issue any additional APDs that year (if the 910 limit were reached, APDs could still be submitted for review and BLM would process them up to the point before approval). The 5 percent limit was chosen to level the pace of development over a 20-year period and to apply a numerical limit to federal APD approvals.

BLM would also limit its approval of APDs each year within each fourth order watershed. This limit would be based on the total number of wells (state, private and federal) predicted for each watershed times the predicted rate of development as identified in the 2003 document (see Minerals Appendix, Figure Min-4). Therefore, cumulative APDs per year, per watershed would not exceed that percentage. If this percentage were to reduce the number of wells to below 50 wells per watershed, the limit would be suspended and 50 wells per watershed would be considered the upper limit for the watershed that year to allow the opportunity to develop an economically viable project.

BLM would also limit the amount of disturbed crucial habitat on BLM-administered surface or private surface overlying federal minerals. BLM would allow no more than 20 percent of any crucial habitat (e.g., crucial brood rearing/breeding/ wintering habitat) area to be directly impacted over a 20-year period. This would include removal of sagebrush resulting from the proposed project activities and other unrelated (non-CBNG) projects resulting in habitat removal (cumulative 20 percent). In addition, a corridor extending 200 meters on either side of travel routes with 12 or more vehicle uses per day would also be considered habitat directly impacted.

In crucial sage-grouse habitat (Map 3-18), development would be allowed under the following conditions:

Sage-grouse would not be displaced from crucial habitat. Displacement of sage-grouse may occur on a small scale around an individual well site. Populations in the crucial habitat would be compared to sage-grouse populations in predetermined areas outside of the CBNG development (baseline areas). Population trends within the CBNG development areas should be comparable to the baseline areas.

The baseline areas would be identified, inventoried and monitored. These areas would provide a baseline or background dataset for comparison to the sage-grouse habitat within the CBNG development area. Criteria for selection of the baseline areas, inventory methods and comparison methods are discussed in the Wildlife Appendix. The baseline areas would encompass areas of similar habitat types and contain active strutting grounds (leks). To account for variations in environmental stressors such as extreme winters, fire and West Nile virus (WNV), a minimum of three discrete and geographically separate areas would be used to establish the sage-grouse population baseline.

BLM recognizes that maintaining current populations within crucial sage-grouse habitat depends on many factors, including fire, agricultural practices and other land uses. These factors would be considered when evaluating monitoring data and determining whether or not the objectives of this alternative are met. The Wildlife Appendix provides a discussion of monitoring data that would be collected, how those data would be evaluated and the method for comparing populations within the CBNG development areas with the baseline areas.

The crucial habitat areas shown on Map 3-18 are likely to change as more information becomes available and other crucial lifecycle habitat (e.g., nesting or brood-rearing) is identified. These habitat areas are also likely to change due to wildfire and changes in land use, such as agriculture.

BLM and CBNG operators would evaluate alternative development schemes to maximize recovery of the gas resource while meeting the above condition. Alternative development schemes could involve dewatering centers with widely spaced gas recovery wells, siting compressors outside the habitat areas and horizontal drilling. In addition, mitigation measures could be used to reduce direct impacts on sage-grouse.

If the above conditions were met and development approved, retention of a sustainable sage-grouse population would be verified by applying the monitoring and data evaluation standards in the Wildlife Monitoring Appendix. If monitoring indicated sustainable sage-grouse populations were not being maintained, then development plans would be modified

or curtailed such that sustainable sage-grouse populations were maintained.

The combined numerical limits for cumulative and watershed development, coupled with the disturbed habitat limit, would necessitate a varied geographical development pattern across the Planning Area. It is anticipated only a few watersheds would be developed in the initial 3- to 5-year period (Upper Tongue, Lower Tongue, Middle Powder, Little Powder), while the remaining watersheds would most likely be developed in later years.

In addition to MPDES requirements, BLM would also establish a threshold for the volume of untreated water that could be discharged to surface waters from federal CBNG wells. This volume initially would be based on 10 percent of the 7Q10 flow, calculated cumulatively based on MPDES permits. This is a conservative limit based on the volume of water that could be discharged under an MPDES permit without exceeding non-degradation criteria.

The above criteria could be modified over time, as needed, based on monitoring data. If monitoring showed unacceptable impacts to surface water were occurring (i.e., approaching trigger values based on the applicable surface water standards), the amount allowed may be decreased; if monitoring showed noticeable impacts to surface water quality were not occurring, the amount allowed may be increased. This limit would apply to intermittent and ephemeral tributaries, as well as to main streams. Since intermittent and ephemeral streams have a 7Q10 of zero, no untreated discharge would be allowed from federal CBNG wells in these drainages. If state and private wells used the entire threshold amount, no discharge of untreated water produced by federal wells would be allowed into that drainage. All other federally produced water would have to be managed by other means (beneficial use; injection; treatment; placement in evaporation, infiltration, or storage pits or reservoirs; or other uses).

Treated discharges are defined as those waters that have been treated to the applicable, in-stream surface water standards at the end of a pipe. Mixing of treated and untreated waters would be allowed and would not be counted towards the cumulative limit, so long as the end of pipe water quality met applicable in-stream standards.

Within 5 miles of the Northern Cheyenne and Crow reservations, site-specific groundwater and air analyses would have to be included with the operator's POD submissions. This buffer is based upon concerns of the Northern Cheyenne Tribe and projected groundwater

drawdowns forecast by modeling in connection with the Statewide 2003 EIS.

The operator's analyses would have to demonstrate whether Indian Trust Assets and air quality would be impacted from development of federal CBNG wells and must provide protection for these assets and resources. If the analyses do not show protection of Indian Trust Assets and air quality, BLM would not approve the APDs. Monitoring wells and air monitoring stations may have to be installed between the development area and the reservations to monitor impacts and demonstrate protection.

If monitoring indicates Indian Trust Assets and air quality are not being protected, mitigation measures for federal CBNG wells, including possible modifications to production, would be administered in consultation with the affected tribes. If CBNG development occurred on a reservation, this requirement may be modified in consultation with the tribes and other affected parties. The BLM restrictions would apply only to BLM-administered leases. Development on private and state leases would be managed by the Montana Board of Oil and Gas Conservation under state regulations.

BLM would continue to implement the concept of adaptive management by using data from studies, monitoring and inspections to guide approvals of federal lease operations. POD requirements, the use of state and federal permits, lease stipulations, surface owner agreements and other management actions, as described in Alternative E, would also be features of this alternative.

This alternative also requires each CBNG proposal with a density greater than one well per 640 acres include a water rationale section in the water management plan. The water rationale section must include a brief discussion of various water management options. At a minimum, these options must include discharge with and without treatment, beneficial use and injection and reinjection options. The discussion must include the advantages and disadvantages of implementation and operation, the effectiveness and the projected quantity of water that may be managed under each option. For example, the injection of produced water into the same aquifer or other usable shallow water aquifers has been analyzed to determine if it is feasible within the proposed project area or in another area chosen by the operator/lessee. The water rationale section would have to show why injection is not feasible, if this is the case. It would also have to show the percentage of produced water that could be injected, if feasible. Following this disclosure, the approach the developer proposes to use would be presented in detail.

Alternative G—Phased Development Multiple Screens (Low Range)

Under this alternative, development of CBNG on federal leases in the Billings and Powder River RMP areas would be done following the same management actions as described under Alternative F; however, development would be limited to the low range of predicted wells (6,470) from the RFD. Therefore, the following would be applied under Alternative G:

- Annual cumulative limit (5 percent or 325 APDs/year)
- Fourth order watershed rate of development
- Wildlife habitat (20 percent over 20 years)
- Crucial sage-grouse habitat conditions
- Untreated produced water (10 percent of 7Q10 thresholds)
- Reservation buffer distance (5 miles)
- Principles of adaptive management
- POD requirements
- State and federal permits and lease stipulations
- Discussion of a range of water management options

The low range of development, as described in the RFD, was developed following the same assumptions as the high range.

Alternative H—Preferred Alternative - Multiple Screens

Alternative H is BLM's preferred alternative for managing the development of CBNG resources on BLM-administered lands. Development in the Billings and Powder River RMP areas would be done in a phased manner through restrictions imposed by BLM.

The phased approach is intended to reduce the overall cumulative impacts to any resource by managing the pace and place as well as the density and intensity of federal CBNG development. In addition to the standard POD review, four evaluation screens for water, wildlife, Native American concerns and air would be applied. The screens would be used when reviewing proposals to identify impacts, develop mitigation measures and guide the decisionmaking process.

Figure 2-1 illustrates the process BLM would follow when reviewing PODs. This process involves reviewing the POD, making a permit decision, monitoring and assessing impacts and adjusting

operations, implementing mitigation measures and reviewing thresholds. Thresholds would be adjusted when monitoring data justified a change (e.g. see "sage-grouse" in the Monitoring Appendix and the WMPP in the Wildlife Appendix.

Slower development rates (fewer wells approved and drilled each year) may extend the overall time required for extraction of the CBNG resources. If monitoring data indicate impacts to resources are being mitigated, the pace of development could increase.

The following would be applied under Alternative H.

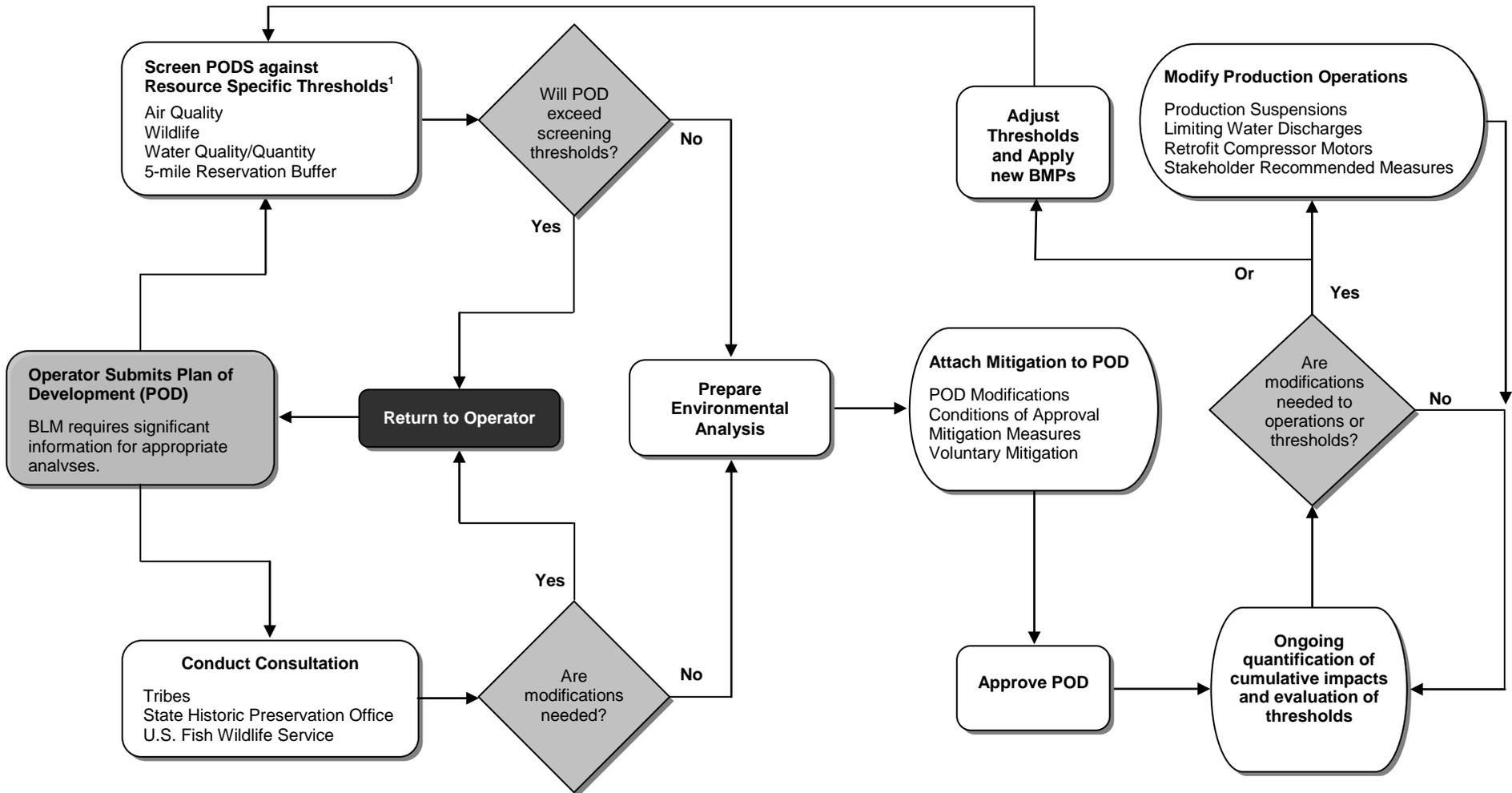
- Wildlife crucial habitat (maintain source population)
- Untreated produced water (10 percent of 7Q10 thresholds)
- Discussion of a range of water management options
- Reservation buffer distance (5 miles)
- Principles of adaptive management
- POD requirements
- State and federal permits and lease BMPs/conditions of approval (COAs)

Water Screen

BLM recognizes MDEQ has the lead role in managing water resources. BLM would coordinate all water monitoring efforts with MDEQ. While Onshore Order 7 reinforces BLM's approval authority for produced water disposal, it does not provide BLM with primacy for the management of water within the state of Montana. Therefore, BLM would apply the water quality screen in close coordination and under the lead of MDEQ. Close coordination would avoid duplication of effort and ensure each agency fulfilled its roles relative to resource management.

If proposed untreated discharges within a watershed are projected to exceed 10 percent of the 7Q10, BLM would coordinate with MDEQ to prepare an annual cumulative surface water monitoring report for that watershed. This report would incorporate The U.S. Geological Survey (USGS) and Discharge Monitoring Report (DMR) data collected within that watershed and evaluate the data against the applicable surface water quality standards. USGS collects data on a wide variety of parameters and DMRs are required for discharges to surface waters under MPDES permits. MDEQ determines the parameters reported in DMRs. If the results of analysis indicate CBNG discharges have the potential to cause exceedances of surface water quality standards, BLM would coordinate with MDEQ to

FIGURE 2-1 PREFERRED ALTERNATIVE – DECISION FLOW CHART



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¹ Thresholds are displayed in the Monitoring Appendix.

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develop appropriate mitigation measures to prevent exceedances.

In addition, if surface water monitoring indicated permitted levels of CBNG discharge would have a potential to cause water quality standards to be exceeded, no future untreated discharge of CBNG water would be allowed from federal wells unless the regional surface water monitoring stations above and below the proposed discharge were active. If CBNG discharges caused surface water quality standards or land health standards (i.e., excessive erosion) to be exceeded, even if discharges did not exceed the 10 percent of 7Q10 threshold, no additional CBNG discharges would be allowed from federal wells upstream of the exceedances.

Previously approved water management plans would be modified if monitoring indicated unacceptable impacts were occurring. Surface water monitoring requirements are detailed in the Monitoring Appendix.

Wildlife Screen

To meet the objectives of conserving wildlife habitat and the sagebrush steppe/mixed grass prairie complex in the FSEIS planning area, BLM would implement adaptive management based on available science and monitoring information. BLM would require BMP measures and alternative development schemes as permit COAs. See the WMPP in the Wildlife Appendix for the current list of specific COAs and BMPs. BLM would work with CBNG operators, surface owners, Native American tribes, FWS and MFWP to identify any additional protection measures necessary. On split estate lands, BLM recognizes that achieving the objectives of this alternative would require cooperation with surface owners.

All Wildlife Species

Data on potentially impacted wildlife habitat would be provided before, or in association with, the operator's POD. The POD would clearly identify how development activities would be designed to minimize impacts to wildlife habitat and maintain wildlife populations within the proposed POD area.

To help protect wildlife species that rely seasonally or year-long on crucial habitats (e.g., mule deer, pronghorns, sage-grouse, other sagebrush obligates), BLM would manage disturbance in such crucial habitats (e.g., crucial brood rearing, breeding and wintering habitat) where federal mineral ownership occurs. Crucial habitat for additional species, particularly Tier 1 species identified in the Montana Comprehensive Fish and Wildlife Strategy (2005d), may be identified and existing crucial habitats may be modified based on additional habitat monitoring surveys, wildlife population surveys and other

information provided by industry, BLM and MFWP. With more information, the crucial areas may be modified or new areas identified. If crucial habitats are identified for species not presently addressed in this plan, additional environmental analysis and planning may be necessary.

Monitoring is described in the WMPP (including the defined methodology, responsibility and frequency). To use adaptive management and make meaningful determinations on the impact of development on wildlife habitat, up to 10 years of monitoring may be needed (see the Wildlife and Monitoring appendices). If science and monitoring indicate changes in development practices are warranted, these changes will be coordinated with MFWP.

BLM's management actions would be designed to affect the location and timing, as well as the density and intensity, of CBNG activities. Management may be modified if science and/or monitoring data indicate a change in wildlife species populations within crucial habitats on or adjacent to POD areas. For example, authorizations would not be given, or the pace of development would be restricted in crucial habitat areas that approach or exceed population change thresholds. Other examples of management actions BLM could impose include reducing the number of seasonal and/or yearlong authorized vehicle trips in existing areas of development, securing road access to limit vehicles not associated with development and modifying reclamation requirements for disturbed sites. If the population trend is downward, but has not yet reached the threshold, interim changes in management could occur. Similarly, if populations remain consistent with adjacent trend areas or increase, development may be less restricted, or the pace of development could be increased. Other factors such as wildfire, agricultural practices, recreational activities and disease would also be considered in determining the management for crucial habitat areas.

For mule deer and pronghorn habitat, the following thresholds would be used to initiate change:

- A 30 percent or more decline (based on MFWP adaptive harvest thresholds) in mule deer or pronghorn populations over a 3-year period relative to baseline and/or adjacent populations. Similarly, if populations remained consistent with adjacent trend areas or increase, development may be less restricted.
- Sage-grouse: See Sage-grouse Habitat Section.

These population thresholds, as well as population thresholds for other species, may be modified or established prior to POD approval based on relevant science, as well as suggestions from agency partners such as MFWP and FWS.

Sage-Grouse Habitat

The general approach described in the All Wildlife Species section would also apply to sage-grouse habitat. Additionally, BLM would manage sage-grouse habitat to meet the following objectives:

- Maintain the connectivity of habitats.
- Manage habitat to maintain healthy sage-grouse populations to serve as source populations.
- In crucial habitat areas, maintain sage-grouse habitat so that population trends follow the general magnitude of decline or increase on control leks. Changes in management of future development would occur if male attendance on leks within two miles of CBNG development declines by 25 percent over a 5-year increment. Changes may also be made if lesser declines occur in a period of less than 5 years, when compared with predetermined control leks. Management actions would include not authorizing or limiting the number of federal well sites, roads and infrastructure and not authorizing or restricting the timing of operations conducted on federal leases. Similarly, if populations remained comparable with the control leks or increase over a 5-year monitoring period, management of development may be modified to be less restrictive, or the pace of development may be increased.
 - These thresholds could be further refined before POD approval based on monitoring, relevant science, as well as suggestions from agency partners such as MFWP and FWS.
 - When development is proposed within crucial sage-grouse habitat, BLM would rely on science, professional judgment and monitoring data to determine the acceptable level of disturbance.

The objectives for crucial sage-grouse habitat would be to maintain sage-grouse populations on the northern end of the Powder River Basin, encourage genetic diversity, permit genetic exchange with other populations and ensure source populations would remain available for areas where sage-grouse may have been reduced or displaced due to CBNG development or other factors.

Sage-grouse habitat (leks, nesting, brood rearing and wintering) outside the crucial sage-grouse habitat boundaries would be managed to maintain connectivity by reducing habitat fragmentation. Management would focus on minimizing disturbance on seasonal habitats. BMPs would be used to minimize surface disturbance and these measures may be the basis for COAs. If

management actions, COAs and/or BMPs were insufficient or overly restrictive, BLM would make the needed changes in order to maintain sage-grouse populations. Science and monitoring data would provide the basis for formulating alternative development scenarios and decisions would be coordinated with MFWP.

To meet the objectives for sage-grouse habitat management, PODs would have to demonstrate specific actions to conserve sage-grouse. Actual placement of wells would depend on the operator's ability to outline a strategy where effects to sage-grouse would be minimized and where sage-grouse would not be displaced from any of the crucial habitat as a result of these actions. The following examples illustrate such a situation:

- Within 1 mile of a lek, surface disturbance proposals would be sited to meet objectives for sage-grouse habitat management, including: avoid the loss of sagebrush, especially in linear routes (roads, flowlines and buried powerlines); avoid installation of perching structures; and keep noise disturbance levels at leks to less than 10 decibels above background noise on active leks. Special attention would be paid to proposals that would result in increased human presence, opportunities for increased predation, or loss of nesting and brood rearing habitat and function. This would not necessarily translate into no development within 1 mile of a lek, but would suggest special attention should be paid to features resulting in increased human presence, opportunities for increased predation and loss of nesting and brood rearing habitat and function.
- Proposals for storage ponds or produced water discharge into vegetated drainages in summer sage-grouse habitat would be designed to minimize the potential for outbreaks of WNV.
- The operator would be required to map and avoid seasonal habitats when proposing placement of infrastructure.

Crucial habitat areas have been identified in only a portion of the FSEIS planning area. BLM would continue to identify crucial habitat areas. New areas would be managed per this section. As research and monitoring continue, BLM and partners may develop new COAs and BMPs to supplement those already contained in the WMPP and other BLM publications.

Native American Concerns Screen

The Crow and Northern Cheyenne tribes consider groundwater and air to be critical resources for their tribal health and welfare. Tribal CBNG is an Indian Trust Asset. Groundwater is used on the reservations for stock watering and drinking water supplies. The tribes highly value air

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resources, as well. In response to these concerns, BLM would require federal lease operators to protect groundwater, CBNG and air quality.

For proposed federal CBNG development within 5 miles of the Northern Cheyenne and Crow reservations, BLM, in consultation with the tribes, would require site-specific groundwater and air analyses (see Northern Cheyenne Mitigation Appendix for details). These analyses would be submitted as part of the operator's POD submissions. The operator's analyses must demonstrate development associated with the proposed POD would be protective of Indian Trust Assets (groundwater and CBNG) and air quality. BLM could disapprove additional CBNG APDs if available monitoring and air modeling of new proposals indicated effects that violate state or federal regulatory standards. In such cases BLM would first consider mitigation measures that would reduce impacts so that actions would comply with such standards. If implementation-level analyses indicate that unacceptable levels of impairment to these resources would occur and could not be mitigated, BLM would not approve the APDs. Unacceptable levels of impairment to the resources would be determined in consultation with the affected tribe(s) and the State of Montana, as appropriate. BLM may require operator(s) to install groundwater monitoring wells and air monitoring stations between the development area and the reservations to confirm the initial findings of the analyses. Modeling and monitoring groundwater would also provide critical data to determine if CBNG or resources were being affected.

As development proceeded, BLM would monitor the effects to air, water and other resources of concern to the Native American tribes. BLM would approve additional APDs only if available monitoring and evaluation of new proposals indicated effects would not exceed state or federal regulatory standards and were not substantially greater than those anticipated in the FSEIS (see Chapter 4 and Table MON-1 in the Monitoring Appendix.)

BLM would consult with affected tribes when operator's proposed actions were near American Indian traditional cultural properties, such as the Rosebud Battlefield, the Wolf Mountain Battlefield, Weatherman Draw and Sacrifice Cliffs. Consultation could result in mitigation of impacts to traditional cultural properties.

Air Quality Impact Screen

MDEQ has permitting authority over emission sources. EPA has permitting authority in the adjacent areas of Indian Country. BLM would conduct an annual review

of available monitoring data collected in designated Class I areas (Northern Cheyenne Reservation) and federally mandated Class I areas (wilderness areas) within the Montana portion of the Powder River Basin.

In addition, MDEQ has agreed to complete an annual cumulative air quality impact model to track air quality impacts of CBNG development, including relevant CBNG development in Wyoming. The MDEQ requires all major sources (>25 tons/year) and all oxides of nitrogen (NO_x) emitting sources, in counties which make up the CBNG development area, to perform near-field air quality modeling. An evaluation of potential cumulative effects for each proposed air quality permit is also required (see description of Additional Air Quality Modeling Studies in Chapter 3 of the FSEIS)

If observed effects and modeled impacts completed for the annual review by MDEQ show state or federal regulatory standards or applicable thresholds for air quality related values would be exceeded, BLM would require additional mitigation measures on development. BLM could disapprove additional CBNG APDs if available monitoring and air modeling of new proposals indicated effects that violate state or federal regulatory standards. In such cases BLM would first consider mitigation measures that would reduce impacts so that actions would comply with such standards..

To minimize potential air impacts from CBNG operations, the number of wells connected to each compressor would be maximized and natural-gas-fired or electrical compressors or generators would be required. When compressors or generators were located close to noise sensitive areas (such as occupied residences or sage grouse strutting grounds), a maximum noise level of 50 decibels measured 0.25 miles from the compressor would be required, except at sage-grouse leks. At sage-grouse leks, no more than 10 decibels above background measured at the lek would be required.

To reduce dust, operators of federal leases would have to post and enforce speed limits for their employees and contractors. Operators would work with local government to use dust suppression techniques on roads.

Given the potential for the level of development to vary, BLM and MDEQ would perform additional visibility modeling to better assess the visibility impacts as development proceeds (e.g., when exploration programs help define the limits of development within the Montana portion of the Powder River Basin). The potential for project wells to impact visibility is due to emissions of sulfur dioxide and oxides of nitrogen from compressor engines. The total potential for emissions of oxides of nitrogen from

compressor engines is based on horsepower requirements, which for the high-end development scenario of 18,225 project wells drilled would be 297,680 horsepower. The visibility modeling would be performed when horsepower requirements for CBNG wells in the Montana portion of the PRB exceed 133,956. Current modeling results indicate 0 days of visibility impacts would occur on the Class I Northern Cheyenne area up to a horsepower level of 148,840. BLM has selected 90% of this value as the visibility screening threshold to ensure appropriate actions can be taken in time to mitigate visibility impacts, if needed. The Class I Northern Cheyenne area was selected as the “trigger Class I area” due to its proximity to the CBNG development, and the sensitivity to CBNG development of this Class I area when compared to other Class I areas in the region.

The visibility modeling effort would provide an updated prediction for future impacts and assumptions would be verified or modified to properly characterize actual conditions and technological changes. The conditions that may change or become more certain as development proceeds include:

- The total number and type of wells (type – single zone completion vs. multi-zone or commingled completions).
- The pace of development.
- BACT and the effect on compressor emission rates.
- Compressor locations.
- Compressor to well ratios.
- Limits of high development potential

If this subsequent modeling work indicates unacceptable impacts would occur at a future point in the PRB development, the modeling work would then include mitigation scenarios that would investigate mitigation measures. Mitigation efforts would focus on compressor motors and the extent of operating compressors because it appears that gas-fired compressor motors account for approximately 90% of the overall project emissions and visibility impacts.

Standard Operating Procedures and Best Management Practices

BMPs would be used, as appropriate, in CBNG development. BMP guidance is found in the Western Governors' Association April 2006 “Coal Bed Methane Best Management Practices,” the “Surface Operating Standards for Oil and Gas Exploration and Development, Fourth Edition” (Gold Book) and BLM's national web site at <http://www.blm.gov/bmp>. The

EPA has also developed BMPs for the prevention of methane emissions which are known as the Gas STAR BMPs. The Gas STAR BMP guidance is found at <http://www.epa.gov/gasstar>.

In addition to applying BMPs, CBNG operators would submit a project POD outlining the proposed development of an area when requesting CBNG well densities greater than one well per 640 acres. The project POD would be drafted in consultation with the affected tribes, affected surface owner(s) and permitting agencies.

POD Requirements

A complete project POD consists of the following:

- Master Drilling Plan
- Master Surface Use Plan
- Water Management Plan
- Cultural Resource Inventory Plan or completed inventory
- Wildlife Monitoring and Mitigation Plan
- Reclamation Plan for surface disturbance
- Digital project maps depicting all infrastructure installations necessary for the project, etc.
- Applications for Permits to Drill (form 3160-3) for each federal well
- List of all permitting agencies involved
- Certification of surface use and water well mitigation agreements
- A cover letter naming the project area and requesting approval
- A list of all known existing wells in the project area, including monitoring wells
- A list of all potentially affected surface owners within the project area
- Any additional information required by the rules of MBOGC

See Alternative E for a full description of each POD component.

Individual well APDs (those located at one well per 640 acres) would be accepted and processed without a project POD in accordance with requirements of Onshore Order 1. A project POD would be required before processing and approving APDs for multiple wells from an operator in the same geographic area. BLM would approve the project POD and individual APDs once they were technically and administratively complete and had met all BLM requirements.

On-site inspections would be conducted at the proposed federal well sites and associated

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infrastructure before any ground-disturbing actions were approved.

PODs that include development within the crucial sage-grouse habitat areas must include information that clearly demonstrates how the proposal would not displace sage-grouse from this habitat. This information would be based on recent research and science, monitoring data and may also include alternative development schemes within these habitat areas.

Wells and Well Pads

CBNG well spacing rules are set by the MBOGC on state and private lands and on federal lands as specified in the Memorandum of Understanding between BLM and MBOGC; however, MBOGC has no authority on Indian lands. A wellpad may contain multiple wells (one well per coal seam), or a single well could open across multiple seams. Wells may be directionally or vertically drilled, depending on the surface location and desired bottomhole location.

Coal Mines

There would be no buffer zone excluding CBNG production around active coal mines (BLM-IM-2006-153, May 11, 2006). BLM advocates the extraction of oil and gas resource, including methane, before mining and promotes the development of multiple mineral resources.

Roads, Pipelines and Other Infrastructure

Corridors would be required for placement of roads, pipelines and utility lines in a common area of disturbance wherever possible. Proposed roads, pipeline routes and utility line routes would be located to follow existing routes, or areas of previous surface disturbance, or to minimize disturbance to important habitats, where possible. In the POD, the operator would also address how the surface owner, BLM and adjacent oil and gas operators and infrastructure companies were consulted for input into the location of roads, pipelines and utility line routes.

There would be minimal road construction. Before approving a road, the operator, landowner, BLM and adjacent landowners and gas leaseholders would coordinate long-term planning for roads in the area. Discussions with affected parties would take place to help meet the transportation corridor requirement to minimize new roads.

Low-voltage (440-v) distribution powerlines would be buried. The authorized officer (AO) could approve proposed high-voltage, aerial powerlines by application. The AO would approve above-ground, low-voltage distribution powerlines only if the operator

could demonstrate it would not be feasible or would be impractical to bury them (technically impossible, etc.). All aerial powerlines would be constructed according to the Avian Power Line Interaction Committee (APLIC) Guidelines, 1996.

Produced Water Management

A water management plan (WMP) would be required for exploratory wells and for each project POD. The WMP would be submitted with the APD(s). The WMP must comply with all federal, state and local laws and regulations, including the Clean Water Act, the Montana Water Quality Act and Onshore Order 7. The WMP must be prepared in accordance with the Miles City CBNG POD Guidebook. The basic elements of a WMP would include the following:

- Water quality data for the produced water
- A copy of any needed discharge or injection permit(s) or applications for such permits
- Applications for unlined impoundments proposed as part of the Water Management Plan that must demonstrate that the infiltration of water would not degrade the quality of surface or subsurface waters in the area (Onshore Oil and Gas Order No. 7, Section III.D.2.)
- A water balance projection showing the anticipated rate of water production over time, the proposed water management practices (preferably beneficial uses) and the amount of water that would be managed by each of the practices over time

The operator would have to list the water management options available and provide a brief rationale for using or not using each method. At a minimum, injection; treatment; surface discharge; the use of infiltration, storage, or evaporation pits or reservoirs; and beneficial uses, such as wildlife and livestock watering, dust control and managed irrigation, would have to be addressed.

Wildlife Monitoring Program and Mitigation Measures

On BLM-administered lands, impacts to wildlife would be monitored and addressed following procedures in the WMPP, in addition to applying mitigating measures that are part of the standard APD review and approval process. Impacts to wildlife, including those species on public lands and adjacent to reservations, would be monitored and addressed in accordance with the WMPP (see Wildlife Appendix).

Bald Eagles

- If a dead or injured bald eagle were located during construction or operation, the FWS Montana Field Office (406-449-5225) or the Billings Suboffice (406-247-7366) and the Service's Law Enforcement Office (406-247-7355) would be notified within 24 hours of the next working day.
- The WMPP (Wildlife Appendix) of the Powder River and Billings Resource Management Plans would be implemented.
- Surveys for active bald eagle nests and winter roost sites would be conducted before APD approval. Surveys would be conducted within a 0.5-mile radius of proposed development for bald eagles and their nests and within a 1-mile radius for roosts. If the proposed CBNG site were found to be within a nesting or winter foraging area, CBNG related activities would be halted until the nest was no longer active or until winter had passed and the foraging eagles had migrated.
- The BLM leasing stipulations pertaining to bald eagles would apply and would be implemented. This would include NSO within 0.5 mile of nests active within the past 7 years and 0.5 mile of roost sites.
- Raptor inventories including bald eagles would be conducted over the entire CBNG project area every 5 years by BLM and MFWP.
- Nest productivity would be conducted by BLM or a BLM-approved biologist in areas with one or more well locations per section and within 1 mile of the project area. Active nests within 1 mile of project-related disturbance areas would 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 with written approval from FWS.
- Signing, speed limits, or speed bumps would be placed on all project access roads to reduce mortality caused by vehicle traffic.

Mountain Plover

Listing the mountain plover under the Endangered Species Act (ESA) is not warranted at this time. BLM would continue monitoring to help prevent the bird from being listed in the future.

- FWS would provide operators and BLM with educational material illustrating and describing the mountain plover, its habitat needs, life history, threats and gas development activities that may lead to the incidental taking of eggs, chicks, or adults. These materials would be provided with the requirement they be posted in common areas, circulated in a memorandum and discussed among employees and service providers.
- If a dead or injured mountain plover were 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) would be notified within 24 hours of the next working day.
- BLM will determine the acreage of occupied black-tailed and white-tailed prairie dog habitat within suitable mountain plover habitat on federally managed surface and mineral estate lands. Further, a reasonable effort should be made to estimate the actual impacts, including habitat loss, CBNG development will have on occupied black-tailed and white-tailed prairie dog acres within suitable mountain plover habitat over the entire project area. The BLM, FWS and cooperators will develop a survey protocol that may include prioritization of subsets of the project area to be analyzed.
- In areas of suitable mountain plover habitat, surveys would be conducted by BLM or by a BLM-approved biologist using the FWS protocol at a specific project area, plus a 0.5 mile buffer. Efforts would be made to identify mountain plover nesting areas not subject to CBNG development to be used as reference sites. Comparisons would be made of the trends in mountain plover nesting occupancy between these reference areas and areas experiencing CBNG development.
- Surveys for nesting mountain plovers would be conducted by appropriately trained personnel if ground-disturbing activities were anticipated to occur between April 10 and July 10. A disturbance-free buffer zone

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of 0.25-mile would be established around all mountain plover nesting locations between April 1 and July 31.

- No ground-disturbing activities would occur in suitable nesting habitat before surveys were conducted in compliance with FWS's Mountain Plover Survey Guidelines (FWS 2002c or more recent version, Wildlife Appendix and Biological Assessment), regardless of the timing of the disturbance. The amount and nature of ground-disturbing activity must be limited within identified mountain plover nesting areas in a manner to avoid the abandonment of these areas.

Sage-grouse

- BLM and cooperators, including MFWP will conduct sage-grouse lek inventories over the CBNG project area with high potential for development every five years. Surveys of different areas may occur during different years, with the high potential CBNG project areas surveyed at least every five years. Inventories and protocol will be consistent with the *Montana Sage Grouse Conservation Plan*, coordinated by the BLM and MFWP. In areas of development, aerial or ground inventories will be conducted annually on affected sections, two mile buffers and selected undeveloped reference areas. Surveys may be conducted aerially or on the ground, as deemed appropriate by the BLM and MFWP. Operator may provide financial assistance.
- Reference leks are leks located in similar habitat and within close proximity to areas currently being developed. These "reference leks" will be identified by BLM and MFWP.
- Aerial or ground surveys will be used for determining lek locations. BLM, MFWP or BLM-approved Operator-financed biologist will monitor sage-grouse lek attendance within two miles of areas of development, such that all leks on these areas are surveyed annually. Data collected during these surveys will be recorded on BLM and MFWP approved data sheets and entered into the approved database. The number of males/lek in areas of development will be compared to reference leks.
- Sage-grouse winter use surveys of suitable winter habitat within two miles of a project

area will be coordinated by the BLM and conducted by the BLM and/or MFWP during November through February as deemed appropriate by these agencies. Results will be provided in interim and/or annual reports. Historical information of winter sage-grouse locations will be useful in focusing efforts in areas suspected of providing winter habitat.

Big Game

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

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 eight 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 CBNG 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 CBNG 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 CBNG**

Issue Topic	Management Action	Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E—CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F (High Range) & Alternative G (Low Range)— Phased Development Multiple Screens	Alternative H— Preferred Alternative - Multiple Screens
Air	Maximize the number of wells connected to each compressor	No	Yes	No	Yes	Yes	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	Gas-fired or electric boosters	Gas-fired or electric boosters
	Noise suppression required	No	No	No	No	Yes	Yes	Yes
	Implementation of a speed limit on CBNG roads on BLM	No	Yes	No	Yes	Yes	Yes	Yes
	Air permit analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Air screen	No	No	No	No	No	No	No	Yes
Bonding	43 CFR 3104 - BLM to set amount based on several factors.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Section 9 SRHA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Coal Mines	Buffer zone (1 mile) around active coal mines	No	Yes	No	Yes	No	No	No
Coal Bed Natural Gas	APD to be filed and approved prior to drilling	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CBNG exploration limits	Yes	No	No	No	No	No	No
	CBNG production limits	Yes	No	No	No	No	Yes, based on watershed level resource analysis	Yes, based on four screens

**TABLE 2-2
ALTERNATIVE MANAGEMENT FOR CBNG**

Issue Topic	Management Action	Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E—CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F (High Range) & Alternative G (Low Range)— Phased Development Multiple Screens	Alternative H— Preferred Alternative - Multiple Screens
Coal Bed Natural Gas (cont.)	Project POD required in consultation with tribes, surface owners and other agencies	No	No	No	No	Yes	Yes	Yes
	Directional drilling required	No	Yes	No	Yes	Yes, unless exempted	Yes, unless exempted	No
	Multiple coal seams developed per well bore required	No	Yes	No	Yes	No	No	No
	Simultaneous coal seam development required	No	Yes	No	Yes	No	No	No
	Wellhead camouflage required by BLM	No	No	No	Yes	Yes	Yes	Yes
Hydrology	Exploration water disposal	Untreated and stored, except for CX Ranch	Untreated and stored	Untreated surface discharge	Treated and conveyed	Exploration WMP required	Exploration WMP required	Exploration WMP required
	Production water disposal	CX Ranch only	Injection	Untreated surface discharge	Treated and conveyed	Various methods WMP required	Water screen (10% of 7Q10) WMP required	Water screen (10% of 7Q10) WMP required
	Site-specific WMP required	Yes	No	No	No	Yes	Yes	Yes
	Exploration/production water available for beneficial use	Yes	No	Yes	Yes	Yes	Yes	Yes
	Ponds (evaporation, infiltration, holding)	No	Lined holding only	Yes	Yes	Yes	Yes	Yes
	Water balance projection included in POD	No	No	No	No	Yes	Yes	Yes
	West Nile Virus management mitigation required	No	No	No	No	No	No	Yes

**TABLE 2-2
ALTERNATIVE MANAGEMENT FOR CBNG**

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Realty	Corridors required	No	Yes	No	Yes	No, with surface owner consultation	Possibly, based on watershed level resource analysis and with surface owner consultation	Yes
	Powerline placement	Aboveground or buried	Buried	Aboveground or buried	Buried	Aboveground or buried	Aboveground or buried	Buried (low-voltage) high-voltage by application only
	Abandoned access roads	Agency/surface owner discretion	Agency/surface owner discretion	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	Yes	Yes
	Road use enforcement on BLM (additional fences and gates to reduce public access and overuse, coupled with speed limits)	No	Yes	No	Yes	No	No	Yes
	Long-term stakeholder planning	No	No	No	No	No	No	Yes
Indian Trust and Native American Concerns	Buffer zone (2 miles) around reservations	No	Yes	No	Yes	No	No	No
	Monitoring wells required on BLM-administered minerals that abut reservations	No	No	No	No	May be required	May be required	May be required

TABLE 2-2
ALTERNATIVE MANAGEMENT FOR CBNG

Issue Topic	Management Action	Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E—CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F (High Range) & Alternative G (Low Range)— Phased Development Multiple Screens	Alternative H— Preferred Alternative - Multiple Screens
Indian Trust and Native American Concerns (cont.)	Resource protection protocols	No	No	No	No	Yes	Yes	Yes
	Air quality mitigation measures	No	No	No	No	Yes	Yes	Yes, based on air screen
	Special cultural resources protection measures	No	No	No	No	Yes, Cultural Resource Plan required in POD	Yes, Cultural Resource Plan required in POD	Yes, Cultural Resource Plan required in POD
	Buffer zone (5-miles) with site specific groundwater and air analyses	No	No	No	No	No	Yes, consultation required if resource impacts predicted within reservation	Yes, consultation required if resource impacts predicted within reservation
	Air quality monitoring for reservations	No	No	No	No	Yes, depending on negotiated mitigation measures	Yes, depending on developments proximity to reservations	Yes, depending on developments proximity to reservation
Vegetation	Commercially harvest ROW trees on BLM	No	Yes	No	No	Agency or surface owner discretion	Agency or surface owner discretion	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	Agency or surface owner discretion	Agency or surface owner discretion
	Noxious weed control by operator	Yes	Yes	No	Yes	Yes	Yes	Yes

**TABLE 2-2
ALTERNATIVE MANAGEMENT FOR CBNG**

Issue Topic	Management Action	Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E—CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F (High Range) & Alternative G (Low Range)— Phased Development Multiple Screens	Alternative H— Preferred Alternative - Multiple Screens
Wildlife	Wildlife surveys required	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Gray wolf, Canada lynx and grizzly bear surveys	As needed	As needed	As needed	As needed	Yes	Yes	Yes
	20/20 Screen Sage-grouse crucial habitat screen	No	No	No	No	No	Yes	No
	Crucial Sage-grouse habitat – Demonstration that viable grouse populations will be maintained	No	No	No	No	No	Yes	Yes
	Sage-grouse habitat area objectives – Connectivity and source populations	No	No	No	No	No	Yes	Yes
	Manage disturbance in crucial wildlife habitats where federal mineral ownership occurs	No	No	No	No	No	No	Yes
	Change management if sage-grouse populations decline by more than 25 percent over 5-year increment	No	No	No	No	No	No	Yes
	Implement WMPP	No	No	No	No	Yes	Yes	Yes

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E— CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F— Phased Development Multiple Screens (High Range)	Alternative G— Phased Development Multiple Screens (Low Range)	Alternative H— Preferred Alternative - Multiple Screens	
<i>Number of wells predicted for analysis purposes:</i>								
<ul style="list-style-type: none"> Federal/State – up to 925 CBNG and 1,720 conventional wells. Cumulative – up to 925 CBNG and 1,775 conventional wells. 	<ul style="list-style-type: none"> Federal/State – up to 18,275 CBNG and 1,720 Conventional wells. Cumulative – up to 26,475 CBNG and 1,775 conventional wells. 	<ul style="list-style-type: none"> Federal/State – up to 18,275 CBNG and 1,720 conventional wells. Cumulative – up to 26,475 CBNG and 1,775 conventional wells. 	<ul style="list-style-type: none"> Federal/State – up to 18,275 CBNG and 1,720 conventional wells. Cumulative – up to 26,475 CBNG and 1,775 conventional wells. 	<ul style="list-style-type: none"> Federal/State – up to 18,275 CBNG and 1,720 conventional wells. Cumulative – up to 26,475 CBNG and 1,775 conventional wells. 	<ul style="list-style-type: none"> Federal/State – up to 18,225 CBNG and 1,720 conventional wells. Cumulative – up to 26,425 CBNG and 1,775 conventional wells. 	<ul style="list-style-type: none"> Federal/state – up to 6,470 CBNG and 1,720 conventional wells. Cumulative – up to 14,670 CBNG and 1,775 conventional wells. 	<ul style="list-style-type: none"> Federal/state – up to 18,225 CBNG and 1,720 conventional wells. Cumulative – up to 26,425 CBNG and 1,775 conventional wells. 	
<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. 	<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. 	<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. 	<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. 	<ul style="list-style-type: none"> Impacts under Alternative E would consist of localized short-term increases in NO_x, SO₂ and PM₁₀ concentrations. Most maximum concentrations would be expected to be below applicable state and NAAQS, as well as NAAQS PSD increments. Alternative E would not result in increases in Acid Neutralizing Capacity above 10 percent for any Class I areas in the modeling domain. Visibility impacts of 1.0 dv would occur in 7 to 10 PSD Class I areas and 6 to 12 PSD Class II Area. 	<ul style="list-style-type: none"> Impacts under Alternatives F would be comparable to those described for Alternative E, but would be lowered and leveled over time due to the 5% annual limit for APDs approved on BLM-administered land. 	<ul style="list-style-type: none"> Impacts under Alternative G would be lower than for Alternatives E or F due to fewer wells predicted to be drilled. This would result in a reduction of approximately 65% in the number of compressors that would be required. Fewer well pads and roads would also have to be constructed. 	<ul style="list-style-type: none"> Impacts under Alternatives H would be comparable to those described for Alternative E but would be lowered and leveled over time due to implementing the four screens for CBNG development. 	

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E— CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F— Phased Development Multiple Screens (High Range)	Alternative G— Phased Development Multiple Screens (Low Range)	Alternative H— Preferred Alternative - Multiple Screens
Air Quality (cont.)							
<ul style="list-style-type: none"> • Potential direct impact on visibility within one mandatory federal PSD Class I, one Class II Area and the Class II Crow Reservation. • 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. 	<ul style="list-style-type: none"> • 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 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. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> - Same as Alternative B. 	<ul style="list-style-type: none"> • Potential direct visibility impacts within one mandatory federal PSD Class I Areas. Additional visibility impacts to three PSD Class II areas including the Crow 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. 	<ul style="list-style-type: none"> • Air quality modeling indicates visibility impacts of 1.0 dv would occur in 7 to 10 PSD Class I areas and 6 to 12 PSD Class II Area. 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. • Cumulative Impacts: <ul style="list-style-type: none"> - Given the non-project emission sources located throughout the analysis region, there would be a potential for cumulative air quality impacts to exceed applicable thresholds under Alternative E. However, none of the predicted impacts would exceed state or NAAQS. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> - Cumulative impacts under Alternative F would be the same as for Alternative E. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> - Cumulative impacts under Alternative G would be fewer than for Alternatives E or F due to fewer wells predicted to be drilled. This would result in fewer compressors, well pads and roads that would have to be constructed. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> - Cumulative impacts under Alternatives H would be comparable to those described for Alternative E.

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

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Air Quality (cont.)							
<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 10 of 17 federal PSD Class I including the Crow and Fort Peck reservations. Additional visibility impacts to 7 of 13 PSD Class II sensitive areas including the Crow and Fort Belknap reservations. 	<ul style="list-style-type: none"> - 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. - 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 reservations. 	<ul style="list-style-type: none"> - Potentially exceed PSD Class I increments for 24-hour PM₁₀ on the Northern Cheyenne Reservation and Washakie WSA. - 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 reservations. 					

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<p>Cultural Resources <i>Approximately 73,600 cultural resource sites may occur above known coal resources within the CBNG emphasis area</i></p>							
<ul style="list-style-type: none"> An estimated 17 cultural resource sites could be identified during foreseen CBNG activities. Of these only one or two would likely be eligible for the NRHP. Cumulative Impacts: - An estimated 4,285 cultural sites would be identified. resulting in 430 to 612 sites likely eligible for the NRHP. 	<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. The number of sites in Alternatives F through H reflect additional cultural resource sites located during surveys after April 2003. Cumulative Impacts: - An estimated 5,135 cultural sites could be identified resulting in 515 to 735 sites that could be eligible for the NRHP. 	<ul style="list-style-type: none"> An estimated 893 to 1,080 cultural resource sites could be identified. Cumulative Impacts: - An estimated 5,398 to 5,585 cultural sites could be identified. 	<ul style="list-style-type: none"> An estimated 893 to 1,080 cultural resource sites could be identified. Should no drilling occur within crucial sage-grouse habitat areas, the number of cultural resources sites that could be identified would be reduced by 12.8% from 942 to 779. Cumulative Impacts: - An estimated 5,398 to 5,585 cultural sites could be identified. If no drilling occurred within crucial sage-grouse habitat, the number of cultural resources sites that could be identified would be reduced from 5,447 to 5,284. 	<ul style="list-style-type: none"> Impacts would be similar to Alternative F with the exception that the number of cultural resource sites identified would be reduced by approximately 65% due to fewer federal APDs that would have to be issued. An estimated 312 to 378 cultural resource sites could be identified, based on the reduced number of federal APDs predicted to be issued. Cumulative Impacts: - An estimated 4,817 to 4,883 cultural sites could be identified, based on the reduced number of federal APDs predicted to be issued. 	<ul style="list-style-type: none"> An estimated 893 to 1,080 cultural resource sites could be identified. Cumulative Impacts: - An estimated 5,398 to 5,585 cultural sites could be identified. 		

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E— CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F— Phased Development Multiple Screens (High Range)	Alternative G— Phased Development Multiple Screens (Low Range)	Alternative H— Preferred Alternative - Multiple Screens
Cultural Resources (continued)							
<i>Approximately 73,600 cultural resource sites may occur above known coal resources within the CBNG emphasis area</i>							
- Identification of traditional cultural properties (TCPs) would increase with the development of CBNG.				• Identification of TCPs would increase with development of CBNG.	• Identification of TCPs would increase with development of CBNG.	• Potential for impacts to TCPs would be similar to those for Alternative F, but would be reduced by approximately 65%.	• Potential for impacts to TCPs could be similar to Alternatives B, C, D, E and F.
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"> Few adverse impacts with the exception of the undetermined Wyoming discharge influence. 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 would be expected to fall disproportionately on minority or low-income populations from this alternative. The influence of Wyoming's discharge on Montana's rivers would constitute a potential environmental justice issue if unresolved. 	<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 Environmental Justice section, Alternative A and by implementation of the Project POD requirements. 	<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 would be the same as for Alternative B Project Plan and watershed-level analysis requirements would help mitigate potential impacts. Project Plan consultation with Tribes and ongoing monitoring for developments within 5 miles of a reservation would help to protect Indian Trust Assets. 	<ul style="list-style-type: none"> Impacts would be lower than for other development alternatives due to fewer wells being developed. 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 would be the same as for Alternative B. Project Plan and watershed-level analysis requirements would help mitigate potential impacts. 	<ul style="list-style-type: none"> Impacts would be similar to Alternative F due to similar number of wells developed. With mitigation, 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. Project Plan, resource screens and watershed-level analysis requirements would help to mitigate potential impacts.

**TABLE 2-3
COMPARISON SUMMARY OF IMPACTS**

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Environmental Justice (continued)							
<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"> • Project Plan consultation with tribes and ongoing monitoring for developments within 5 miles of a reservation would help to protect ITAs. 	<ul style="list-style-type: none"> • Project Plan consultation with tribes and ongoing monitoring for developments within 5 miles of a reservation would help to protect Indian Trust Assets.
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: - Only minor loss of CBNG during testing operations. 	<ul style="list-style-type: none"> • Federal: - Irretrievable commitment of CBNG resources from production, magnitude and complexity to reflect increase scale of development. - Potential mineral drainage between Federal mineral estates and state, private and tribal developments depending on site-specific conditions. 	<ul style="list-style-type: none"> • Federal: - 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: - Same as Alternative B. 	<ul style="list-style-type: none"> • Federal: - 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 CBNG from drainage because of resource protection protocols. 	<ul style="list-style-type: none"> • Federal: - Irretrievable commitment of CBNG resources from production, rate of development would be managed by limit set on the number of federal APDs that would be approved per year, geographic development of CBNG resources managed through limits set on the number of APDs allowed for each fourth order watershed. 	<ul style="list-style-type: none"> • Federal: - Irretrievable commitment of CBNG resources from production, rate of development would be 65% less than alternative F. - The potential for mineral drainage between federal mineral estates and other mineral owners would be 65% lower than for Alternative F due to the lower number of wells developed. 	<ul style="list-style-type: none"> • Federal: - Irretrievable commitment of CBNG resources from production, magnitude and complexity would reflect increase scale of development - Potential mineral drainage between federal mineral estates and state, private and tribal developments depending on site-specific conditions.

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E— CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F— Phased Development Multiple Screens (High Range)	Alternative G— Phased Development Multiple Screens (Low Range)	Alternative H— Preferred Alternative - Multiple Screens
Geology and Minerals (cont.)							
<ul style="list-style-type: none"> • State: - Irretrievable commitment of CBNG 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. 	<ul style="list-style-type: none"> - The presence of shallow CBNG production could delay or interfere with certain types of seismic prospecting for conventional oil and gas reservoirs. • State: - Increased commitment of CBNG resources due to increased level of CBNG. - Mineral drainage and seismic interference issues same as for Federal under this alternative 	<ul style="list-style-type: none"> • State: - Same as Alternative B. - Potential mineral drainage between federal mineral estates and state, private, or Tribal developments depending on site-specific conditions. 	<ul style="list-style-type: none"> • State: - Same as Alternative B. - Potential mineral drainage between Federal mineral estates and state, private or Tribal developments depending on site-specific conditions. 	<ul style="list-style-type: none"> • State: - Same as Alternative B. - Potential mineral drainage between federal mineral estates and state, private or Tribal developments depending on site-specific conditions. 	<ul style="list-style-type: none"> - Potential mineral drainage between federal mineral estates and state, private and tribal developments depending on site-specific conditions and increased potential for drainage of federal minerals due to cumulative limit on number of federal APDs allowed per year. - Protection of tribal CBNG from drainage because of resource protection protocols. • State: - Increased commitment of CBNG resources due to increased level of CBNG development. - Potential mineral drainage between federal mineral estates and state, private and tribal developments depending on site-specific conditions. 	<ul style="list-style-type: none"> • State: - The same as F, but approximately 65% lower. 	<ul style="list-style-type: none"> - Potential operational interference within and adjacent to coal mines. - Protection of tribal CBNG from drainage because of 5-mile buffer zone. • State: - Increased commitment of CBNG resources due to increased level of CBNG development. - Potential mineral drainage between federal mineral estates and state, private and tribal developments depending on site-specific conditions.

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E— CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F— Phased Development Multiple Screens (High Range)	Alternative G— Phased Development Multiple Screens (Low Range)	Alternative H— Preferred Alternative - Multiple Screens
Geology and Minerals (cont.)							
<ul style="list-style-type: none"> - CBNG production dewatering at nearby coal seams, in rare occurrences can cause underground coal fires, methane seeps and the liberation of methane to water wells. 					<ul style="list-style-type: none"> - Presence of shallow CBNG production could delay certain types of seismic prospecting for conventional oil and gas reservoirs. 		<ul style="list-style-type: none"> - Presence of shallow CBNG production could delay certain types of seismic prospecting for conventional oil and gas reservoirs.
<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> - Reduction in Coal resources from current and planned surface mine operations. - Potential CBNG drainage along Wyoming Montana State Line. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> - Increase in wells and infrastructure could impact existing mine expansion greater possibility of CBNG drainage than A. 	<ul style="list-style-type: none"> • Cumulative Impacts: Impacts increased over alternative B. 	<ul style="list-style-type: none"> • Cumulative Impacts: <ul style="list-style-type: none"> - Same as Alternative B. 	<ul style="list-style-type: none"> • Cumulative Impacts: Similar to Alternative B. <ul style="list-style-type: none"> - Potential mineral drainage between federal mineral estates and state, private, or tribal developments depending on site-specific conditions. 	<ul style="list-style-type: none"> • Cumulative Impacts: Similar to Alternative B. <ul style="list-style-type: none"> - Increased potential mineral drainage of federal mineral estates by state, private, or tribal developments depending on site-specific conditions. 	<ul style="list-style-type: none"> • Cumulative Impacts: Similar to Alternative B, but lower based on less development. 	<ul style="list-style-type: none"> • Cumulative Impacts: Similar to Alternative B. <ul style="list-style-type: none"> - Increased potential mineral drainage of federal mineral estates by state, private, or tribal developments depending on site-specific conditions

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Hydrological Resources							
<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>							
<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 effects taste and beneficial uses.</i>							
<i>Beneficial Reuse: The southeastern region of Montana is classified as a high plains semi-arid environment and has experienced drought conditions over much of the last decade</i>							
<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"> - Similar to Alternative A; potential for increased sediment loads due to soil disturbance and erosion. 	<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"> - Similar to Alternative A; potential for increased sediment loads due to soil disturbance and erosion. - 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. 	<ul style="list-style-type: none"> • Surface Water: <ul style="list-style-type: none"> - 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. 	<ul style="list-style-type: none"> • Surface Water: <ul style="list-style-type: none"> - Water quality would be slightly altered; however, downstream uses would not be diminished. - Flows would slightly increase resulting is slight riparian erosion, as well as minor increases in sedimentation. 	<ul style="list-style-type: none"> • Surface Water: <ul style="list-style-type: none"> - Water quality will 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.

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Hydrological Resources (cont.)							
<ul style="list-style-type: none"> • Groundwater: - Groundwater will be drawn down over time in the Powder River Basin. - Isolated areas of development would experience an increased drawdown effect. <ul style="list-style-type: none"> - Immediate drawdown of coal seam aquifers would be minor and limited in horizontal extent. As CBNG production matures, coal seam aquifer drawdown could reach 20 feet 4 to 5 miles from the edge of production. - No change in groundwater quality. 	<ul style="list-style-type: none"> • Groundwater: - Drawdown same as Alternative B. - Alluvial groundwater quality would be altered due to infiltration of untreated production water. 	<ul style="list-style-type: none"> • Groundwater: - Drawdown same as Alternative B - No groundwater quality impacts. 	<ul style="list-style-type: none"> • Groundwater: - Drawdown same as Alternative B. - Minor impacts to shallow groundwater quality from impoundment infiltration and surface discharge of some untreated production water. 	<ul style="list-style-type: none"> • Groundwater: - Drawdown same as Alternative B. - Minor impacts would occur to shallow groundwater quality from impoundment infiltration and other water management practices. 	<ul style="list-style-type: none"> • Groundwater: - Drawdown effects near CBNG fields would be the same as Alternative B, but fewer CBNG fields would be developed. - Minor impacts to shallow groundwater quality would occur from impoundment infiltration and other water management practices. 	<ul style="list-style-type: none"> • Groundwater: - Drawdown same as Alternative B. - Minor impacts would occur to shallow groundwater quality from impoundment infiltration and other water management practices. 	

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Hydrological Resources (cont.)							
<ul style="list-style-type: none"> • Beneficial Reuse: <ul style="list-style-type: none"> - 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. • Cumulative Impacts: <ul style="list-style-type: none"> - Surface Water: Wyoming’s discharge of CBNG production water would result in moderate increases in surface water flow in Montana rivers depending on the season and watershed from minor to noticeable amounts. 	<ul style="list-style-type: none"> • Beneficial Reuse: <ul style="list-style-type: none"> - Same as Alternative A. • Cumulative Impacts: <ul style="list-style-type: none"> - Surface water flow and quality will be the same as Alternative A. - CBNG production in Montana and Wyoming will noticeably drawdown coal seam aquifers. - Groundwater quality in Montana and beneficial reuse will be the same as Alternative A. 	<ul style="list-style-type: none"> • Beneficial Reuse: <ul style="list-style-type: none"> - Same as Alternative A. • Cumulative Impacts: <ul style="list-style-type: none"> - Surface water quality in some watersheds would be noticeably altered, resulting in restricted downstream uses. 	<ul style="list-style-type: none"> • 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. • 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. 	<ul style="list-style-type: none"> • 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%. • Cumulative Impacts: <ul style="list-style-type: none"> - Cumulative impacts to surface water will be reduced dependent on MDEQ numerical and narrative 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. 	<ul style="list-style-type: none"> • Beneficial Reuse: <ul style="list-style-type: none"> - Required WMPs from all operators would result in beneficial reuse of approximately 20% of production water. • Cumulative Impacts: <ul style="list-style-type: none"> - Cumulative impacts to surface waters would be lower than MDEQ standards. - Surface water quality would be slightly altered; however, downstream uses would not be diminished - Surface water flows would be moderately increased. 	<ul style="list-style-type: none"> • Beneficial Reuse: <ul style="list-style-type: none"> - Required WMPs from all operators would result in beneficial reuse of approximately 20% of production water. • Cumulative Impacts: <ul style="list-style-type: none"> - Cumulative impacts to surface waters would be lower than MDEQ standards. - Surface water quality would be slightly altered; however, downstream uses would not be diminished - Surface water flows would be only slightly increased due to fewer wells developed. 	<ul style="list-style-type: none"> • Beneficial Reuse: <ul style="list-style-type: none"> - Required WMPs from all operators would result in beneficial reuse of approximately 20% of production water. • Cumulative Impacts: <ul style="list-style-type: none"> - Cumulative impacts to surface waters would be lower than MDEQ standards. - Surface water quality would be slightly altered; however, downstream uses would not be diminished - Surface water flows would be moderately increased.

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Hydrological Resources (cont.)							
<ul style="list-style-type: none"> - The surface water quality in the three-shared rivers between Montana and Wyoming would be slightly altered, however downstream uses will not be diminished. - TRR construction could lead to localized soil erosion and impact to surface water focused runoff, localized increased stream flow and increased suspended sediment. - Groundwater: Drawdown of groundwater from Wyoming CBNG operations could extend several miles north into Montana. - Groundwater quality in Montana would not be impacted by Wyoming CBNG operations - Drawdown from the CX Ranch may extend out several miles from the development. 	<ul style="list-style-type: none"> - 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"> - 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"> - 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%. 	<ul style="list-style-type: none"> - Minor impacts would occur to shallow groundwater quality from impoundment infiltration and other water management practices. 	<ul style="list-style-type: none"> - Drawdown effects near CBNG fields would be the same as for Alternative B, but fewer CBNG fields would be developed. - Minor impacts would occur to shallow groundwater quality from impoundment infiltration and other water management practices. 	<ul style="list-style-type: none"> - Groundwater drawdown would be similar to Alternative B. - Minor impacts would occur to shallow groundwater quality from impoundment infiltration and other water management practices. 	

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<p>Indian Trust and Native American Concerns <i>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.</i></p>							
<ul style="list-style-type: none"> • Federal: - No measurable impacts to Indian trust assets would occur from the CBNG activities. 	<ul style="list-style-type: none"> • Federal: - No surface water quality impacts foreseen. - Potential CBNG 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: - Potential for surface water quality and quantity impacts. - Potential CBNG drainage, same as Alternative B. - Cultural Resource impacts same as B. - Visibility impacts. 	<ul style="list-style-type: none"> • Federal: - 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 CBNG drainage, same as Alternative B. - Cultural Resource impacts same as B. - Visibility impacts. 	<ul style="list-style-type: none"> • Federal: - Effects from groundwater drawdown mitigated because of resource protection protocols. Potential CBNG 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. 	<ul style="list-style-type: none"> • Federal: - Potential effects from groundwater drawdown would be reduced by implementation of a 5-mile buffer zone. Potential CBNG drainage would be mitigated or eliminated. - Surface water quality impacts would be reduced through implementation of water screen and 5-mile buffer. - TCP site would be identified sooner through use of block surveys and tribal consultations. - Air Quality impacts would be mitigated through site-specific permits and control measures. 	<ul style="list-style-type: none"> • Federal: - Potential impacts from Alternative G would be similar to Alternative F, except approximately 65% lower due to reduced number of APDs predicted to be issued. - Surface water quality impacts would be similar to Alternative F although approximately 65% would be reduced due to fewer wells developed. - TCP site would be identified sooner through use of block surveys and tribal consultations. - Air quality impacts would be mitigated through site-specific permits and control measures. 	<ul style="list-style-type: none"> • Federal: - Potential effects from groundwater drawdown would be reduced by implementation of 5-mile buffer zone. Potential CBNG drainage would be mitigated or eliminated. - Surface water quality impacts would be reduced through implementation of water screen and 5-mile buffer. - TCP site would be identified sooner through use of block surveys and tribal consultations. - Air Quality impacts would be mitigated through site-specific permits and control measures.

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Indian Trust and Native American Concerns (cont.)							
<ul style="list-style-type: none"> • State: - No measurable impacts to Indian trust assets would occur from the CBNG activities. 	<ul style="list-style-type: none"> • State: - Groundwater drawdown inward from reservation boundaries. - Limited short-term surface water impacts from spills and ruptures adjacent to reservations. - Potential CBNG drainage, dependent on specific site conditions, no delay due to adjacent development. 	<ul style="list-style-type: none"> • State: - Groundwater drawdown same as Alternative B. - Surface water quality and quantity impacts. - Potential CBNG drainage, same as Alternative B. 	<ul style="list-style-type: none"> • State: - Groundwater drawdown same as Alternative B. - Surface water quality impacts reduced. - Potential CBNG drainage, same as Alternative B. 	<ul style="list-style-type: none"> • State: - Surface water quality protected. 	<ul style="list-style-type: none"> • State: - Same as Alternative E. 	<ul style="list-style-type: none"> • State: - Same as Alternative E. 	<ul style="list-style-type: none"> • State: - Groundwater drawdown potential on reservations would be minimized. CBNG drainage would be minimized by state spacing. Surface water quality would be protected.

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Indian Trust and Native American Concerns (cont.)							
<ul style="list-style-type: none"> • Cumulative Impacts: - 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 CBNG development. - Drawdown of groundwater from Wyoming CBNG operations has the potential to lower aquifer levels on the Crow Reservation. - Potential CBNG drainage along southeastern corner of Crow Reservation from Wyoming operations. 	<ul style="list-style-type: none"> • Cumulative Impacts: - Same as Alternative A. - Reduction of CBNG 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"> • Cumulative Impacts: - Same as Alternative B. 	<ul style="list-style-type: none"> • Cumulative Impacts: - Same as Alternative B except no potential air quality impacts to PSD Class I annual NO₂ increments. 	<ul style="list-style-type: none"> • Cumulative Impacts: - Same as Alternative B. 	<ul style="list-style-type: none"> • Cumulative Impacts: - Would be same as Alternative B, except no potential air quality impacts to PSD Class I annual NO₂ increments. 	<ul style="list-style-type: none"> • Cumulative Impacts: - Would be same as Alternative B, except reduced due to fewer wells developed. 	<ul style="list-style-type: none"> • Cumulative Impacts: - Would be same as Alternative B, except no potential air quality impacts to PSD Class I annual NO₂ increments.

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<p>Lands and Realty Emphasis Area Land Ownership: Private 69%, Federal 15%, Tribal 10%, State 5% Total Acreage: 19,371,593</p>				<p>Miles of Road: Interstate, 386; US, 675; State, 409; Off-System, 24,431 Miles of Railroad: BNSF, 573; MT Rail Link, 146</p>			
<ul style="list-style-type: none"> • Federal: - Minimal land area displaced by roads. - 400 acres disturbed short term during CBNG exploration drilling. • State: - Increased motorized access on the CX Ranch. - Increase motorized trespass. - 1,100 short term acres disturbed and 500 long term acres during CBNG exploration and production activities. 	<ul style="list-style-type: none"> • Federal: - 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 CBNG development activities. • State: - 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. 	<ul style="list-style-type: none"> • All Federal and State impacts in Alternative B occur in Alternative C in addition to: - Impacts to adjacent mining operations The land use displacement from roads and utility lines lease operations is greatest in Alternative C. - Increased disturbances by CBNG 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 the following: - Federal: Permanent loss of land use from road network. 	<ul style="list-style-type: none"> • Federal and State: - 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. 	<ul style="list-style-type: none"> • Federal: - 25,600 acres would be disturbed during CBNG exploration and construction activities (short term). - 15,250 acres would be disturbed during operation (long term). • State: - 29,550 acres would be disturbed during CBNG exploration and construction activities (short term). - 17,600 acres would be disturbed during operation (long term). 	<ul style="list-style-type: none"> • Federal: - 9,100 acres would be disturbed during CBNG exploration and construction activities (short term). - 5,400 acres would be disturbed during operation (long term). • State: - 10,500 acres would be disturbed during CBNG exploration and construction activities (short term). - 6,250 acres would be disturbed during operation (long term). 	<ul style="list-style-type: none"> • Federal: - 25,600 acres would be disturbed during CBNG exploration and construction activities (short-term). - 15,250 acres would be disturbed during operation (long-term). • State: - 29,500 acres would be disturbed during CBNG exploration and construction activities (short-term). - 17,600 acres would be disturbed during operation (long-term).

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Lands and Realty (cont.)							
<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 would be approximately 81,000 acres. 	<ul style="list-style-type: none"> Total cumulative long term acres disturbed would be approximately 102,300 acres. 	<ul style="list-style-type: none"> Total cumulative long term acres disturbed would be approximately 92,200. 	<ul style="list-style-type: none"> 88,170 acres would experience cumulative effects. 	<ul style="list-style-type: none"> 20,450 acres would experience cumulative effects. 	<ul style="list-style-type: none"> 88,170 acres would experience cumulative effects. 	

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Livestock Grazing							
<i>AUM is equal to the amount of forage required to support one cow and her calf or 5 sheep for one month.</i>							
<i>The CBNG Planning Area has an estimated 1,389,908 acres of land classified as grazing, capable of supporting 259,554 AUMs.</i>							
<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. • CBNG 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 managed irrigation 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 CBNG 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 managed irrigation 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. 	<ul style="list-style-type: none"> • Impacts to livestock grazing would be similar to Alternative B and phased in after watershed analysis. • WMPs for federal CBNG wells would incorporate results and requirements identified by watershed-level analysis. • Impacts from federal CBNG development would occur primarily in the latter years of the planning period, generally following state and private development. 	<ul style="list-style-type: none"> • Impacts would be similar to Alternative B, but the land disturbance area would be approximately 65% lower. 	<ul style="list-style-type: none"> • Impacts to livestock grazing would be similar to Alternative B. • CBNG PODs would be screened for four resources, of which water would have the most effect on livestock grazing. • Water Management Plans for federal CBNG wells would incorporate results and requirements identified by watershed-level analysis.

TABLE 2-3
COMPARISON SUMMARY OF IMPACTS

Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E— CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F— Phased Development Multiple Screens (High Range)	Alternative G— Phased Development Multiple Screens (Low Range)	Alternative H— Preferred Alternative - Multiple Screens
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 know areas are protected.</i>							
<ul style="list-style-type: none"> It is unlikely that any of the 1,500 short term acres disturbed during CBNG 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 CBNG 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. 	<p>Would be same as Alternatives B, C, D and E.</p>	<ul style="list-style-type: none"> Impacts would be similar to the other expanded alternatives with the exception that they would be reduced by approximately 65% due to fewer APDs predicted to be issued. Between 19,400 and 25,900 short-term acres would be disturbed during CBNG development activities, increasing chances that a minor fossil discovery would be made. Cumulative impacts would disturb additional 11,700 acres, increasing likelihood of additional fossil discoveries. 	<ul style="list-style-type: none"> Implementation of paleontological inventories in areas of High Potential Fossil Yield Formations (See BLM Instruction Memorandum 2008-2009) would result in fewer impacts to paleontological localities since the recorded localities would be avoided. 			

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Paleontological Resources (continued)							
							<ul style="list-style-type: none"> There would be between 55,400 and 74,000 short term acres disturbed during CBNG development activities increasing chances that a fossil discovery would be made. Cumulative impacts would disturb an additional 33,400 acres increasing likelihood of additional fossil discoveries.
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. 	<ul style="list-style-type: none"> Impacts would be similar to those for Alternative B. Impacts from federal CBNG development would occur differently than the other alternatives based on annual and watershed-based limits. 	<ul style="list-style-type: none"> Impacts would be similar to those for Alternative B in the sequence of development, but would result in lower impacts than other alternatives due to fewer wells developed. 	<ul style="list-style-type: none"> Impacts would be similar to or lower than Alternative B in the sequence of development, but could result in lower visual impacts than other alternatives due to use of resource screens and mitigation and management plans for development.

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Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E— CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F— Phased Development Multiple Screens (High Range)	Alternative G— Phased Development Multiple Screens (Low Range)	Alternative H— Preferred Alternative - Multiple Screens
<p>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></p>							
<ul style="list-style-type: none"> • Few 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"> • Most new CBNG jobs probably would be filled by workers commuting from Wyoming. If this occurred, social benefits and impacts could be lower than described below. • 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. 	<ul style="list-style-type: none"> • Because development is phased, it is likely that most new jobs would be filled by workers commuting from Wyoming. • Social impacts would be similar to those for Alternative B and lower than those for Alternatives C through E during certain years, but of longer duration due to phased development. • Economic impacts would be fewer than those for Alternatives B through E, but would be of longer duration due to the evening out of CBNG activities over the phased development period. 	<ul style="list-style-type: none"> • Social impacts would be fewer than those for other development alternatives, with the duration of impacts similar to that for Alternative F due to phased development. • Economic impacts would be fewer than those for Alternatives B through F, with the duration of impacts similar to those for Alternative F due to phased development. 	<ul style="list-style-type: none"> • Social and economic impacts similar to Alternative F due to similar rate of CBNG well development.

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<p>Soils <i>Montana has a wide mix of geologic parent material, which produces a vast array of different soil types</i></p>							
<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 CBNG 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. CBNG activities would result in 55,400 short term acres being disturbed. • 32,950 acres would be disturbed longer term during CBNG production, with a majority of the land reclaimed after production is ceased. • No impacts would occur to soils from CBNG waters. 	<ul style="list-style-type: none"> • CBNG 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 	<ul style="list-style-type: none"> • Impacts would be similar to those for Alternative B, although some impacts would not occur or would be delayed due to implementation of cumulative and watershed-specific numerical limits on the number of federal CBNG APDs approved per year. • Produced water would be available for beneficial use, including irrigation. 	<ul style="list-style-type: none"> • Impacts would be similar to those for Alternative B, although impacts would be fewer due to the limit on the number of federal CBNG APDs (323 versus 910) approved per year. • Produced water would be available for beneficial use, including irrigation. 	<ul style="list-style-type: none"> • CBNG development would result in approximately 55,100 acres being disturbed. • An estimated 32,850 acres would be disturbed longer term during production, with most of the land reclaimed after production ceased. • No impacts would occur to soils from CBNG waters.

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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, E, F and G 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 CBNG development. 	<ul style="list-style-type: none"> • Typical solid waste refuse could be disposed of in local landfills. • Drilling mud and cuttings could be disposed of onsite with the landowner's permission on private surface and on BLM-administered surface with agency approval. • Minor impacts would also occur from use of pesticides and herbicides during access and construction activities. • Impacts would include increased quantities of waste requiring on-site disposal or transport to commercial landfills. • Oil and gas developers would be responsible for any damages to property, real or personal, resulting from the lack of ordinary care during operations. Operators must maintain SPCC plans and immediately remove any spilled or unused non-exempt wastes from the sites. • No long-term impacts to private, state, or federal lands would occur from waste products associated with CBNG development. 					

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<p>Vegetation <i>Emphasis area acreage by land classifications, overlying known coal reserves: Grasslands, 3.55 million (2.56 million in the FSEIS Planning Area); Shrublands, 1.8 million (1.66 million in the FSEIS Planning Area); Forests, 1.36 million (1.29 million in the FSEIS Planning Area); Riparian Areas, 378,000 (268,000 in the FSEIS Planning Area); Barren Lands, 372,000 (297,000 in the FSEIS Planning Area); and Other Areas, 700,000 (345,000 in the FSEIS Planning Area) Forty BLM sensitive plant species have been recorded in one or more of the Planning Area counties.</i></p>							
<ul style="list-style-type: none"> • 1,142 acres of native habitat would be impacted under this Alternative, more than half (580 acres) in grasslands 	<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. 	<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. 	<ul style="list-style-type: none"> • Native habitat disturbances would be similar to those discussed under Alternative B. 	<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. 	<ul style="list-style-type: none"> • Impacts would be similar to those for Alternative B. • Resource impacts from proposed development projects would be evaluated on a watershed-level basis. 	<ul style="list-style-type: none"> • Impacts would be similar to those for Alternative B, but the land disturbance area would be approximately 65% lower. 	<ul style="list-style-type: none"> • Impacts would be similar to those for Alternative B. • Resource impacts from proposed development projects would be evaluated on a watershed-level basis. • Use of resource screens and watershed-based limits on federal CBNG development would result in spatial and temporal distribution of impacts similar to Alternative F.

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Vegetation (cont.)							
<ul style="list-style-type: none"> • Potential minor loss of plant diversity with reclamation. • On non-federal land, Ute ladies'-tresses could be slightly impacted by disturbances. • No federal threatened or endangered plant species are known to occur within the Planning Area. 	<ul style="list-style-type: none"> • Potential moderate loss of plant diversity with reclamation. • On non-federal land, Ute ladies'-tresses could be impacted by disturbances. • No federal threatened or endangered plant species are known to occur within the Planning Area. 	<ul style="list-style-type: none"> • 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. • No federal threatened or endangered plant species are known to occur within the Planning Area. 	<ul style="list-style-type: none"> • 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. • No federal threatened or endangered plant species are known to occur within the Planning Area. 	<ul style="list-style-type: none"> • No federal threatened or endangered plant species are known to occur within the Planning Area. 	<ul style="list-style-type: none"> • Annual and watershed-based limits on federal CBNG development would result in a different spatial and temporal distribution of impacts than for the other development alternatives. • Watershed-based analysis would limit the amount of disturbed habitat on BLM-administered surface or on private surface overlying federal minerals within each fourth order watershed, based on the potential to affect species of special concern from habitat fragmentation. • No federal threatened or endangered plant species are known to occur within the FSEIS Planning Area. 	<ul style="list-style-type: none"> • No federal threatened or endangered plant species are known to occur within the FSEIS Planning Area. 	<ul style="list-style-type: none"> • Watershed-based analysis would limit the amount of disturbed habitat on BLM-administered surface or on private surface overlying federal minerals within each 4th order watershed, based on the potential to affect species of special concern from habitat fragmentation. • No federal threatened or endangered plant species are known to occur within the FSEIS Planning Area.

TABLE 2-3
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Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E— CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F— Phased Development Multiple Screens (High Range)	Alternative G— Phased Development Multiple Screens (Low Range)	Alternative H— Preferred Alternative - Multiple Screens
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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 POD for visual resources. • Impacts would be mitigated as described under the Alternative B, Mitigation subsection. 	<ul style="list-style-type: none"> • Impacts would be similar to those for Alternative E. • Locations and levels of impacts would vary compared to other alternatives based on annual and watershed-based federal CBNG development limits. 	<ul style="list-style-type: none"> • Impacts would be similar to those for Alternative E in the sequence of development, but would result in lower impacts than other action alternatives. 	<ul style="list-style-type: none"> • Impacts would be similar to or less than Alternative E in the sequence of development, but could result in fewer visual impacts than other alternatives due to screening process and use of mitigation and management plans for development.

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Wilderness Study Areas											
<i>There are 10 WSAs within the CBNG emphasis area (6 in the FSEIS Planning 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. 	<ul style="list-style-type: none"> • There would be no direct impacts to WSAs from CBNG 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 CBNG development. • Laws and regulations established for WSAs prohibit leasing of WSAs designated lands for resource extraction. 	<ul style="list-style-type: none"> • No direct impacts to WSAs would be expected from phased CBNG development. 	<ul style="list-style-type: none"> • Same as Alternative F. 	<ul style="list-style-type: none"> • No direct impacts to WSAs would be expected from CBNG development. 				
Wildlife											
<p><i>Mammal Species:</i></p> <ul style="list-style-type: none"> - 10 bats - 8 Shrews - 34 small mammals - 17 predators - 4 big game 	<p><i>Bird Species:</i></p> <ul style="list-style-type: none"> - 32 waterfowl - 33 shore & wading birds - 18 diurnal & - 11 nocturnal raptors - 8 gallinaceous - 8 woodpeckers - 137 songbirds 	<p><i>Reptiles and Amphibian species</i></p> <ul style="list-style-type: none"> - 1 salamander - 4 frogs - 4 toads - 3 turtles - 2 lizards - 9 snakes 	<p><i>Species of Concern consist of 16 mammals, 9 reptiles and amphibians and 22 birds, including:</i></p> <ul style="list-style-type: none"> - Sage-grouse - Interior Least Tern - Gray Wolf - Canada Lynx - Grizzly Bear - Mountain Plover - Bald Eagle - Peregrine Falcon - Black-tailed Prairie Dog - Black-footed Ferret 	<ul style="list-style-type: none"> • Direct and indirect impacts would occur at a level commensurate with the level of CBNG development. • Direct impacts include habitat loss, death from vehicle collisions and effects associated with greater human access into previously untraveled areas. 	<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). 	<ul style="list-style-type: none"> • Direct and indirect impacts would occur at a level commensurate with the level of CBNG development. • Indirect impacts to wildlife on 884,000 to 4.7 million acres from:- 	<ul style="list-style-type: none"> • Impacts would be similar to Alternative B. • Discharged treated CBNG water would erode riparian and wetland habitat. • Increased livestock grazing within 2 miles of CBNG discharges that occur in areas without summer water. 	<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. 	<ul style="list-style-type: none"> • Direct impacts would be fewer than for other development alternatives due to implementation of the wildlife screen. • Indirect impacts would be fewer than for other development alternatives due to implementation of the wildlife screen. 	<ul style="list-style-type: none"> • Direct impacts would be similar to Alternative F, but reduced by approximately 65% due to wells being developed. • Indirect effects from new roads and new utility lines would be lower than for all other development alternatives due to fewer wells being developed. 	<ul style="list-style-type: none"> • Direct and indirect impacts under Alternative H would be reduced relative to other development alternatives due to conditions placed on development within defined crucial sage-grouse habitat areas, use of BMPs and adaptive management.

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COMPARISON SUMMARY OF IMPACTS

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Wildlife (cont.)	<ul style="list-style-type: none"> • 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"> - 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 CBNG 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 CBNG discharges that occur in areas without summer water. 	<ul style="list-style-type: none"> • 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, or collisions with vehicles, would occur at a level less than Alternative C. 	<ul style="list-style-type: none"> • Increased livestock grazing within 2 miles of CBNG discharges that occur in areas without summer water. • Through implementation of WMPP 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. - These impacts would be less than alternative B, C and D through the implementation of the WMPP. This alternative would include more holding ponds than any other development alternative. Consequently, it would include a greater risk of WNV infection to sage-grouse than any other development alternative. 	<ul style="list-style-type: none"> • Species of concern not federally protected may be impacted by habitat loss, disturbance and habitat changes, but impacts would be minimized due to implementing the wildlife screen. 	<ul style="list-style-type: none"> • Impacts to species of concern would be similar to Alternative F, but would be reduced by approximately 65% due to fewer wells being developed. 	<ul style="list-style-type: none"> • Indirect effects from new roads and new utility lines would be similar to Alternatives B and D, but fewer than for Alternatives C and E while federal restrictions are applied. • Thresholds for important sagebrush-steppe habitat impacts could result in slightly fewer impacts to wildlife relative to other development alternatives, particularly sage-grouse and other sagebrush-steppe species

TABLE 2-3
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Alternative A— No Action (Existing CBNG Management)	Alternative B— CBNG Development with Emphasis on Soil, Water, Air, Vegetation, Wildlife and Cultural Resources	Alternative C— Emphasize CBNG Development	Alternative D— Encourage CBNG Exploration and Development While Maintaining Existing Land Uses	Alternative E— CBNG Exploration and Development with Enhanced Mitigation to Minimize Environmental Impacts While Maintaining Existing Land Uses	Alternative F— Phased Development Multiple Screens (High Range)	Alternative G— Phased Development Multiple Screens (Low Range)	Alternative H— Preferred Alternative - Multiple Screens
Wildlife (cont.)	<ul style="list-style-type: none"> Potential indirect impacts to T&E species, such as human disturbance, 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. 	<ul style="list-style-type: none"> Through mitigation, this Alternative should not directly impact any T&E listed wildlife species. 	<ul style="list-style-type: none"> 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"> More water would be available for wildlife as a result of CBNG production. An adaptive management strategy included as part of the WMP would help minimize impacts to wildlife and habitat by using new information to change or form additional conditions of approval. 	<ul style="list-style-type: none"> Thresholds for important sagebrush-steppe habitat impacts could result in slightly fewer impacts to wildlife relative to other development alternatives, particularly sage-grouse and other sagebrush- and grassland-associated species. 	<ul style="list-style-type: none"> Potential indirect impacts from human disturbance or collisions with vehicles would be reduced by approximately 65% from other development alternatives due to fewer wells being developed. 	<p>Similar to Alternative F. In the long term, impacts are expected to be the same as F; however, some level of impact that is greater than F may occur within the short-term (<5 years).</p>
<ul style="list-style-type: none"> 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, or collisions with vehicles, would be low because of the limited number of CBNG wells permitted. 	<ul style="list-style-type: none"> All species of concern not federally protected may be impacted by habitat changes caused by vegetation removal or access roads 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, or collisions with vehicles, are greater under this Alternative than any other because of the increased number of CBNG wells permits. 			<ul style="list-style-type: none"> Impacts to sage-grouse populations in crucial habitat areas would be lower in this alternative because CBNG development in crucial habitat areas would be allowed only when operators could demonstrate retention of existing populations (as defined). 		

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<p>Wildlife (cont.)</p>	<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 not fully reclaimed after well abandonment. 	<ul style="list-style-type: none"> 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 not fully reclaimed 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"> Alternative G includes an adaptive management strategy which would help to minimize impacts to wildlife and habitats. 	<ul style="list-style-type: none"> Species of concern not federally protected may be impacted by habitat loss, disturbance and habitat changes. These impacts may be lower than under the other development alternatives due to established habitat, well development thresholds and implementation of the Wildlife Monitoring and Protection Plan and the wildlife screen.

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Wildlife (cont.)							
					<ul style="list-style-type: none"> • Potential indirect impacts such as human disturbance, or collisions with vehicles, would be lower than those for other development alternatives due to implementation of the Wildlife Monitoring and Protection Plan, and well development thresholds. • Alternative F would include an adaptive management strategy. This would minimize impacts to wildlife and habitats. 		<ul style="list-style-type: none"> • Potential indirect impacts such as human disturbance, or collisions with vehicles, would be lower than those for other development alternatives due to implementation of the Wildlife Monitoring and Protection Plan, and well development thresholds. • Alternative H would include an adaptive management strategy. This would minimize impacts to wildlife and habitats.

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Wildlife (Aquatic Resources)							
<i>Fish species vary between watersheds within the CBNG emphasis area from 8 in the Little Big Horn River to 47 in the Yellowstone River</i>		<i>Special Status Aquatic Species:</i> - Montana Arctic grayling - Pallid sturgeon		<i>Species of Special Concern/BLM sensitive species:</i> - Blue sucker - Northern redbelly X Finescale dace - Paddlefish - Pearl Dace - Sauger - Sturgeon chub - Yellowstone cutthroat trout			
<ul style="list-style-type: none"> Minor short-term impacts on aquatic resources during CBNG 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. 	<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 CBNG wells across a much larger geographic area. No CBNG 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. 	<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 16,000 CBNG wells. A total of 0.67 billion cubic feet of untreated CBNG 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. 	<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 16,000 CBNG wells. The annual discharge of 2.24 billion cubic feet of treated CBNG 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. 	<ul style="list-style-type: none"> The same types of impacts described for Alternative A would occur under Alternative E, but they would occur on a greater scale because of the development of over 18,000 CBNG wells. The potential for affecting aquatic resources would be greater under Alternative E than under Alternatives B or D, but less than under Alternative C. Pipelines or constructed water courses for the conveyance of CBNG-produced water and resultant flow increases could impact aquatic resources in smaller drainages during yearly dry periods. About 2.24 billion cubic feet of CBNG production water would be managed through flexible options, but would allow no degradation of water quality (including thermal criteria). 	<ul style="list-style-type: none"> The same types of impacts described for Alternative A would occur under Alternative F, but the impacts would occur on a greater scale because of the development of more than 16,000 producing CBNG wells. The potential for affecting aquatic resources would be greater under Alternative F than under Alternatives B or D, but lower than under Alternative C. 	<ul style="list-style-type: none"> The approximate 6,500 CBNG wells are about 65% fewer than the other action alternatives, resulting in a lower overall impact. The effects on aquatic resources would be similar in nature to those for Alternative F, but substantially fewer than those for Alternative F due to fewer wells being developed. About 0.78 billion cubic feet of CBNG production water would be managed through flexible management options, thus reducing the volume of untreated water discharged to surface waters. 	<ul style="list-style-type: none"> The same types of impacts described for Alternative A would occur under Alternative H, but the impacts would occur on a greater scale because of the development of more than 16,000 producing CBNG wells. The potential for affecting aquatic resources would be greater under Alternative H than under Alternatives B or D, but lower than under Alternative C.

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Wildlife (Aquatic Resources)(cont.)				<ul style="list-style-type: none"> The required WMPs and MPDES permits would provide assurances that water quality, aquatic resources and beneficial uses of receiving waters would be protected. The potential for affecting aquatic resources in sensitive drainages would be greater than for Alternatives B and D, but lower than under C. Implementation of Wildlife Monitoring and Protection Plan would reduce impacts to aquatic habitat wildlife and invertebrates. 			

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Wildlife (Aquatic Resources)(cont.)							
<ul style="list-style-type: none"> • 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 CBNG abandonment would be minor and subside over time. 	<ul style="list-style-type: none"> • Based on fish species present, fisheries management policies, fisheries resource values and the projected intensity of CBNG development, the drainages most sensitive to the effects of CBNG 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"> • 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 treatment of CBNG 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"> • Pipelines or constructed water courses for the conveyance of CBNG-produced water and resultant flow increases could impact aquatic resources in smaller drainages during yearly dry periods. • About 2.24 billion cubic feet of CBNG production water would be managed through flexible options, but no degradation of water quality would be allowed (including thermal criteria). Required WMPs and MPDES permits would provide assurances that water quality, aquatic resources and beneficial uses of receiving waters would be protected. 	<ul style="list-style-type: none"> • MPDES permits would provide assurances that water quality, aquatic resources and beneficial uses of receiving waters would be protected. • Would limit CBNG development and total disturbed habitat annually and by watershed. • A sequential and controlled development schedule, combined with watershed-level analysis, would provide a framework for assessing potential impacts through a systematic monitoring program. • Would incorporate an adaptive management approach in the phased development process by using relevant monitoring data. 	<ul style="list-style-type: none"> • Pipelines or constructed water courses and resultant flow increases could impact aquatic resources in smaller drainages during dry times of the year. • About 2.24 billion cubic feet of CBNG-produced water would be managed through flexible options, but no degradation of water quality would be allowed (including thermal criteria). • Required WMPs and MPDES permits would provide assurances that water quality, aquatic resources and beneficial uses of receiving waters would be protected. 	

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Wildlife (Aquatic Resources)(cont.)							
					<ul style="list-style-type: none"> • Potential for affecting aquatic resources in sensitive drainages would be greater than for Alternatives B and D, but lower than for C. • Would incorporate an adaptive management approach in the phased development process by using relevant monitoring data. 		<ul style="list-style-type: none"> • The potential for affecting aquatic resources in sensitive drainages would be greater than for Alternatives B and D, but lower than for C. • Would incorporate an adaptive management approach in the phased development process by using relevant monitoring data.