FINAL
Environmental Impact Statement for the Eagle Butte West Coal Lease Application
WYW155132

BLM

Casper Field Office

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

August 2007

MISSION STATEMENT

It is the mission of the Bureau of Land Managment to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/WY/PL-07/031+1320

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
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In Reply Refer To:

3425 (LBA)
WYW155132
(Eagle Butte West)
(922JWeaver)
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August 22, 2007

Dear Reader:

The Bureau of Land Management (BLM) has prepared this Final Environmental Impact Statement (EIS) to document and disclose the results of an environmental analysis of an application received by BLM to lease a tract of Federal coal, the Eagle Butte West Tract, to the Eagle Butte Mine in the Wyoming Powder River Basin. A copy of this document is provided for your review. The Final EIS may also be reviewed on the BLM Wyoming website at: http://www.blm.gov/wy/st/en/info/NEPA/cfodocs/eaglebutte-westcoal.html.

Copies of the Final EIS are also available for public inspection at the following BLM offices:

Bureau of Land Management
Wyoming State Office
5353 Yellowstone Road
Cheyenne, WY 82009

Bureau of Land Management
Casper Field Office
2987 Prospector Drive
Casper, WY 82604

The Draft EIS was published in October 2006 and the 60-day comment period on the draft document ended on December 19, 2006. A formal public hearing on this application to lease Federal coal was held at 7:00 p.m. on November 14, 2006, at the Clarion Hotel, 2009 South Douglas Highway, Gillette, Wyoming. The purpose of the hearing was to receive comments on the proposed coal lease sale, on the fair market value, and on the maximum economic recovery of the Federal coal resources included in the tract. Two individuals presented comments at the hearing and eight comment letters were received by the BLM on the Draft EIS.

BLM has prepared a separate document entitled *Supplementary Information on the Affected Environment in the General Analysis Area for the Eagle Butte West Coal Lease Application EIS* in addition to the EIS. This document, which is available on request, includes more detailed site-specific information about the potentially affected resources included in the study area for the Eagle Butte West Tract.

A 30-day review period on this Final EIS will commence on the date the Environmental Protection Agency publishes a Notice of Availability in the Federal Register. BLM will also publish a Notice of Availability in the Federal Register. Press releases will be submitted to local and state media outlets once the notice is published to notify the public of the final date comments will be accepted. All comments received will be considered in preparation of the Record of Decision (ROD) for this EIS.

If you wish to comment on the Final EIS, your comments should relate directly to the document. We request that you make your comments as specific as possible and that you cite the location or locations in the document on which you are commenting. The agencies involved in preparing this Final EIS are required to respond in the ROD to all substantive comments submitted on the Final EIS. Substantive comments should:

1. Give any new information that could alter conclusions;

2. Show why or how analysis or assumptions in the Final EIS are flawed;

3. Show errors in data, sources, or methods; or

4. Request clarifications that bear on conclusions.

Opinions or preferences will not receive a formal response. However, they will be considered and included as part of the BLM decision making process.

This Final EIS was prepared pursuant to the National Environmental Policy Act and applicable regulations, and other applicable statutes, to address possible environmental and socioeconomic impacts that could result from this project. This Final EIS is not a decision document. Its purpose is to inform the public and the agency decision makers of the impacts of leasing the Eagle Butte West Tract of Federal coal to the existing Eagle Butte Mine in the Wyoming Powder River Basin and to evaluate alternatives to leasing the Federal coal included in the tract as applied for.

Comments, including names and street addresses of respondents, will be available for public review at the address listed below during regular business hours (7:45 a.m. - 4:30 p.m.), Monday through Friday, except holidays, and will be published as part of the Final EIS. Before including your address, phone number, e-mail address, or other personal identifying information in your comments, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Please send written comments to Bureau of Land Management, Casper Field Office, Attn: Nancy Doelger, 2987 Prospector Drive, Casper, WY 82604. Written comments may also be e-mailed to the attention of Nancy Doelger at "casper_wymail@blm.gov". E-mail comments must include the name and mailing address of the commenter to receive consideration. Written comments may also be faxed to (307) 261-7587.

If you have any questions or would like to obtain a copy of the supplementary information document or additional copies of this Final EIS, please contact Nancy Doelger at (307) 261-7627, or at the above address.

Sincerely,

Robert A. Bennett
State Director

FINAL ENVIRONMENTAL IMPACT STATEMENT
EAGLE BUTTE WEST LBA TRACT
CAMPBELL COUNTY, WYOMING

Lead Agency: USDI Bureau of Land Management, Casper Field Office, Casper, WY

Cooperating Agencies: USDI Office of Surface Mining Reclamation & Enforcement Western Region, Denver, CO

Wyoming Department of Environmental Quality
Land Quality & Air Quality Divisions, Cheyenne, WY

Wyoming State Planning Office, Cheyenne, WY

Wyoming Department of Transportation, Sheridan & Cheyenne, WY

Campbell County Board of Commissioners, Gillette, WY

Abstract: This Final Environment Impact Statement (EIS) assesses the environmental consequences of decisions to hold a competitive, sealed-bid sale and issue a lease for a tract of federal coal located adjacent to an existing surface coal mine in Campbell County, Wyoming, subject to standard and special lease stipulations. The Eagle Butte West Lease by Application (LBA) Tract, as applied for by Foundation Coal West, includes approximately 1,397.64 acres containing approximately 238 million tons of in-place Federal coal. Foundation Coal West, the operator of the adjacent Eagle Butte Mine, proposes to mine the tract as a maintenance lease for the existing mine, if a lease sale is held and they acquire the lease.

This Final EIS describes the physical, biological, cultural, historic, and socioeconomic resources in and around the existing mine and the LBA tract. The alternatives in the Final EIS consider the impacts of leasing the tract as it was applied for; leasing a reconfigured tract in order to avoid bypassing Federal coal or to increase competitive interest in the tract, and not leasing the tract. The focus for the impact analysis was based upon resource issues and concerns identified during previous coal leasing analyses and public scoping conducted for this lease application. Potential concerns related to development include impacts to groundwater, air quality, wildlife, and nearby roads, occupied residences, a school and an airport. Cumulative impacts related to ongoing surface coal mining and other proposed development in the Powder River Basin of Wyoming are also of potential concern.

This Final EIS, in compliance with Section 7(c) of the Endangered Species Act (as amended), identifies any endangered or threatened species which are likely to be affected by the Proposed Action.

The Final EIS is open for a 30-day review period beginning on the date that the U.S. Environmental Protection Agency publishes the Notice of Availability in the *Federal Register*. Comments that are postmarked or received on or before the end of the 30-day review period will be considered in the preparation of the Record of Decision.

For Further Information Contact:

Nancy Doelger
Bureau of Land Management, Casper Field Office
2987 Prospector Drive
Casper, WY 82604
(307) 261-7627
Email: casper_wymail@blm.gov (Nancy Doelger in the subject line)

EAGLE BUTTE WEST COAL LEASE APPLICATION
FINAL ENVIROMENTAL IMPACT STATEMENT

Prepared by

WWC Engineering
Sheridan, Wyoming

Under the Direction of

U.S. Department of the Interior
Bureau of Land Management
Casper Field Office
Casper, Wyoming

and

Cooperating Agencies

U.S. Department of Interior
Office of Surface Mining
Reclamation and Enforcement
Denver, Colorado

Wyoming Department of Environmental Quality
Land Quality Division &
Air Quality Division
Cheyenne, Wyoming

Wyoming State Planning Office
Cheyenne, Wyoming

Wyoming Department of Transportation
Sheridan & Cheyenne, Wyoming

Campbell County Board of Commissioners
Gillette, Wyoming

August 2007

EXECUTIVE SUMMARY

On December 28, 2001, RAG[1] filed an application with the BLM for federal coal reserves in a tract located west of and immediately adjacent to the Eagle Butte Mine in Campbell County, Wyoming, approximately three miles north of Gillette, Wyoming (Figures ES-1 and ES-2). The application, which was assigned case file number WYW155132, is referred to as the Eagle Butte West coal lease application. RAG submitted a modification to the application to the BLM, effective October 20, 2003, which decreased the size of the lease application area and increased the coal volume. As currently applied for, the Eagle Butte West LBA Tract includes approximately 1,397.64 acres and FCW estimates that it includes 238 million tons of mineable federal coal reserves.

In August 2004, RAG finalized the sale of the Eagle Butte Mine to FCW, a directly held subsidiary of Foundation Coal Corporation. In this EIS, the applicant for the Eagle Butte West LBA Tract is referred to as FCW.

This lease application was reviewed by Division of Mineral and Lands at the BLM Wyoming State Office, who determined that the application and the lands involved met the requirements of the regulations governing coal leasing on application at 43 CFR 3425.1. The PRRCT reviewed this lease application at public meetings held on May 30, 2002, in Casper, Wyoming and on April 27, 2005, in Gillette, Wyoming. At those meetings, the PRRCT recommended that the BLM continue to process the lease application.

In order to process an LBA, the BLM must evaluate the quantity, quality, maximum economic recovery, and fair market value of the federal coal and fulfill the requirements of the NEPA by evaluating the environmental consequences of leasing the federal coal.

To evaluate the environmental impacts of leasing the coal, the BLM must prepare an EA or an EIS to evaluate the site-specific and cumulative environmental and socioeconomic impacts of leasing and developing the federal coal in the application area. The BLM made a decision to prepare an EIS for this lease application. BLM does not authorize mining by issuing a lease for federal coal, but the impacts of mining the coal are considered in this EIS because it is a logical consequence of issuing a maintenance lease to an existing mine.

The EPA published a notice announcing the availability of the Draft EIS in the *Federal Register* on October 20, 2006. BLM published a Notice of Availability and Notice of Public Hearing in the *Federal Register*, also on October 20, 2006. The 60-day comment period on the Draft EIS ended on December 19, 2006. The public hearing was held on November 14, 2006, in Gillette, Wyoming. The applicant and one member of the public made statements during the hearing and eight written comments were received on the Draft EIS. The written comments are included, with agency responses, as Appendix I of the Final EIS.

[1] Refer to page xv for a list of abbreviations and acronyms used in this document.

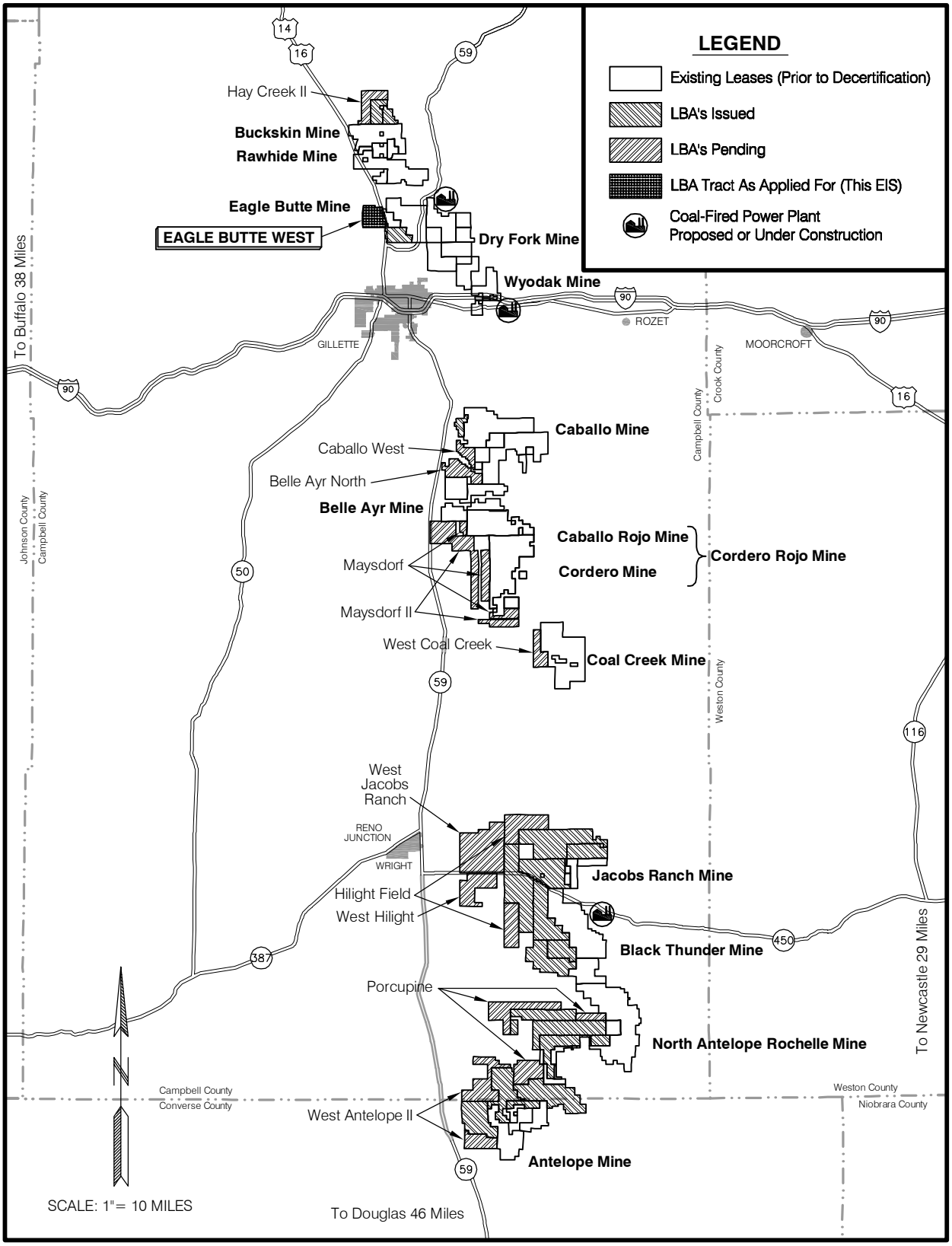

Figure ES-1. General Location Map with Federal Coal Leases and LBA Tracts.

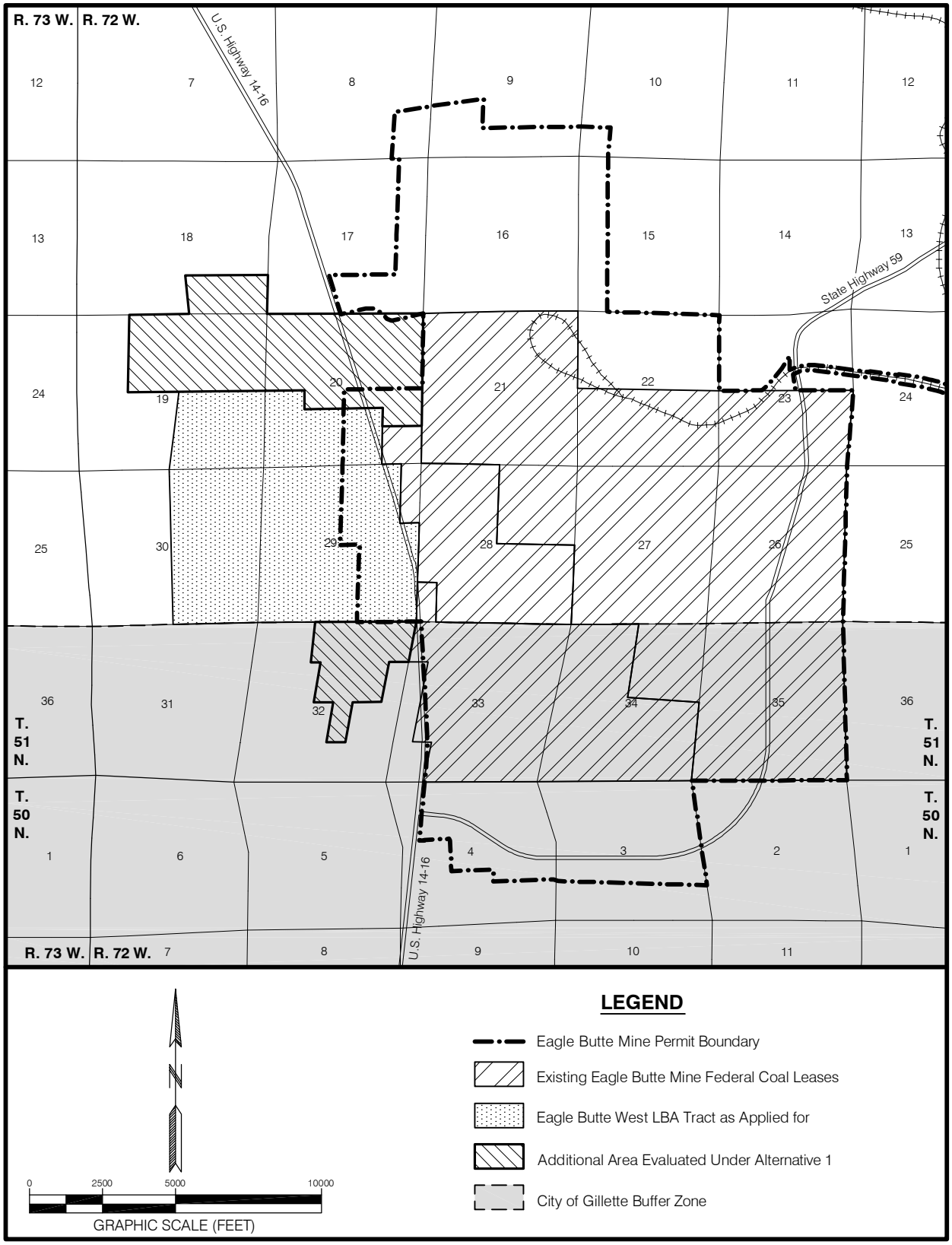

Figure ES-2. Eagle Butte West LBA Tract Alternatives.

The BLM and EPA will each publish a notice of availability of the Final EIS in the *Federal Register*. After a 30-day availability period, the BLM will make a decision to hold or not to hold a competitive sealed-bid lease sale for the tract.

The LBA sale process is, by law and regulation, an open, public, competitive sealed-bid process. Bidding at a potential sale would be open to any qualified bidder. If a lease sale is held for this LBA tract, the applicant (FCW) may not be the successful high bidder. If a lease sale is held, a federal coal lease would be issued to the highest bidder at the sale if a federal sale panel determines that the high bid at that sale meets or exceeds the fair market value of the coal as determined by BLM's economic evaluation, and if the U.S. Department of Justice determines that there are no antitrust violations if a lease is issued to the high bidder at the sale.

Cooperating agencies in the preparation of this EIS include OSM, WDEQ/LQD, WDEQ/AQD, WYDOT, the Campbell County Board of Commissioners, and the Wyoming State Policy Office. Other agencies, including OSM, will also use this analysis to make decisions related to leasing and mining the federal coal in this tract.

Not all of the coal included in the Eagle Butte West LBA Tract as applied for is currently considered to be mineable. Some of the coal included in the tract is overlain by U.S. Highway 14-16. SMCRA prohibits mining within 100 ft of the outside ROW line of any public road unless the appropriate public road authority allows the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected [30 CFR 761.11(d)]. As a result, the federal coal underlying U.S. Highway 14-16, its ROW, and the associated 100 foot buffer zone has been determined to be unsuitable for mining. FCW and WYDOT, the authorized agency, are working on a plan to relocate the highway. If the road relocation is approved, the unsuitability determination for the coal underlying U.S. Highway 14-16, the ROW, and the associated buffer zone could be reconsidered. The coal underlying the highway is included in the tract being considered for leasing because it could be mined if WYDOT determines that the road could be moved [43 CFR 3461.5(c)(2)(iii)]. If the highway is not moved, including these lands in the tract would allow recovery of all the mineable coal adjacent to and outside of the highway buffer zone and would comply with the coal leasing regulations, which do not allow leasing in less than 10-acre aliquot parts.

A Proposed Action and two alternatives to that action are analyzed in detail in this EIS.

- **Proposed Action** - The Proposed Action is to offer the Eagle Butte West LBA Tract as applied for (see Figure ES-2) at a sealed-bid competitive coal lease sale and issue a maintenance lease to the successful bidder. The lease would be subject to the standard and special lease stipulations developed for the PRB that are listed in Appendix D of the Final EIS.

The tract as applied for includes approximately 1,397.64 acres. If U.S. Highway 14-16 is moved, FCW estimates that the Eagle Butte West LBA Tract as applied for includes approximately 238 million tons of mineable coal. If Highway 14-16 is not moved, FCW estimates that the tract as applied for includes approximately 211 million tons of mineable coal.

Under the Proposed Action, FCW currently estimates that average annual production would be 25 million tons per year. The life of the existing mine would be extended by eight to nine years, depending on if Highway 14-16 is or is not moved. Employment would be about 223 persons. The surface of the Eagle Butte West LBA Tract as applied for is owned by FCW.

- **Alternative 1** - Under Alternative 1, BLM would reconfigure the Eagle Butte West LBA Tract, hold a competitive coal lease sale for the lands included in the reconfigured tract, and issue a lease to the successful bidder. Alternative 1, holding a competitive coal sale for a modified tract, is the BLM's Preferred Alternative.

  BLM identified a study area for the Eagle Butte West LBA Tract in order to evaluate the potential that an alternate configuration of the tract would provide for more efficient recovery of the federal coal, increase competitive interest in the Eagle Butte West LBA Tract, and/or reduce the potential that some of the remaining unleased federal coal in this area would be bypassed in the future. The BLM study area, shown in Figure ES-2, includes the tract as applied for and unleased federal coal adjacent to the northern and southern edges of the tract as applied for. In accordance with the Leasing on Application regulation at 43 CFR 3425.1-9, BLM could increase or decrease the size of the tract as applied for under Alternative 1.

  The BLM's preferred tract configuration is to add approximately 30 acres, shown in Figure ES-3, to the northeast corner of the tract as applied for. As shown in Figure ES-4, there are occupied residences and an elementary school located in the BLM study area in the north half of Section 20, T.51N., R.72W. Most of the coal included in BLM's proposed addition to the tract would not be recoverable due to setback distances from the occupied dwellings and school that are required by WDEQ/LQD for conducting blasting operations. However, including this coal in the tract would potentially allow more efficient recovery of the coal up to the required setback distances.

  The modified tract under the BLM's preferred tract configuration includes approximately 1,427.77 acres. If U.S. Highway 14-16 is moved, FCW estimates that the Eagle Butte West LBA Tract under the BLM's preferred tract configuration includes approximately 241 million tons of mineable coal. If Highway 14-16 is not moved, FCW estimates that the

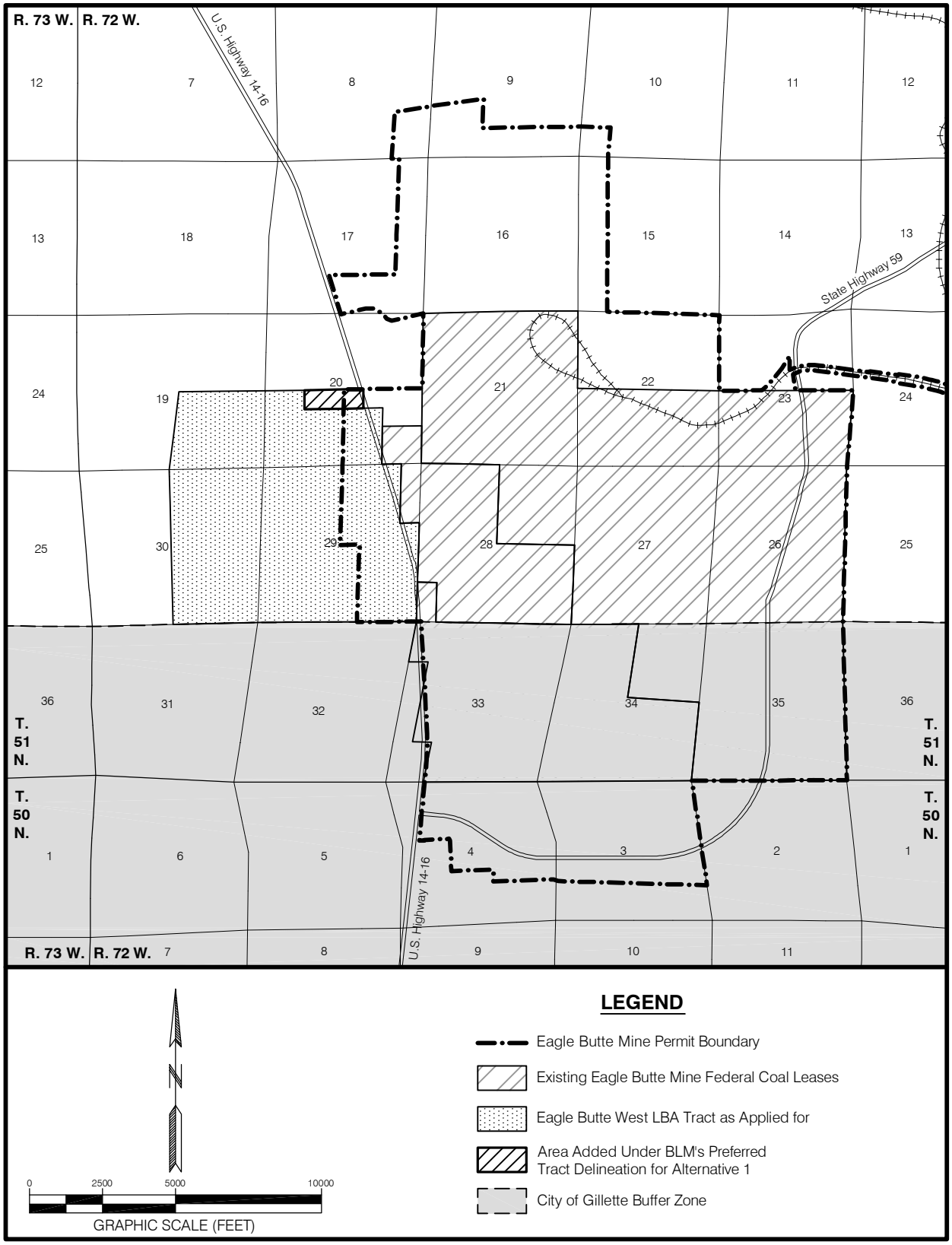

Figure ES-3. Eagle Butte West LBA Preferred Alternative Tract Configuration.

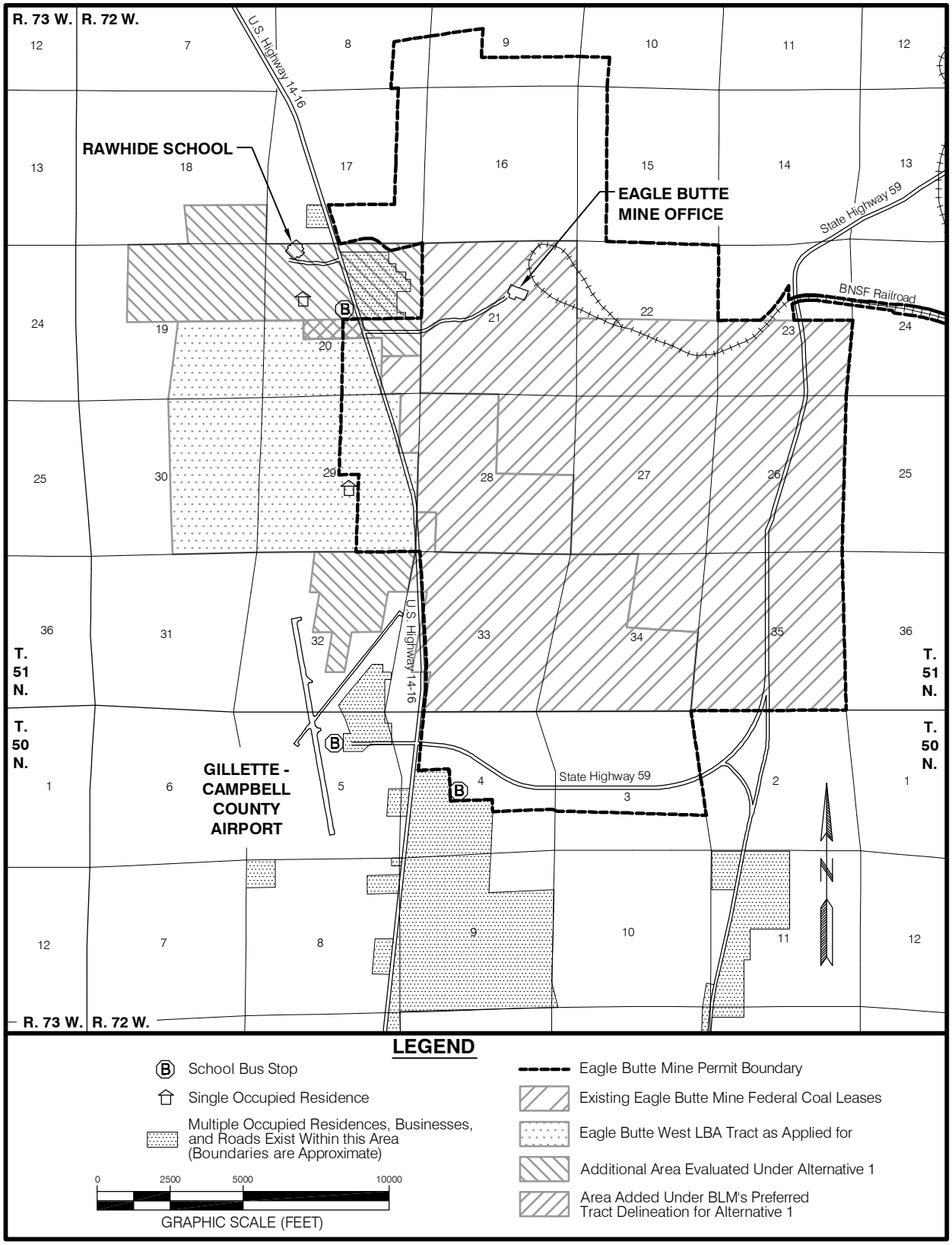

Figure ES-4. Residences, School Bus Stops, Public Roads, and other Publicly Accessible Facilities Within and Adjacent to the Eagle Butte West LBA Tract.

tract under the BLM's preferred tract configuration includes approximately 214 million tons of mineable coal.

Under this alternative, the modified tract would be subject to the standard and special lease stipulations developed for the PRB and for this tract (Appendix D in the FEIS). The projected rate of production and employment would be similar to the Proposed Action. The life of the existing mine would be extended by eight to nine years, depending on if Highway 14-16 is or is not moved.

Alternative 2 - Under this alternative, the LBA tract would not be leased, but the existing leases at the adjacent Eagle Butte Mine would be developed according to the existing approved mining plan. Under the No Action Alternative, the Eagle Butte Mine would mine its remaining leased coal reserves in approximately 14 years at an average annual production rate of 25 million tons per year and average employment would be 223 persons. Rejection of the lease application would not preclude an application to lease the tract in the future.

The analysis in this EIS assumes that FCW would be the successful bidder on the Eagle Butte West LBA Tract if a sale is held, and that it would be mined as a maintenance tract for the Eagle Butte Mine.

Tables ES-1 and ES-2 summarize estimated coal production, surface disturbance, and mine life for the Eagle Butte Mine. Table ES-1 summarizes the situation if Highway 14-16 is moved and Table ES-2 assumes that the highway is not moved. The environmental impacts of mining the LBA tract would be similar under the Proposed Action and under the BLM's preferred tract configuration for Alternative 1. The following discussion assumes that Highway 14-16 is not moved.

Other alternatives that were considered but not analyzed in detail include holding a competitive coal lease sale and issuing a lease to the successful bidder (not the applicant) for the purpose of developing a new stand-alone mine, and delaying the sale of the Eagle Butte West LBA Tract as applied for to increase the benefit to the public afforded by higher coal prices and/or to allow more complete recovery of the potential CBNG resources in the tract prior to mining.

Critical elements of the human environment (BLM 1988) that could be affected by the proposed project include air quality, cultural resources, Native American religious concerns, T&E plant and animal species, migratory birds, hazardous or solid waste, water quality, wetlands/riparian zones, environmental justice, and invasive nonnative species. Five critical elements (areas of critical environmental concern, prime and unique farmland, floodplains, wild and scenic rivers, and wilderness) are not present in the project area and are not addressed further. In addition to the critical elements that are potentially present in the project area, the EIS discusses the status and potential effects of

Table ES-1. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for Eagle Butte West LBA Tract and Eagle Butte Mine – Assuming Highway 14-16 is Moved and the Underlying Coal is Recovered.

Item	**No Action Alternative (Existing Eagle Butte Mine)**	**Added by Proposed Action**	**Added by Alternative 1 (Preferred Tract Configuration)**
In-Place Coal (as of 1/1/06)	374.0 mmt	238.0 mmt	243.7 mmt
Mineable Coal (as of 1/1/06)	354.0 mmt	238.0 mmt	241.2 mmt
Recoverable Coal (as of 1/1/06)[1]	340.0 mmt	228.0 mmt	231.1 mmt
Coal Mined Through 2005	420.4 mmt	--	--
Lease Area[2]	4,884.0 ac	1,397.6 ac	1,427.8 ac
Total Area To Be Disturbed[2]	6,076.0 ac	2,460.0 ac	2,460.0 ac
Permit Area[2]	7,471.0 ac	2,460.0 ac	2,460.0 ac
Average Annual Post-2005 Coal Production	25.0 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2005)	13.6 yrs	9.1 yrs	9.2 yrs
Average Number of Employees	223	0	0
Total Projected State Revenues (post-2005)[3]	$ 384.4 million	$ 293.5 – $ 373.2 million	$ 297.4 – $ 378.2 million
Total Projected Federal Revenues (post-2005)[4]	$ 261.6 million	$ 211.1 – $ 290.9 million	$ 214.0 – $ 294.8 million

[1] Assumes 96 percent recovery of mineable coal. The estimated tons of recoverable coal added under the Proposed Action and Alternative 1 are based on the assumptions that the coal beneath the north half of Section 20 (under Alternative 1) would not be mined, and that the coal beneath U.S. Highway 14-16 ROW and associated buffer zone would be mined.

[2] The lease area includes federal coal leases only and does not include state coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

[3] Revenues to the State of Wyoming include income from severance tax, property and production taxes, sales and use taxes, and Wyoming's share of federal royalty payments, bonus bids, and AML fees. State revenues are based on $5.80 per ton (projected for 8,400-Btu coal) price × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus $0.35 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus payment on LBA leased coal of $0.30 to $0.97 per ton (based on the range of bonus payments for the last 6 LBAs sold in 2004 and 2005) × amount of mineable coal minus federal's 50 percent share, plus $0.023 per ton estimate for sales and use taxes × amount of recoverable coal, plus $0.26 per ton estimate for Ad Valorem taxes × amount of recoverable coal, plus $0.31 per ton estimate for severance taxes × amount of recoverable coal.

[4] Federal revenues are based on $5.80 per ton (projected for 8,400-Btu coal) price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus $0.35 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus $5.80 per ton (for 8,400-Btu coal) price × amount of recoverable coal × black lung tax of 4.0 percent, plus bonus payment on LBA leased coal of $0.30 to $0.97 per ton (based on the range of bonus payments for the last 6 LBAs sold in 2004 and 2005) × amount of mineable coal minus state's 50 percent share.

Table ES-2. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for Eagle Butte West LBA Tract and Eagle Butte Mine – Assuming Highway 14-16 is Not Moved and the Underlying Coal is Not Recovered.

Item	**No Action Alternative (Existing Eagle Butte Mine)**	**Added by Proposed Action**	**Added by Alternative 1 (Preferred Tract Configuration)**
In-Place Coal (as of 1/1/06)	374.0 mmt	238.0 mmt	243.7 mmt
Mineable Coal (as of 1/1/06)	354.0 mmt	211.0 mmt	214.2 mmt
Recoverable Coal (as of 1/1/06)[1]	340.0 mmt	203.0 mmt	206.1 mmt
Coal Mined Through 2005	420.4 mmt	--	--
Lease Area[2]	4,884.0 ac	1,397.6 ac	1,427.8 ac
Total Area To Be Disturbed[2]	6,076.0 ac	2,395.0 ac	2,415.0 ac
Permit Area[2]	7,471.0 ac	2,460.0 ac	2,460.0 ac
Average Annual Post-2005 Coal Production	25.0 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2005)	13.6 yrs	8.1 yrs	8.2 yrs
Average Number of Employees	223	0	0
Total Projected State Revenues (post-2005)[3]	$ 384.4 million	$ 261.1 - $ 331.8 million	$ 264.2 - $ 336.0 million
Total Projected Federal Revenues (post-2005)[4]	$ 261.6 million	$ 187.9 - $ 258.5 million	$ 190.7 - $ 262.5 million

[1] Assumes 96 percent recovery of mineable coal. The estimated tons of recoverable coal added under the Proposed Action and Alternative 1 are based on the assumptions that the north half of Section 20 (under Alternative 1) would not be mined, and the coal beneath the U.S. Highway 14-16 ROW and associated buffer zone would not be mined.

[2] The lease area includes federal coal leases only and does not include state coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

[3] Revenues to the State of Wyoming include income from severance tax, property and production taxes, sales and use taxes, and Wyoming's share of federal royalty payments, bonus bids, and AML fees. State revenues are based on $5.80 per ton (projected for 8,400-Btu coal) price × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus $0.35 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus payment on LBA leased coal of $0.30 to $0.97 per ton (based on the range of bonus payments for the last 6 LBAs sold in 2004 and 2005) × amount of mineable coal minus federal's 50 percent share, plus $0.023 per ton estimate for sales and use taxes × amount of recoverable coal, plus $0.26 per ton estimate for Ad Valorem taxes × amount of recoverable coal, plus $0.31 per ton estimate for severance taxes × amount of recoverable coal.

[4] Federal revenues are based on $5.80 per ton (projected for 8,400-Btu coal) price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus $0.35 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus $5.80 per ton (for 8,400-Btu coal) price × amount of recoverable coal × black lung tax of 4.0 percent, plus bonus payment on LBA leased coal of $0.30 to $0.97 per ton (based the range of bonus payments for the last 6 LBAs sold in 2004 and 2005) × amount of mineable coal minus state's 50 percent share.

the project on topography and physiography, geology, mineral resources, soils, water availability and quality, AVFs, vegetation, wildlife, land use and recreation, paleontological resources, visual resources, noise, transportation resources, and socioeconomics.

The project area is located in the PRB, a part of the Northern Great Plains that includes most of northeastern Wyoming. The Eagle Butte West LBA Tract is located in the eastern part of the PRB, in an area consisting primarily of a dissected rolling upland plain with low relief, broken by low red-capped buttes, mesas, hills, and ridges. Elevations range from about 4,240 ft to 4,560 ft above sea level, slopes range from flat to around 40 percent, and 73 percent of the surface has a slope of five percent or less.

At the Eagle Butte Mine, there are two mineable coal seams, which are locally referred to as the Roland (upper seam) and Smith (lower seam). The two seams are separated by a shale parting of variable thickness. The mineable coal seams are referred to as the Anderson and Canyon, Wyodak-Anderson, and Wyodak coal beds at other mines in the eastern PRB. Mining would remove an average of 325 feet of overburden, eight feet of interburden, and 110 feet of coal under the Proposed Action and the BLM's preferred tract configuration for Alternative 1.

The existing topography on the LBA tract would be substantially changed during mining. A highwall with a vertical height equal to overburden plus coal thickness would exist in the active pits. Following reclamation, the average surface elevation would be lower due to removal of the coal. The reclaimed land surface would approximate premining contours and the basic drainage network would be retained; however, the reclaimed surface would contain fewer and gentler topographic features. This could contribute to reduced habitat diversity and wildlife carrying capacity on the LBA tract. These topographic changes would not conflict with regional land use, and the postmining topography would adequately support anticipated postmining land use.

The geology from the base of the coal to the land surface would be subject to considerable permanent change on the LBA tract under the Proposed Action or the BLM's preferred tract configuration for Alternative 1. The coal would be permanently removed and the replaced overburden would be a relatively homogeneous mixture compared to the premining layered overburden. Development of other minerals potentially present on the Eagle Butte West LBA Tract could not occur during mining, but could occur after mining.

There are currently no producing conventional oil wells on the tract as applied for or the BLM's preferred tract configuration under Alternative 1. If any conventional wells are drilled prior to mining, they would have to be plugged and abandoned during mining but could be recompleted after mining if the remaining reserves justify the expense of the recompletion.

Extensive development of CBNG in the Roland-Smith/Wyodak-Anderson coal zone has occurred in the vicinity of the Eagle Butte West LBA Tract, beginning in the late 1980s. WOGCC records show that as of May 19, 2006, 68 wells had been drilled for CBNG production and 19 wells were capable of producing from the main coal beds in the BLM study area (the Eagle Butte West LBA Tract as applied for and the additional area evaluated under Alternative 1) (WOGCC 2006). Extensive CBNG development has also occurred immediately north, west, and south of the LBA tract. There has been little recent interest in drilling additional wells in this area. CBNG resources that are not recovered prior to mining would be vented to the atmosphere and irretrievably lost when the coal is removed. BLM's policy is to optimize recovery of both resources, ensure the public receives a reasonable return, and encourage agreements between lessees or use BLM authority to minimize loss of publicly owned resources.

No significant or unique paleontological resources have been recorded in the general analysis area.

Moderately adverse short-term impacts to air quality would be extended onto the Eagle Butte West LBA Tract during the time it is mined if a lease is issued. Modeling for the current Eagle Butte Mine permit predicted no exceedances of the annual PM_{10} NAAQS at a 35-mmtpy production rate and there have been no exceedances of the 24-hour and annual PM_{10} NAAQS. Figure ES-5 shows the maximum modeled PM_{10} and NO_x concentrations at the Eagle Butte Mine for 2006. If the Eagle Butte Mine acquires and mines the Eagle Butte West LBA Tract, the mine estimates that the average annual rate of production would be 25 mmtpy, and that mine life would be extended for about eight to nine additional years. There would be an increase in overburden thickness but fugitive dust emissions would be expected to remain within daily and annual NAAQS limits.

Low-lying, gaseous orange clouds containing NO_x that can be transported by wind sometimes form from overburden blasting prior to coal removal. Exposure to NO_x can cause adverse health effects. EPA has expressed concerns that NO_x levels in some blasting clouds may be sufficiently high at times to cause human health effects.

Prior to 2001, WDEQ received reports of public exposure to blasting clouds from blasts at the Eagle Butte Mine from residents in the area of the mine (Emme 2007). Nearby residents brought concerns about blasting practices at the Eagle Butte Mine to the EQC several times, which resulted in the inclusion of conditions regulating blasting operations in the mine's WDEQ/LQD mine permit. Control measures to limit public exposure to NO_2 from blasting are in place and being implemented at the Eagle Butte Mine. Since these control measures were implemented, WDEQ/LQD has received one report of an orange-tinged blasting cloud at the mine, but no visible NO_x fumes left the mine permit area during that incident (Emme 2007).

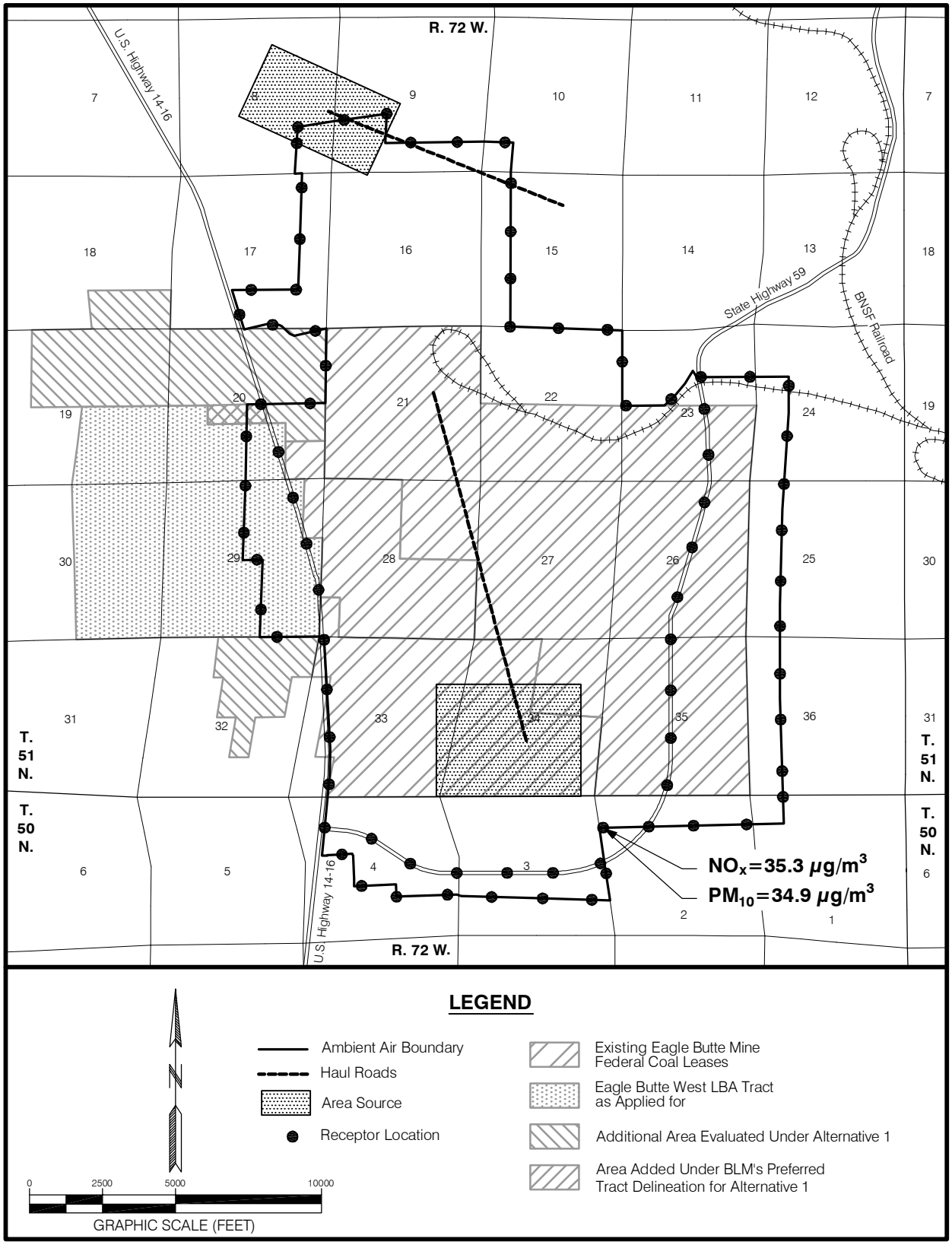

Figure ES-5. Maximum Modeled PM_{10} and NO_X Concentrations at the Eagle Butte Mine Ambient Air Boundary for the Year 2006.

Public exposure to emissions caused by surface mining operations is most likely to affect travelers on publicly accessible roads and highways that pass through and near the area of the mining operations and occupants of dwellings or businesses near the area of mining operations. The Eagle Butte Mine is three miles north of the City of Gillette, and there are occupied residences, school bus stops, U.S. Highway 14-16 and other public roads, Rawhide Elementary School, the Gillette-Campbell County Airport, and other publicly-accessible facilities in the vicinity of the Eagle Butte West LBA Tract (Figure ES-4). The density of residences and publicly-accessible businesses increases to the south, toward Gillette.

Mining would disturb the coal aquifer and the aquifers in the overburden above the coal within the Eagle Butte West LBA Tract. The coal aquifer and any water-bearing strata in the overburden would be removed and replaced with unconsolidated backfill. The area of drawdown in the areally-continuous coal aquifer related to mining operations at the Eagle Butte Mine would be expected to increase roughly in proportion to the increase in area affected by mining. Figure ES-6 shows the projected life-of-mine drawdown that would result from currently approved mining on the existing leases with the addition of the Eagle Butte West LBA Tract. The area of drawdown in the discontinuous overburden aquifers would be smaller. The data available indicate that, after reclamation, the hydraulic properties of the backfill would be comparable to the properties of the premining overburden and coal aquifers. TDS levels in groundwater from the backfill could initially be expected to be higher than in the premining overburden and coal aquifers, but would be expected to meet Wyoming Class III standards for use as livestock water.

Mining would not directly disturb aquifers below the coal. FCW has two water supply wells completed in aquifers below the coal and these wells would be used to supply water for a longer period of time if the Eagle Butte West LBA Tract is leased.

Little Rawhide Creek and its tributary, Prong Draw, drain the Eagle Butte West LBA Tract. Little Rawhide Creek is currently diverted from its natural channel as a result of mining within the existing Eagle Butte Mine permit area. The creek would also be diverted during mining of the LBA tract, but would be restored during reclamation. After mining and reclamation are complete, surface water flow, quality, and sediment discharge would approximate premining conditions.

Surface water quality varies with flow and/or season. Changes in runoff characteristics and sediment discharges would occur during mining of the LBA tract, and erosion rates could reach high values on the disturbed areas as a result of vegetation removal. However, state and federal regulations require that surface runoff from mined lands be treated to meet effluent standards, so sediment would be deposited in ponds or other sediment-control devices within the mine permit area.

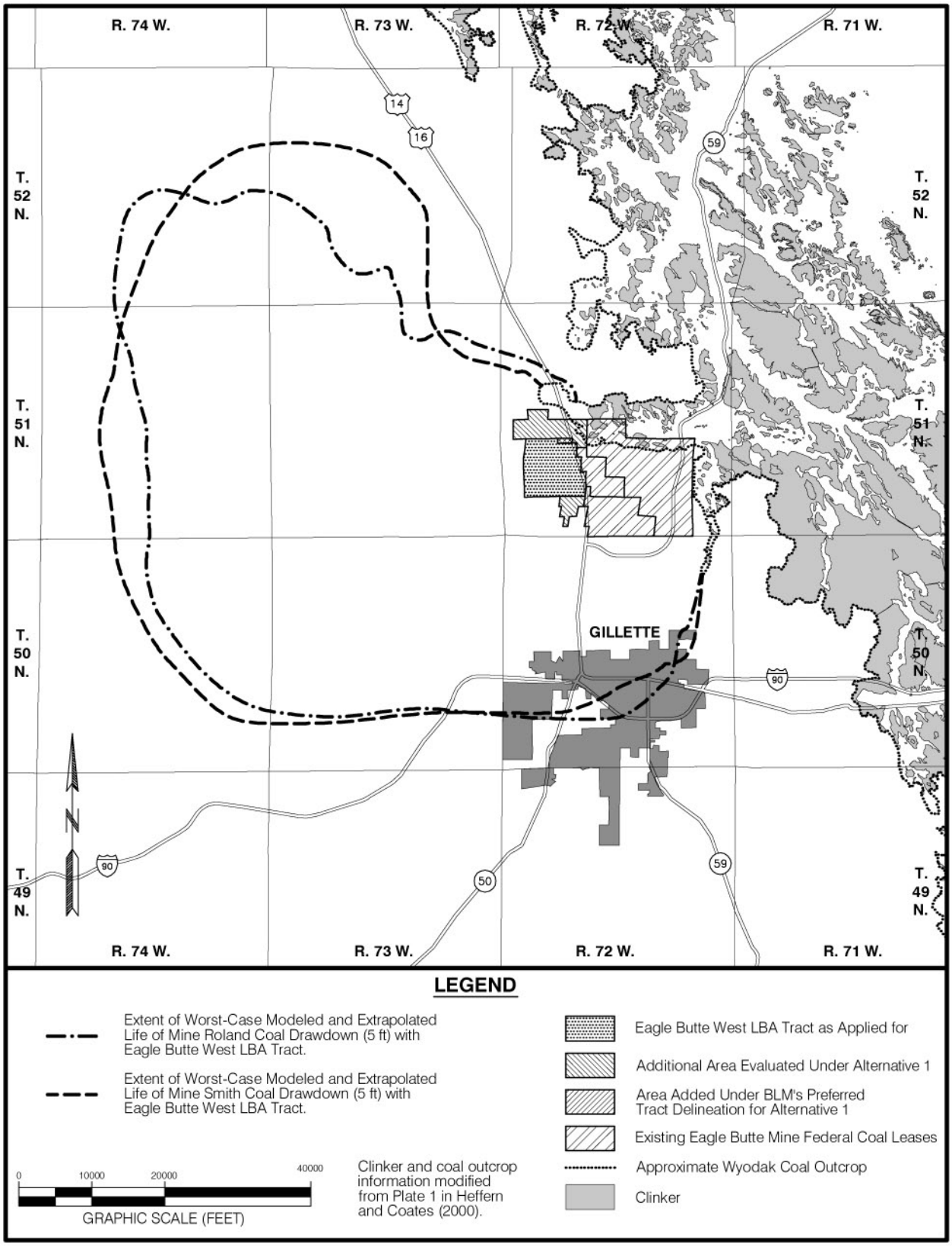

Figure ES-6. Life of Mine Drawdown Map, Resulting from Currently Approved Mining With Addition of the Eagle Butte West LBA Tract.

The reach of Little Rawhide Creek within the LBA tract has been investigated for the presence of AVFs and has been declared an AVF non-significant to farming by the WDEQ/LQD as part of the mine permitting process for the purpose of recovering coal in the mine's existing leases. Approximately 83 acres of declared AVF lie within the Eagle Butte West LBA Tract as applied for, and an additional 45 acres of declared AVF lie within the additional area evaluated under Alternative 1.

A preliminary wetlands inventory, based on USFWS NWI mapping and vegetation mapping in the field, was conducted in 2004. The wetland analysis area includes the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional lands evaluated under Alternative 1) and a ¼-mile disturbance buffer around the tract sufficient to mine and reclaim the tract as a part of the existing Eagle Butte Mine operation. Within the entire wetland analysis area, the preliminary inventory identified approximately 37.5 acres of jurisdictional wetlands that occur along the watercourses of Little Rawhide Creek and its tributaries. Existing wetlands located in the LBA tract would be destroyed by mining operations. Jurisdictional wetlands that are disturbed by mining must be replaced during the reclamation process.

Consequences to soil resources from mining the LBA tract would include changes in the physical, biological, and chemical properties. Following reclamation, the soils would be unlike premining soils in texture, structure, color, accumulation of clays, organic matter, microbial populations, and chemical composition. The replaced topsoil would be more uniform in type, thickness, and texture. It would be adequate in quantity and quality to support planned postmining land uses (i.e., wildlife habitat and rangeland).

The predominant vegetation types, in terms of total acres of occurrence in the vegetation analysis area are agricultural pasture 1 (36.1 percent), sagebrush grassland (27.6 percent), and agricultural pasture 2 (11.9 percent). Common plant species on these types include crested wheatgrass, smooth brome, needleandthread, threadleaf sedge, Sandberg bluegrass, western wheatgrass, cheatgrass brome, silver sagebrush, and Wyoming big sagebrush. Mining would progressively remove this native vegetation. Reclamation and revegetation of mined areas would occur contemporaneously with mining on adjacent lands. Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures, which are approved by the WDEQ/LQD. The majority of these species would be native to the LBA tract. Initially, the reclaimed land would be dominated by grassland vegetation, which would be less diverse than the premining vegetation. Estimates for the time it would take to restore sagebrush to premining density levels range from 20 to 100 years. An indirect long-term impact associated with this vegetative change would potentially be a decrease in available habitat for shrub dependent species. However, a diverse, productive, and permanent vegetative cover would be established on the LBA tract within about 10 years following reclamation, prior to release of the final reclamation bond. The decrease in plant diversity would not seriously affect the potential productivity of the

reclaimed areas, and the proposed postmining land uses (wildlife habitat and rangeland) should be achieved even with the changes in vegetation composition and diversity. The reclamation plans for the LBA tract would also include steps to control invasion by weedy (invasive, nonnative) plant species.

Direct impacts of surface coal mining on wildlife occur during mining and are short term. They include road kills by mine-related traffic, direct losses of less mobile wildlife species, restrictions on wildlife movement created by fences, spoil piles and pits, displacement of wildlife from existing habitat in areas of active mining (including abandonment of nests or nesting and breeding habitat for birds), increased competition between animals in areas adjacent to mining operations, and increased noise, dust, and human presence. Habitat for aquatic species would also be lost during mining operations. Indirect impacts are longer term and include alterations in topography and vegetative cover following reclamation, which may decrease wildlife carrying capacity and habitat diversity. The Eagle Butte West LBA Tract does not include any unique or crucial big game habitat, and habitat disturbance would be incremental, with reclamation progressing as new disturbance occurs. There are two sage grouse leks within the wildlife study area that have been active within the last five years. In the long term, following reclamation, carrying capacity and habitat diversity may be reduced due to gentler topography, less diverse vegetative cover, and reduction in sagebrush density.

At this time, T&E plant and animal species that could be present on the tract include the Ute ladies'-tresses orchid, bald eagle, and black-footed ferret. However, the USFWS published a notice in the *Federal Register* removing the bald eagle in the lower 48 states from the list of endangered and threatened wildlife on July 9, 2007. The effective date for this action will be August 8, 2007. The bald eagle will continue to be protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act after delisting.

Areas of suitable habitat for the Ute ladies'-tresses orchid within the Eagle Butte West LBA Tract and adjacent study area were surveyed by Habitat Management, Inc. in August and September 2004 and in August 2005, and no individuals were located. Bald eagles are relatively common winter residents and migrants in northeastern Wyoming's PRB. During 2004, qualified biologists with TWC conducted searches for bald eagle winter roosts and potential nesting habitat within the BLM study area for the LBA tract (the tract as applied for and the additional area evaluated under Alternative 1) and a one-mile perimeter. No bald eagles, roosts, or potential nesting habitat were observed at that time. Over time, individual eagles have infrequently been seen during winter foraging within the one-mile survey area or perched in the cottonwood trees on the tract. Bald eagle foraging habitat would be lost on the tract during mining and before final reclamation. The black-footed ferret is a nocturnally active mammal that depends almost entirely upon the prairie dog for its survival. No black-tailed prairie dog colonies are currently present on the BLM study area for the Eagle Butte West LBA Tract. One small town

(approximately one acre in size) is located approximately one mile north of the northern edge of the BLM study area.

Active mining would preclude other land uses. Recreational and grazing use of the LBA tract would be severely limited during mining. Oil and gas development would be curtailed and CBNG that is not recovered prior to mining would be vented and irretrievably lost as the coal is removed. The surface of the tract as applied for and the BLM's preferred tract configuration under Alternative 1 is owned by FCW.

Within 10 years after initiation of each reclamation phase, rangeland and wildlife use would return to near premining levels. The cumulative impacts of energy development (coal mining, oil and gas) in the PRB are and will continue to contribute to a reduction in hunting opportunities for some animals (pronghorn, mule deer, and sage-grouse).

The Eagle Butte West LBA Tract has been surveyed for cultural resources at the Class III level. A total of 17 cultural sites (nine re-recorded and eight new) were documented in the survey area. Twelve isolated finds were also recorded. Of the 17 cultural sites, nine are prehistoric, five are historic, and three are multi-component. All cultural sites are protected from disturbance until consultation with SHPO is completed and agreement regarding NRHP eligibility is reached.

No sites of Native American religious or cultural importance have been identified on the LBA tract. If such sites or localities are identified at a later date, appropriate action must be taken to address concerns related to those sites.

U.S. Highway 14-16 crosses the eastern portion of the tract; however, FCW and WYDOT are working on a plan to relocate the highway, as discussed above. It is likely that some mining activities on the LBA tract would be visible from this major travel route whether it is moved or remains in its current location. Mining would affect landscapes classified by BLM as VRM Class V, and the landscape character would not be significantly changed following reclamation. No unique visual resources have been identified on or near the LBA tract.

There are occupied dwellings, businesses, the Rawhide Elementary School, and the airport located in the vicinity of the Eagle Butte West LBA Tract (Figure ES-4). These facilities would experience an adverse noise impact if mining activities (particularly blasting) occur within 2,500 ft of them under either the Proposed Action or the BLM's preferred tract configuration for Alternative 1.

Leasing the Eagle Butte West LBA Tract would extend the length of time that coal is shipped from the permitted Eagle Butte Mine, which would extend the length of time that coal transportation facilities would be required under the Proposed Action or under the BLM's preferred tract configuration for Alternative 1. Vehicular traffic to and from the mine would continue for an

additional eight years. As discussed above, not all of the coal included in the Eagle Butte West LBA Tract is mineable. U.S. Highway 14-16 overlies some of the coal included in the tract under both the Proposed Action and the BLM's preferred tract configuration for Alternative 1. FCW and WYDOT are working on a plan to relocate the highway, so that the coal underlying the highway ROW can be recovered. Mining the Eagle Butte West LBA Tract as applied for would not bring FCW's operations any closer to the Gillette-Campbell County Airport than they currently are; however, mining activities would continue at existing levels for an additional eight years. Depending upon the location of the final coal lease boundary that is selected by the BLM, a proposed airport expansion would potentially be delayed by eight or more years. Active pipelines and utility lines would have to be relocated in accordance with previous agreements, or agreements would have to be negotiated for their removal or relocation.

Royalty and bonus payments for the coal in the LBA tract would be collected by the federal government and split with the state. Assuming an average coal price of $5.80 per ton recovered and a potential range of bonus payments of 30 to 97 cents per ton, the potential additional federal revenues would range from approximately $188 to $263 million, depending on the alternative selected and the bonus price at the time the coal is leased. The potential additional revenue to the State of Wyoming would range from $261 to $336 million, depending on the alternative selected and the bonus price at the time the coal is leased. Mine life and employment at current levels would be extended by about eight years at the Eagle Butte Mine.

With regard to Environmental Justice issues, it was determined that potentially adverse impacts do not disproportionately affect minorities, low-income groups or Native American tribes or groups. No tribal lands or Native American communities are included in this area, and no Native American treaty rights or Native American trust resources are known to exist for this area.

Under the No Action Alternative, the coal lease application would be rejected and the area contained in the application would not be offered for lease at this time. The tract could be nominated for lease again in the future. Under the No Action Alternative, the impacts described in the preceding paragraphs to topography and physiology, geology and minerals, soils, air quality, water resources, AVFs, wetlands, vegetation, wildlife, T&E species, land use and recreation, cultural resources, Native American concerns, paleontological resources, visual resources, noise, transportation, and socioeconomics would occur on the existing Eagle Butte Mine coal leases, but these impacts would not be extended onto the Eagle Butte West LBA Tract.

If impacts are identified during the leasing process that are not mitigated by existing required mitigation measures, BLM can include additional mitigation measures, in the form of stipulations on the new lease, within the limits of its regulatory authority. BLM has not identified additional special stipulations

that should be added to the BLM lease or areas where additional or increased monitoring measures are recommended.

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. Cumulative impacts can result from individually minor, but collectively significant, actions occurring over time.

Since decertification of the Powder River Federal Coal Region in 1990, 17 coal leases containing more than five billion tons of federal coal have been issued following competitive sealed-bid sales. Three exchanges of federal coal in the Wyoming portion of the Powder River Federal Coal Region have also been completed. Twelve coal lease applications, including the Eagle Butte West application, are currently pending. The pending LBA applications contain over 4.4 billion tons of coal.

Currently, BLM is completing a regional technical study, called the PRB Coal Review, to help evaluate the cumulative impacts of coal and other mineral development in the PRB. The study evaluates current conditions as of a baseline year (2003) and projects development levels and potential associated cumulative impacts related to coal and coal-related development, oil and gas and oil- and gas-related development, and other development through 2020. Due to variables associated with future coal production, two projected coal production scenarios (representing an upper and a lower production level) were developed. The projected development levels are based on projected demand and coal market forecasts and include production at the Eagle Butte Mine during the baseline year and projected production for the mine for 2010, 2015, and 2020.

The Wyoming portion of the PRB is the primary focus of the PRB Coal Review, but the Montana portion of the PRB is included in some studies. A series of reports has been prepared or are being prepared to present the result of the PRB Coal Review studies. The results of the PRB Coal Review studies that have been completed are summarized in Section 4.0 of the EIS.

Cumulative impacts vary by resource, with potential impacts to air quality, groundwater quantity, wildlife habitat, and socioeconomics generally being the greatest concerns.

The PRB Coal Review air quality study documents the modeled air quality impact of existing operations during 2002 and of projected development activities in 2010. The model was used to evaluate impacts of existing and projected source emissions on several source groups, including near-field receptors in Wyoming and Montana, receptors in nearby federally designated “Class I” areas, and receptors at “Class II” sensitive areas. The EPA guideline CALPUFF model system was used for the modeling analysis.

The existing regional air quality conditions are generally very good, but the modeling showed some substantial impacts at some receptors for both the baseline year 2002 and the projected development activities in 2010. Table ES-3 presents the maximum modeled impacts on ambient air quality at the near-field receptors in Wyoming and Montana for 2002 and for the 2010 upper and lower coal development scenarios. Table ES-4 lists the projected modeled visibility impacts for 2002 for all analyzed Class I and sensitive Class II areas. For the upper and lower coal production scenarios, it shows the number of additional days that the impacts were projected to be greater than 1.0 dv (10 percent in extinction) for each site in 2010.

The PRB Coal Review groundwater and surface water studies are in progress, but a number of modeling analyses have previously been conducted to help predict the impacts of surface coal mining on groundwater resources in the PRB. In addition, each mine must monitor groundwater levels in the coal and underlying and overlying aquifers and assess the probable hydrologic consequences of mining as part of the mine permitting process. The monitoring programs track the extent of groundwater drawdown propagation to the west and the extent of recharge and quality of the water in the backfill areas of the mines. The monitoring data indicate that recharge is occurring in the backfill and that water from the backfill will generally be acceptable for premining uses, which is primarily livestock watering. Modeling and monitoring indicate that the groundwater drawdown impacts of coal mining and CBNG development are overlapping.

The PRB Coal Review studies include an evaluation of the impacts to wildlife and aquatic species as of 2003 and an evaluation of the projected levels of disturbance in the PRB in 2010, 2015, and 2020, based on the projected development levels in those years. As discussed above, impacts to wildlife and fisheries can be classified as short-term and long-term. Short-term impacts are related to habitat disturbance during project development and operation. Long-term impacts result from changes in habitat after reclamation is completed. Habitat fragmentation can result from activities such as roads, well pads, mines, pipelines, and electrical power lines, as well as increased noise, elevated human presence, dispersal of noxious and invasive weed species, and dust from unpaved road traffic.

The PRB Coal Review used the REMI Policy Insight regional economic model to project cumulative employment and population levels and associated impacts in the PRB for the upper and lower coal production scenarios in 2010, 2015, and 2020. Table ES-5 presents the recent and projected population levels for the counties included in the PRB Coal Review socioeconomic analysis.

This EIS presents the BLM's analysis of environmental impacts under authority of the NEPA and associated rules and guidelines. The BLM will use this analysis to make a leasing decision. The decision to lease these lands is a necessary requisite for mining, but is not in itself the enabling action that will allow mining. The most detailed analysis prior to mine development would

Table ES-3. Projected Maximum Potential Near-field Impacts (µg/m³).

Pollutant	Averaging Time	Base Year (2002) Impacts	2010 Lower Development Scenario Impacts	2010 Upper Development Scenario Impacts	NAAQS	Wyoming AAQS	Montana AAQS	PSD Class II Increments[2]
Wyoming Near-field								
NO_2	Annual	37.3	42.4	49.0	100	100	--[1]	25
SO_2	Annual	3.9	4.8	5.6	80	60	--[1]	20
	24-hour	14.5	33.5	34.8	365	260	--[1]	91
	3-hour	37.9	148.0	154.2	1,300	1300	--[1]	512
PM_{10}	Annual	42.7	49.0	**56.6**	--[3]	50	--[1]	17
	24-hour	**335.5**	**378.8**	**439.9**	150	150	--[1]	30
Montana Near-field								
NO_2	Annual	8.85	11.3	11.8	100	--[1]	100	25
	1-hour	365.8	415.9	519.5	--	--[1]	564	--
SO_2	Annual	1.3	2.3	2.7	80	--[1]	80	20
	24-hour	18.9	19.5	20.4	365	--[1]	365	91
	3-hour	74.7	76.4	79.8	1,300	--[1]	1,300	512
	1-hour	240.7	246.4	257.3	--	--[1]	1,300	--
PM_{10}	Annual	19.6	22.5	27.7	--[3]	--[1]	50	17
	24-hour	**175.8**	**200.0**	**247.7**	150	--[1]	150	30

[1] No standard or increment.

[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD Increment Consumption Analysis.

[3] On September 21, 2006, the EPA announced final revisions to the NAAQS for particulate matter, which took effect December 18, 2006. The revision revoked the annual PM_{10} standard of 50 µg/m³. The revisions retained the 24-hour PM_{10} standard. The State of Wyoming will enter into rulemaking to revise the Wyoming Ambient Air Quality Standards. See additional discussion in Chapter 3, Section 3.4.2.1.

Bold values indicate projected exceedances of AAQS.

Source: PRB Coal Review Task 3A Report (BLM 2006b)

Table ES-4. Modeled Change in Visibility Impacts at Class I and Sensitive Class II Areas.

Location	2002 No. of Days >10%	2010 Lower Development Scenario Change in No. of Days > 10%	2010 Upper Development Scenario Change in No. of Days > 10%
Federally and Tribally Designated Class I Areas			
Badlands National Park[1]	238	19	26
Bob Marshall WA	12	2	4
Bridger WA	47	4	7
Fitzpatrick WA	42	3	5
Fort Peck Indian Reservation	69	8	9
Gates of the Mountain WA	14	6	7
Grand Teton National Park	26	2	5
North Absaroka WA	47	6	6
North Cheyenne Indian Reservation	305	5	10
Red Rock Lakes	16	3	5
Scapegoat WA	14	4	4
Teton WA	40	4	5
Theodore Roosevelt National Park	98	15	22
UL Bend WA	49	4	5
Washakie WA	53	2	3
Wind Cave National Park	261	11	15
Yellowstone National Park	42	7	8
Sensitive Class II Areas			
Absaroka Beartooth WA	53	3	5
Agate Fossil Beds National Monument	199	26	30
Big Horn Canyon National Rec. Area	108	7	8
Black Elk WA	263	16	22
Cloud Peak WA	137	8	8
Crow Indian Reservation	284	10	15
Devils Tower National Monument	279	15	21
Fort Belknap Indian Reservation	46	3	4
Fort Laramie National Historic Site	153	27	30
Jedediah Smith WA	23	1	2
Jewel Cave National Monument	267	14	18
Lee Metcalf WA	25	2	4
Mount Naomi WA	8	6	8
Mount Rushmore National Monument	248	19	25
Popo Agie WA	47	7	8
Soldier Creek WA	223	23	29
Wellsville Mountain WA	6	5	7
Wind River Indian Reservation	66	12	15

[1] The U.S. Congress designated the Wilderness Area portion of Badlands National Park as a mandatory Federal PSD Class I area. The remainder of Badlands National Park is a PSD Class II area.

Source: PRB Coal Review Task 3A Report (BLM 2006a)

Table ES-5. Recent and Projected PRB Population.

Year	Campbell County	Converse County	Crook County	Johnson County	Sheridan County	Weston County	Total Study Area
Census							
2000	33,698	12,104	5,895	7,108	26,606	6,642	92,053
2003	36,438	12,314	5,986	7,554	27,115	6,671	96,078
Lower Coal Production Scenario							
2010	45,925	13,103	6,542	8,389	28,459	7,108	109,526
2015	48,905	13,671	6,759	8,867	30,016	7,174	115,392
2020	50,995	14,193	6,989	9,326	31,467	7,208	120,178
Upper Coal Production Scenario							
2010	47,662	13,160	6,570	8,424	28,579	7,137	111,532
2015	51,558	13,763	6,802	8,924	30,214	7,219	118,480
2020	54,943	14,313	7,045	9,403	31,733	7,266	124,703

Source: U.S. Census Bureau 2005 (2000 and 2003 data)

occur after the lease is issued, when the lessee files an application for a surface mining permit and mining plan approval, supported by extensive proposed mining and reclamation plans, to the WDEQ/LQD.

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Appendix I. Comment Letters on the Final EIS and Responses

Abbreviations and Acronyms Used in this Report

AAQS	Ambient Air Quality Standards
Ac	acre(s)
ACC	Antelope Coal Company
ac-ft	acre-foot, acre-feet
ac-ft/yr	acre-foot per year, acre-feet per year
AIRS	Aerometric Information and Retrieval System
ALC	Ark Land Company
AML	Abandoned Mine Land
ANC	acidification neutralization capacity
ANFO	ammonium nitrate fuel oil
APLIC	Avian Power Line Interaction Committee
AQD	Air Quality Division
AQRV	air quality related values
ARCO	Atlantic Richfield Company
AREV	SEO water rights database and program
ARS	Air Resource Specialists, Inc.
AUM	animal unit month
AVF	alluvial valley floor
BACM	best available control measures
BACT	best available control technology
bcf	billion cubic feet
bcy	bank cubic yards
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe
BNSF-UP, BNSF&UP	Burlington Northern Santa Fe and Union Pacific
BN-UP, BN&UP	Burlington Northern-Union Pacific
BOE	barrels of oil equivalent
B.P.	before present
Btu	British thermal units
Btu/lb	British thermal units per pound
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAGR	compounded annual growth rate
CANDO	Converse Area New Development Organization
CBNG	coal bed natural gas
CCBC	Campbell County Board of Commissioners
CCEDC	Campbell County Economic Development Corporation
CCSD	Campbell County School District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHIA	Cumulative Hydrologic Impact Assessment
CO	carbon monoxide
CO_2	carbon dioxide
COE	U.S. Army Corps of Engineers
CREG	Consensus Revenue Estimating Group
CRI	Caballo Rojo, Inc.
CWA	Clean Water Act
cy	cubic yards
dBA	A-weighted decibels

Abbreviations and Acronyms Used in this Report

DEIS	Final Environmental Impact Statement
DM&E	Dakota, Minnesota & Eastern Railroad Corporation
DOI	Department of the Interior
dv	deciview, a measure of view impairment
EA	Environmental Assessment
EC	elemental carbon particles (re: air quality)
EIS	Environmental Impact Statement
ENCOAL	Encoal Corporation
EOR	enhanced oil recovery
EPA	Environmental Protection Agency
EQC	Environmental Quality Council
ESA	Endangered Species Act
EUR	estimated ultimate recovery
EVG	Erathem-Vanir Geological, PLLC
F	Fahrenheit
FAA	Federal Aviation Administration
FCLAA	Federal Coal Leasing Act Amendments of 1976
FCW	Foundation Coal West, Inc.
FDM	Fugitive Dust Model
FEA	Final Environmental Assessment
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FLM	Federal Land Management
FLPMA	Federal Land Policy Management Act of 1976
FR	Federal Register
ft	feet, foot
ft/day	feet per day
ft/mile	feet per mile
ft^3	cubic feet
FY	fiscal year
g	Gram
GAO	General Accounting Office
GAGMO	Gillette Area Ground Water Monitoring Organization
GDP	Gross Domestic Product
gpm	gallons per minute
GSP	Gross State Product
HAP	Hazardous Air Pollutant
hp	horsepower
hr	hour
IBLA	Interior Board of Land Appeals
IMPROVE	Interagency Monitoring of Protected Visual Environments
IWAQM	Interagency Workgroup on Air Quality Monitoring
JRCC	Jacobs Ranch Coal Company
km	kilometers
KMCC	Kerr-McGee Coal Corporation
kV	kilovolts
LAC	limits of acceptable change (re: air quality)
LBA	lease by application
lbs/mmBtu	pounds per million British thermal units
LFC	liquids from coal
LNCM	Lands Necessary to Conduct Mining

Abbreviations and Acronyms Used in this Report

LOC	level of concern
LOP	life of project
LRMP	Land and Resource Management Plan
LW	Lower Wyodak coal seam
MACT	Maximum Achievable Control Technology
MBHFI	migratory birds of high federal interest
µeq/L	microequivalents per liter
µg/m^3	micrograms per cubic meter
µmhos/cm	micromhos per centimeter
mcf	thousand cubic feet
MDEQ	Montana Department of Environmental Quality
MDEQ/AWM	Montana Department of Environmental Quality/Air and Waste Management Bureau
MEI	maximally exposed individual
mg/L	milligrams per liter
MLA	Mineral Leasing Act of 1920
MLE	most likely exposure
mm	million
mmbcy	million bank cubic yards
mmbo	million barrels of oil
mmcf	million cubic feet
mmcfpd	million cubic feet of gas per day
mmgpy	million gallons per year
mmt	million tons
mmtpy	million tons per year
mph	miles per hour
MSA	Metropolitan Statistical Area
MSHA	Mine Safety and Health Administration
MW	megawatts
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NAPG	North American Power Group
NEPA	National Environmental Policy Act of 1969
NIOSH	National Institute of Occupational Safety and Health
NO	nitrogen oxide
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSPS	National Source Performance Standards
NWI	National Wetlands Inventory
NWLWG	Northeast Wyoming Local Sage-Grouse Working Group
O_3	photochemical oxidants
OC	organic carbon particles
ORV	Off road vehicle
OSHA	Occupational Safety and Health Administration
OSM	Office of Surface Mining Reclamation & Enforcement
PECs	passive enclosure control systems

Abbreviations and Acronyms Used in this Report

PFYC	Probable Fossil Yield Classification
P.M.	Prime Meridian
$PM_{2.5}$	particulates finer than 2.5 microns in effective diameter
PM_{10}	particulates finer than 10 microns in effective diameter
PMT	postmining topography
PP&L	Pacific Power and Light Company
ppm	parts per million
PRB	Powder River Basin
PRBRC	Powder River Basin Resource Council
PRCC	Powder River Coal Company
PRRCT	Powder River Regional Coal Team
PSD	Prevention of Significant Deterioration
R2P2	Resource Recovery and Protection Plan
RAG	RAG Coal West, Inc.
RH	relative humidity
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-Way
RV	recreational vehicle
SAR	sodium absorption ratio
SARA	Superfund Amendment & Reauthorization Act of 1986
scf/ton	standard cubic feet per ton
SCSD	Sheridan County School District
SEIS	Supplemental Environmental Impact Statement
SEO	State Engineer's Office
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Stations
SMCRA	Surface Mining Control and Reclamation Act of 1977
SO_2	sulfur dioxide
SPRB	South Powder River Basin
STB	Surface Transportation Board
T&E	threatened and endangered
TBCC	Thunder Basin Coal Company, LLC
TBNG	Thunder Basin National Grassland
TCC	Triton Coal Company, LLC
TCO	temporary cessation of operations
TDS	total dissolved solids
TEOM	Tapered Element Oscillating Microbalance
TPY	tons per year
TSP	total suspended particulates
TSS	total suspended solids
TWC	Thunderbird Wildlife Consulting, Inc.
UP	Union Pacific
U.S.	United States
USC, U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USDA-FS	U.S. Department of Agriculture - Forest Service
USDI	U.S. Department of the Interior
USGS	U.S. Geological Survey
USFS	U.S. Forest Service

Abbreviations and Acronyms Used in this Report

USFWS	U.S. Fish and Wildlife Service
UW	Upper Wyodak coal seam
VMT	vehicle miles traveled
VOCs	volatile organic compounds
VRM	visual resource management
WA	Wilderness Area
WAAQS	Wyoming Ambient Air Quality Standards
WAQSR	Wyoming Air Quality Standards and Regulations
WARMS	Wyoming Air Resources Monitoring System
WCIC	Wyoming Coal Information Committee
WDEQ	Wyoming Department of Environmental Quality
WDEQ/AQD	Wyoming Department of Environmental Quality/Air Quality Division
WDEQ/LQD	Wyoming Department of Environmental Quality/Land Quality Division
WFA	Western Fuels Association
WGFD	Wyoming Game and Fish Department
WMA	Wyoming Mining Association
WOC	Wyoming Outdoor Council
WOGCC	Wyoming Oil and Gas Conservation Commission
WRCC	Western Regional Climate Center
WRRI	Water Resources Research Institute
WSBLC	Wyoming State Board of Land Commissioners
WSFC	Wyoming School Facilities Commission
WSGS	Wyoming State Geological Survey
WSO-RMG	Wyoming State Office Reservoir Management Group (BLM)
WYDOT	Wyoming Department of Transportation

1.0 INTRODUCTION

This EIS[1] analyzes the environmental impacts of leasing a tract of federal coal reserves adjacent to the Eagle Butte Mine, an operating surface coal mine in the eastern PRB of Wyoming. The operator of the Eagle Butte Mine filed an application to lease the federal coal included in a maintenance coal tract under the regulations at 43 CFR 3425, Leasing On Application. The Division of Minerals and Lands at the BLM Wyoming State Office reviewed the application and determined that the lease application meets the regulatory requirements for a lease by application, or LBA. The tract is referred to as the Eagle Butte West LBA Tract. Figure 1-1 shows the Eagle Butte West LBA Tract, other currently pending LBA tracts, and the existing federal leases, including previously leased LBA tracts, in the Wyoming PRB.

A separate document, entitled *Supplementary Information on the Affected Environment in the General Analysis Area for the Eagle Butte West Coal Lease Application EIS*, has been prepared to provide more detailed information on the affected environment in the general analysis area. Copies of the supplementary information document are available on request and can be viewed at the BLM offices in Casper and Cheyenne.

1.1 Background

On December 28, 2001, RAG Coal West, Inc. filed an application with the BLM for federal coal reserves in a tract located west of and immediately adjacent to the Eagle Butte Mine in Campbell County, Wyoming, approximately three miles north of Gillette, Wyoming (Figure 1-1). The tract, which was originally referred to as the Eagle Butte Mine West Extension LBA Tract, was assigned case file number WYW155132. The federal coal reserves were applied for as a maintenance tract for the Eagle Butte Mine. BLM subsequently renamed the tract the Eagle Butte West LBA Tract and RAG submitted a modification to the application to the BLM, effective October 20, 2003, which decreased the size of the lease application area and increased the coal volume. BLM reviewed the proposed tract modification and notified the company by letter, dated March 8, 2005, that their application had been revised.

In August 2004, RAG finalized the sale of the Eagle Butte Mine to Foundation Coal West, Inc. (FCW), a directly held subsidiary of Foundation Coal Holdings, Inc. In this EIS, the applicant for the Eagle Butte West LBA Tract will be referred to as FCW.

These federal coal lands are located within the Powder River Federal Coal Region, which was decertified in January 1990. Although the Powder River Federal Coal Region is decertified, the PRRCT, a federal/state advisory board established to develop recommendations concerning management of federal coal in the region, has continued to meet regularly and review all federal lease

[1] Refer to page xv for a list of abbreviations and acronyms used in this document.

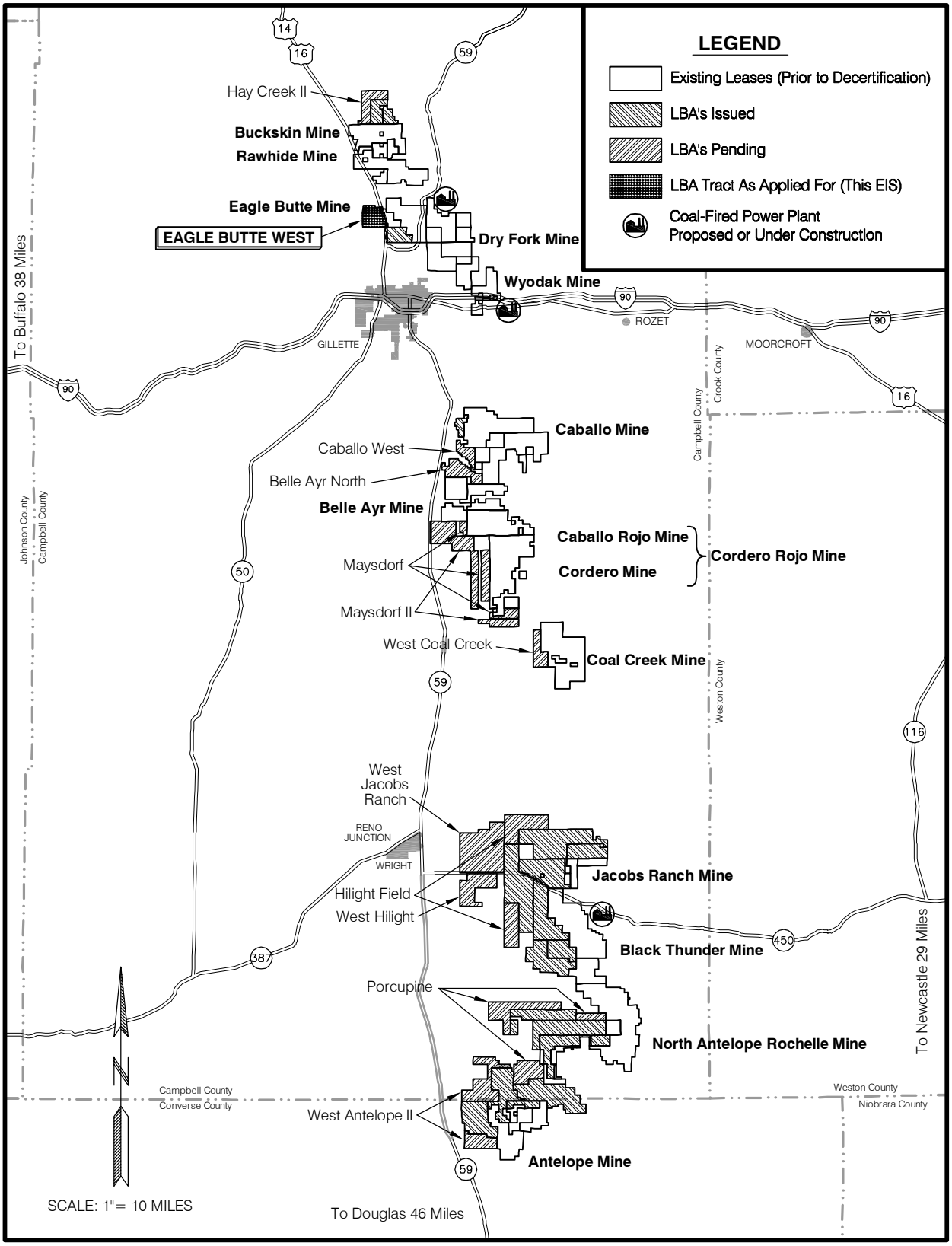


Figure 1-1. General Location Map with Federal Coal Leases and LBA Tracts.

applications in the region. The PRRCT reviewed this maintenance coal lease application at public meetings held on May 30, 2002, in Casper, Wyoming and on April 27, 2005, in Gillette, Wyoming. The PRRCT recommended that the BLM continue to process the Eagle Butte West lease application at both meetings.

In order to process an LBA, the BLM must evaluate the quantity, quality, maximum economic recovery, and fair market value of the federal coal and fulfill the requirements of NEPA by evaluating the environmental impacts of leasing the federal coal. BLM does not authorize mining by issuing a lease for federal coal, but the impacts of mining the coal are considered in this EIS because it is a logical consequence of issuing a maintenance lease to an existing mine. This EIS has been prepared to evaluate the site-specific and cumulative environmental impacts of leasing and developing the federal coal included in the Eagle Butte West application area. BLM will use the analysis in this EIS to decide whether to hold a competitive, sealed-bid lease sale for the tract as applied for, hold a competitive, sealed-bid lease sale for a modified tract, or reject the lease application and not offer the tract for sale at this time. A Record of Decision will be issued and, if the decision is to offer the tract for lease, a sale will be held. If a sale is held, the bidding at the sale would be open to any qualified bidder; it would not be limited to the applicant.

If the lease sale is held, a lease would be issued to the highest bidder at the sale if a federal sale panel determines that the high bid meets or exceeds the fair market value of the coal as determined by BLM's economic evaluation and if the U.S. Department of Justice determines that there would be no antitrust violations if a lease is issued to the high bidder.

In return for receiving a lease, a lessee must pay the federal government a bonus equal to the amount it bids at the time the lease sale is held (the bonus can be paid in five yearly installments), make annual rental payments to the federal government, and make royalty payments to the federal government when the coal is mined. Federal bonus, rental, and royalty payments are equally divided with the state in which the lease is located.

Federal, state, and local agencies may qualify as cooperating agencies because of "jurisdiction by law or special expertise" (40 CFR 1501.6, 1508.5). BLM invited the participation of potentially qualified agencies as cooperating agencies in the preparation of the Eagle Butte West Coal Lease Application EIS. In response, one federal agency (OSM), four state agencies (WDEQ/LQD, WDEQ/AQD, WYDOT, and the Wyoming State Planning Office), and one county agency (the Campbell County Board of Commissioners) requested cooperating agency status. OSM has primary responsibility to administer Federal programs that regulate surface coal mining operations. WDEQ has entered into a cooperative agreement with the Secretary of the Interior to regulate surface coal mining operations on federal and non-federal lands within the State of Wyoming. WYDOT's responsibilities include planning and supervising road improvement work, maintaining roads, and supporting airports and aviation in

the state. The responsibilities of the Campbell County Board of Commissioners include, but are not limited to, management and oversight of county roads and facilities and planning and zoning rules in the county.

Since decertification of the Powder River Federal Coal Region, 17 federal coal leases have been sold at competitive sealed-bid sales and three exchanges of federal coal in the Wyoming portion of the Powder River Federal Coal Region have been completed (Table 1-1). A lease for a tract adjacent to the Eagle Butte Mine was issued to RAG on August 1, 1995, after they submitted the successful bid for a maintenance tract at a competitive sealed-bid coal lease sale (Figure 1-1 and Table 1-1).

Table 1-2 summarizes the twelve lease applications that are currently pending.

The Eagle Butte West LBA Tract as applied for and the existing federal coal leases in the adjacent Eagle Butte Mine are shown in Figure 1-2. As applied for, the Eagle Butte West LBA Tract consists of a single block of federal coal and includes approximately 1,397.64 acres and an estimated 238 million tons of in-place coal reserves. Not all of the coal included in the Eagle Butte West LBA Tract is currently considered to be mineable. U.S. Highway 14-16 overlies some of the coal included in the tract. SMCRA prohibits mining within 100 ft on either side of the ROW of any public road unless the appropriate public road authority allows the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected [30 CFR 761.11(d)]. The coal underlying Highway 14-16, its ROW, and the 100 ft buffer zone is included in the tract being considered for leasing because that coal could be mined if WYDOT, the authorized agency, determines that the road can be moved [43 CFR 3461.5(c)(2)(iii)]. If the highway is not moved, including the coal underlying the highway in the lease would allow maximum recovery of all the mineable coal adjacent to the 100 ft buffer zone on either side of the highway ROW. FCW estimates that approximately 27 million tons of mineable coal are included within the ROW and associated buffer zone. Excluding the federal coal reserves within the highway ROW and buffer zone, FCW estimates that approximately 211 million tons of coal reserves are mineable and that approximately 203 million tons of coal would be recovered from the Eagle Butte West LBA Tract as applied for.

The Eagle Butte Mine, as currently permitted, includes 7,471 acres and originally contained approximately 707.9 million tons of mineable coal reserves. The mine produced approximately 25.3 million tons of coal in 2006. As of January 1, 2006, an estimated 374 million tons of in-place coal reserves remained at the Eagle Butte Mine. FCW estimates that approximately 340 million tons of those remaining reserves are recoverable and that those recoverable reserves will be depleted in approximately 13.6 years, based on the assumption that the average production rate remains at approximately 25 million tons per year. Eagle Butte Mine's currently approved (by WDEQ/AQD on October 24, 2005) air quality permit (MD-1251) allows up to 35 million tons

Table 1-1. Leases Issued and Exchanges Completed Since Decertification, Powder River Basin, Wyoming.

Leases Issued			
LBA Name (Lease Number) **Applicant Mine** **Current Lessee** **Effective Date**	**Acres Leased[1]**	**Mineable Tons of Coal[1]**	**Successful Bid**
Jacobs Ranch (WYW117924) Jacobs Ranch Mine Jacobs Ranch Coal Co. 10/1/1992	1,708.620	147,423,560	$20,114,930.00
West Black Thunder (WYW118907) Black Thunder Mine Thunder Basin Coal Co. 10/1/1992	3,492.495	429,048,216	$71,909,282.69
North Antelope/Rochelle (WYW119554) North Antelope & Rochelle Mines Powder River Coal Co. 10/1/1992	3,064.040	403,500,000	$86,987,765.00
West Rocky Butte (WYW122586) No Existing Mine[2] Caballo Coal Co. 1/1/1993	463.205	56,700,000	$16,500,000.00
Eagle Butte (WYW124783) Eagle Butte Mine Foundation Wyoming Land Co. 8/1/1995	1,059.180	166,400,000	$18,470,400.00
Antelope (WYW128322) Antelope Mine Antelope Coal Co. 2/1/1997	617.200	60,364,000	$9,054,600.00
North Rochelle (WYW127221) North Rochelle Mine Ark Land Co. 1/1/1998	1,481.930	157,610,000	$30,576,340.00
Powder River (WYW136142) North Antelope Rochelle Mine Powder River Coal Co. 9/1/1998	4,224.225	532,000,000	$109,596,500.00
Thundercloud (WYW136458) Jacobs Ranch Mine Thunder Basin Coal Co., LLC 1/1/1999	3,545.503	412,000,000	$158,000,008.50
Horse Creek (WYW141435) Antelope Mine Antelope Coal Co. 12/1/2000	2,818.695	275,577,000	$91,220,120.70
North Jacobs Ranch (WYW146744) Jacobs Ranch Mine Jacobs Ranch Coal Co. 5/1/2002	4,982.240	537,542,000	$379,504,652.00
NARO South (WYW154001) North Antelope Rochelle Mine BTU Western Resources, Inc. 9/1/2004	2,956.725	297,469,000	$274,117,684.00

Table 1-1. Leases Issued and Exchanges Completed Since Decertification, Powder River Basin, Wyoming (Continued).

Leases Issued

LBA Name (Lease Number) **Applicant Mine** **Current Lessee** **Effective Date**	**Acres Leased[1]**	**Mineable Tons of Coal[1]**	**Successful Bid**
West Hay Creek (WYW151634) Buckskin Mine Kiewit Mining Properties, Inc. 1/1/2005	921.158	142,698,000	$42,809,400.00
Little Thunder (WYW150318) Black Thunder Mine Ark Land LT Co. 3/1/2005	5,083.500	718,719,000	$610,999,949.80
West Antelope (WYW151643) Antelope Mine Antelope Coal Co. 3/1/2005	2,809.130	194,961,000	$146,311,000.00
NARO North (WYW150210) North Antelope Rochelle Mine BTU Western Resources, Inc. 3/1/2005	2,369.380	324,627,000	$299,143,785.00
West Roundup (WYW151134) North Rochelle Mine West Roundup Resources, Inc 5/1/2005	2,812.510	327,186,000	$317,697,610.00
TOTALS	**44,409.736**	**5,183,824,776**	**$2,683,014,027.69**

Exchanges Completed

Exchange Name **Case File Number** **Exchange Proponent** **Exchange Type** **Effective Date**	**Acres Exchanged**	**Mineable Tons of Coal**	**Federal Coal Exchanged for:**
EOG (Belco) I-90 Lease Exchange WYW150152 EOG Resources (formerly Belco)[3] I-90 Lease Exchanged for New Lease 4/1/2000	599.170	106,000,000	Lease Rights to Belco I-90 Lease (WYW0322794).
Pittsburg & Midway Coal Exchange WYW148816 Pittsburg and Midway Coal Mining Co. Private Land Exchanged for Federal Coal 1/27/2005	2,045.530	84,200,000	6,065.77 acres of land and some minerals in Lincoln, Carbon, and Sheridan Counties, Wyoming.
Gold Mine Draw Lease Exchange WYW0321779, WYW154001 Powder River Coal Co. AVF Lease Exchanged for New Lease 6/25/2006	623.000	47,700,000	Lease rights to 921.60 acres of leased federal coal underlying an AVF.
TOTALS	**3,267.700**	**237,900,000**	

1 Information from Sale Notice.
2 The West Rocky Butte LBA was originally leased to Northwestern Resources Co.
3 The EOG Resources Belco Exchange lease is now owned by the Buckskin Mine.

Table 1-2. Pending LBAs and Exchanges, Powder River Basin, Wyoming.

Pending LBAs

LBA Name Lease Number Applicant Mine	Application Date	Acres as Applied for	Estimated as Applied for Coal (mmt)	Status
Maysdorf **(formerly Mt. Logan)** WYW154432 Cordero Rojo Mine	9/20/2001 Modified 11/8/2004	2,219.39	230.30 [2]	FEIS available 4/13/2007 ROD in preparation
Eagle Butte West **(formerly West Extension)** WYW155132 Eagle Butte Mine	12/28/2001 Modified 10/16/2003	1,397.64	228.00 [3]	DEIS available 10/20/2006 Hearing 11/14/2006 FEIS in preparation
Belle Ayr North WYW161248 Belle Ayr Mine	7/06/2004	1,578.76	200.00 [3]	Scoping period ended 6/1/2007 DEIS in preparation
West Antelope II WYW163340 Antelope Mine	4/06/2005	4,108.60	429.70 [1]	Scoping period ended 12/1/2006 DEIS in preparation
Hilight Field WYW164812 Black Thunder Mine	10/07/2005	4,590.19	588.20 [3]	PRRCT reviewed 4/19/2006
West Hilight Field WYW172388 Black Thunder Mine	1/17/2006	2,370.52	428.00 [3]	PRRCT reviewed 4/19/2006
West Coal Creek WYW172585 Coal Creek Mine	2/10/2006	1,151.26	57.00 [3]	Scoping period ended 12/1/2006 DEIS in preparation
Caballo West WYW172657 Caballo Mine	3/15/2006	777.48	87.52 [2]	Scoping period ended 12/1/2006 DEIS in preparation
West Jacobs Ranch WYW172685 Jacobs Ranch Mine	3/24/2006	5,944.37	956.00 [1]	PRRCT reviewed 4/19/2006
Hay Creek II WYW172684 Buckskin Mine	3/24/2006	1,447.00	148.00 [2]	PRRCT reviewed 4/19/2006
Maysdorf II WYW173360 Cordero Rojo Mine	9/1/2006	4,653.84	483.00 [3]	Scoping period ended 12/1/2006 DEIS in preparation
Porcupine WYW173408 North Antelope Rochelle Mine	9/29/2006	5,111.39	598.00 [2]	PRRCT reviewed 1/18/2007
TOTALS		**35,350.44**	**4,433.72**	

[1] Estimated tons of in-place coal as reported in the lease application.
[2] Estimated tons of mineable coal as reported in the lease application.
[3] Estimated tons of recoverable coal as reported by the applicant.

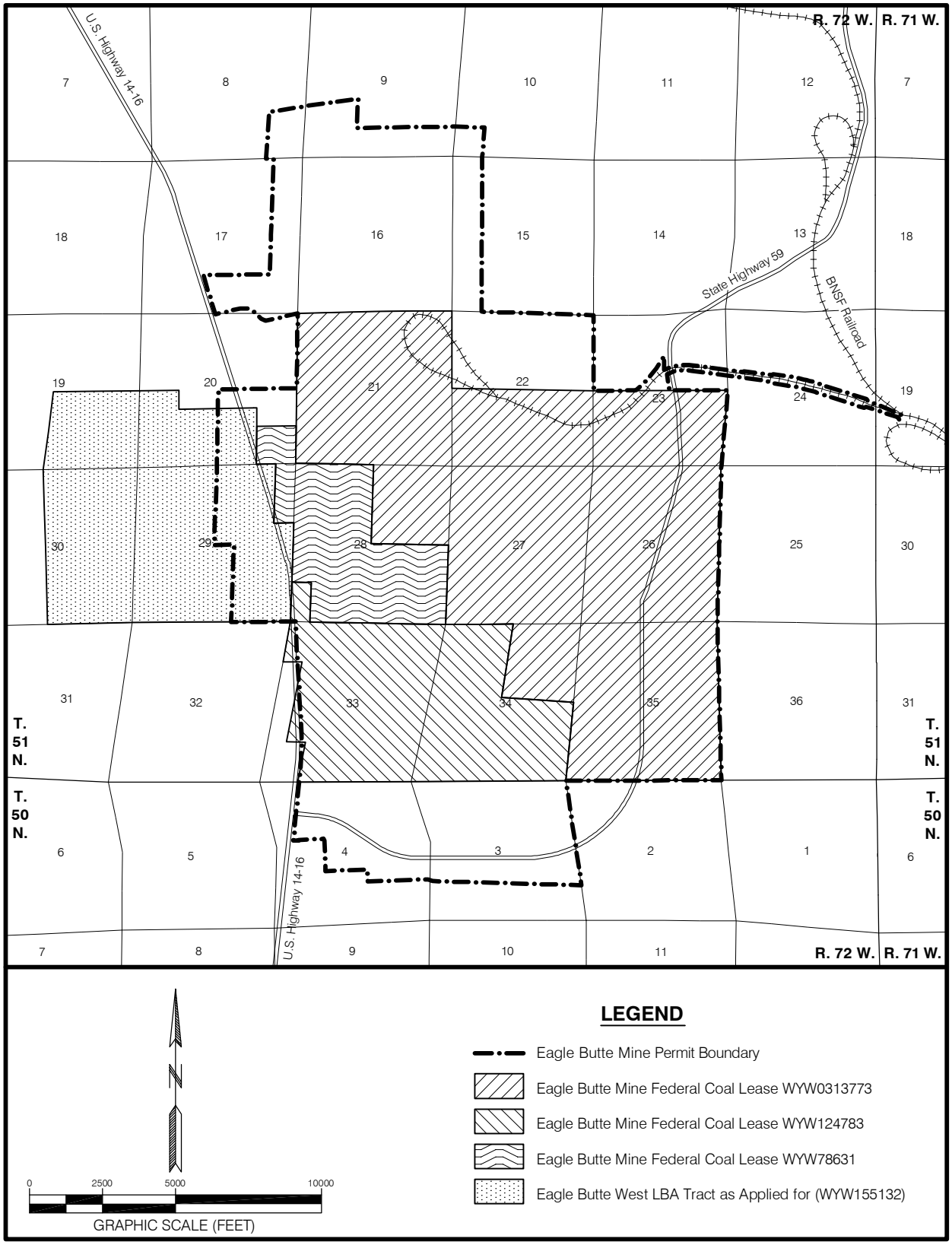


Figure 1-2. Eagle Butte Mine Federal Coal Leases and Eagle Butte West LBA Tract as Applied for.

of coal per year to be mined. If the average rate of production increases to the permitted level of 35 million tons per year, the remaining recoverable reserves would be depleted in about 9.7 years.

The Eagle Butte West LBA Tract is contiguous to and west of the Eagle Butte Mine and a portion of the tract lies within the Eagle Butte Mine's current mining permit boundary (Figure 1-2). The area applied for is substantially similar to the adjacent mine for which detailed site-specific environmental data have been collected and for which environmental analyses have previously been prepared to secure the existing lease and necessary mining permits. As shown in Figure 1-1, the Eagle Butte West LBA Tract is not contiguous with any of the other existing mines in this area.

The surface of the Eagle Butte West LBA Tract as applied for is owned by FCW. Currently, the principal land uses within the LBA tract are grazing by domestic animals and wildlife habitat. The grazing lands include agricultural pasturelands and native grasslands. CBNG production is also a major land use within the LBA tract.

The mining method would be truck and shovel, which is the mining method currently in use at the Eagle Butte Mine. The coal would be used primarily for electric power generation.

After mining, the land would be reclaimed to a rangeland function suitable for use by livestock and wildlife, as is the current practice at the Eagle Butte Mine. Industrial postmining land uses, which include but are not limited to, oil and gas wells, pipelines, roads, and utility easements, will also be reestablished as required.

1.2 Purpose and Need for Action

BLM administers the federal coal leasing program under the Mineral Leasing Act of 1920. A federal coal lease grants the lessee the exclusive right to obtain a mining permit for, and to mine coal on, the leased tract subject to the terms of the lease, the mining permit, and applicable state and federal laws. Before a new lease can be mined, the lessee must obtain approval of a detailed permit to conduct mining operations.

This EIS is being prepared in response to an application BLM received from an existing mine, the Eagle Butte Mine, to lease a tract of federal coal in the Wyoming PRB. In response to this coal lease application, the BLM must decide whether to hold a competitive, sealed-bid lease sale for the tract as applied for, hold a competitive sealed-bid lease sale for a modified tract, or reject the current lease application and not offer the tract for sale at this time.

FCW has applied for the coal reserves in the Eagle Butte West LBA Tract in order to extend the life of the Eagle Butte Mine. Mining operations at the Eagle

Butte Mine would be extended for about eight additional years if FCW acquires a lease for the Eagle Butte West LBA Tract, the coal underlying U.S. Highway 14-16 is not mined, and the average production rate at the Eagle Butte Mine is 25 million tons per year. If production increases to the permitted level of 35 million tons per year, mining operations would be extended by about six years if FCW acquires a lease for the Eagle Butte West LBA Tract, assuming that the coal underlying the highway is not mined. If Highway 14-16 is moved and the underlying coal is mined, production would be extended for about one additional year. If the LBA tract is leased to the applicant as a maintenance tract, the mining and reclamation permit for the adjacent Eagle Butte Mine would have to be amended to include the new lease area before it could be disturbed. This process takes several years to complete. FCW is applying for federal coal reserves now so that they can negotiate new contracts and then complete the permitting process in time to meet anticipated new contract requirements.

As discussed above, the purpose of FCW's application is to allow the Eagle Butte Mine access to a continuing supply of low sulfur compliance coal, which it can continue to sell to power plants for the purpose of electric power generation. According to the Energy Information Administration, coal was responsible for more than 51 percent of the total generation in the electric power sector in 2004 and 2005 (EIA 2007). Continued leasing of PRB coal enables coal-fired power plants to meet CAA requirements without constructing new plants, revamping existing plants, or switching to existing alternative fuels. This helps provide a stable supply of power to meet increasing demand without a potentially significant increase in power costs for individuals and businesses.

A primary goal of the National Energy Policy is to add energy supplies from diverse sources, including domestic oil, gas, and coal, as well as hydropower and nuclear power. BLM recognizes that the continued extraction of coal is essential to meet the nation's future energy needs. As a result, private development of federal coal reserves is integral to the BLM coal leasing program under the authority of the MLA, as well as FLPMA and FCLAA. The coal leasing program, managed by BLM, encourages the development of domestic coal reserves and reduction of the U.S. dependence on foreign sources of energy. As a result of the leasing and subsequent mining and sale of federal coal resources in the PRB, the public receives lease bonus payments, lease royalty payments, and a reliable supply of low sulfur coal for power generation.

This EIS analyzes the environmental impacts of issuing a federal coal lease and mining the federal coal in the Eagle Butte West maintenance coal lease application as required by NEPA and associated rules and guidelines. A decision to hold a competitive sale and issue a lease for the lands in this application is a prerequisite for mining but it is not the enabling action that would allow mining to begin. The BLM does not authorize mining operations by issuing a lease. After a lease has been issued but prior to mine development, the lessee must file a permit application package with the

WDEQ/LQD and OSM for a surface mining permit and approval of the MLA mining plan. An analysis of a detailed site-specific mining and reclamation plan occurs at that time. Authorities and responsibilities of the BLM and other concerned regulatory agencies are described in the following sections.

1.3 Regulatory Authority and Responsibility

The Eagle Butte West maintenance coal lease application was submitted and will be processed and evaluated under the following federal authorities:

- MLA, as amended;
- Multiple-Use Sustained Yield Act of 1960;
- NEPA;
- FCLAA;
- FLPMA; and
- SMCRA.

The BLM is the lead agency responsible for leasing federal coal lands under the MLA as amended by FCLAA and is also responsible for preparation of this EIS to evaluate the potential environmental impacts of issuing a coal lease.

OSM is a cooperating agency on this EIS. After a federal coal lease is issued, SMCRA gives OSM primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations. WDEQ is also a cooperating agency on this EIS. Pursuant to Section 503 of SMCRA, the WDEQ developed, and in November 1980 the Secretary of the Interior approved, a permanent program authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on nonfederal lands within the State of Wyoming. In January 1987, pursuant to Section 523(c) of SMCRA, WDEQ entered into a cooperative agreement with the Secretary of the Interior authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on federal lands within the state.

Pursuant to the cooperative agreement, a federal coal lease holder in Wyoming must submit a permit application package to OSM and WDEQ/LQD for any proposed coal mining and reclamation operations on federal lands in the state. WDEQ/LQD reviews the permit application package to insure the permit application complies with the permitting requirements and the proposed coal mining operation meets the performance standards of the approved Wyoming program. OSM, BLM, and other federal agencies review the permit application package to insure it complies with the terms of the coal lease, the MLA, NEPA, and other federal laws and their attendant regulations. If the permit application package does comply, WDEQ issues the applicant a permit to conduct coal mining operations. OSM recommends approval, approval with conditions, or disapproval of the MLA mining plan to the Assistant Secretary of the Interior, Land and Minerals Management. Before the MLA mining plan can be approved, the BLM must concur with this recommendation.

If a proposed LBA tract is leased to an existing mine, the lessee is required to revise its coal mining permit prior to mining the newly-leased coal, following the processes outlined above. As a part of that process, a detailed new plan would be developed showing how the newly-leased lands would be mined and reclaimed. The area of mining disturbance would be larger than the newly-leased area to allow for activities such as overstripping, matching reclaimed topography to undisturbed topography, constructing flood control and sediment control facilities, and related activities. Specific impacts that would occur during the mining and reclamation of the LBA tract would be addressed in the mining and reclamation plan, and specific mitigation measures for anticipated impacts would be described in detail at that time.

WDEQ enforces the performance standards and permit requirements for reclamation during a mine's operation and has primary authority in environmental emergencies. OSM retains oversight responsibility for this enforcement. Where federal surface or coal resources are involved, BLM has authority in emergency situations if WDEQ or OSM cannot act before environmental harm and damage occurs. In preparing this EIS, BLM also has a responsibility to consult with and obtain the comments and assistance of other state and federal agencies that have jurisdiction by law or special expertise with respect to potential environmental impacts.

Appendix A presents other federal and state permitting requirements that must be satisfied to mine this LBA tract.

1.4 Relationship to BLM Policies, Plans, and Programs

In addition to the federal acts listed under Section 1.3, guidance and regulations for managing and administering public lands, including the federal coal lands in the FCW application, are set forth in 40 CFR 1500 (Protection of Environment), 43 CFR 1601 (Planning, Programming, Budgeting), and 43 CFR 3400 (Coal Management).

Specific guidance for processing applications is provided by BLM Manual 3420, Competitive Coal Leasing (BLM 1989) and the 1991 *Powder River Regional Coal Team Operational Guidelines For Coal Lease-By-Applications* (BLM 1991). The *National Environmental Policy Act Handbook* (BLM 1988) has been followed in developing this EIS.

1.5 Conformance with Existing Land Use Plans

FCLAA requires that lands considered for leasing be included in a comprehensive land use plan and that leasing decisions be compatible with that plan. The BLM *Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office* (BLM 2001a) [an update of the *Buffalo Resource Area Resource Management Plan* (BLM 1985)] governs and addresses the leasing of federal coal in Campbell County.

The major land use planning decision that BLM must make concerning the federal coal resources is a determination of which federal coal lands are acceptable for further consideration for leasing. There are four screening procedures that BLM uses to identify these coal lands. These screening procedures require BLM to:

- estimate development potential of the coal lands;
- apply the unsuitability criteria listed in the regulations at 43 CFR 3461;
- make multiple land use decisions that eliminate federal coal deposits from consideration for leasing to protect other resource values; and
- consult with surface owners who meet the criteria defined in the regulations at 43 CFR 3400.0-5(gg)(1) and (2).

Only those federal coal lands that pass these screens are given further consideration for leasing. BLM has applied these coal screens to federal coal lands in Campbell County several times, starting in the early 1980s. Most recently, in 1993, BLM began the process of reapplying the four screens to federal coal lands in Campbell, Converse, and Sheridan counties. This analysis was adopted in the 2001 BLM Buffalo Field Office RMP update (BLM 2001a). The results of this analysis are included as Appendix D of the 2001 BLM Buffalo Field Office RMP update, which can be viewed in the 2001 NEPA documents section on the Wyoming BLM website at: http://www.blm.gov/wy/st/en/info/NEPA/documents.html.

Under the first coal screening procedure, a coal tract must be located within an area that has been determined to have coal development potential [43 CFR 3420.1-4(e)(1)]. The Eagle Butte West coal lease application is within the area identified as having coal development potential by the BLM in the coal screening analyses published in the 2001 BLM Buffalo Field Office planning document.

The second coal screening procedure requires the application of the unsuitability criteria listed in the regulations at 43 CFR 3461. These coal mining unsuitability criteria have been applied to high to moderate coal development potential lands in the Wyoming PRB, including the Eagle Butte West LBA Tract and surrounding lands during the coal screening conducted for the 2001 BLM Buffalo Office RMP update. No lands included in the Eagle Butte West LBA Tract were found to be unsuitable for mining during the application of the unsuitability criteria for the 2001 RMP update; however, site-specific unsuitability determinations for some criteria were deferred until an application to lease was filed.

Appendix B of this EIS summarizes the unsuitability criteria, describes the general findings for the 2001 BLM Buffalo Field Office RMP update, and presents a validation of these findings for the Eagle Butte West LBA Tract.

Unsuitability Criterion Number 3 states that lands within 100 ft of the outside line of the ROW of a public road shall be considered unsuitable for surface coal

mining, with certain exceptions. One of the exceptions allows surface coal mining in the ROW and buffer zone for a public road if the regulatory authority (or the appropriate public road authority designated by the regulatory authority) allows the public road to be relocated or closed after providing public notice and opportunity for a public hearing; and finding in writing that the interests of the affected public and landowners will be protected [30 CFR 761.11(d) and 43 CFR 3461.5(c)(iii)].

As discussed in Section 1.1 and shown in Figure 1-2, a portion of Highway 14-16 crosses the eastern edge of the Eagle Butte West LBA Tract. The 2001 BLM Buffalo RMP update deferred a decision on the unsuitability of the Highway 14-16 ROW and associated buffer zone until a leasing action occurred, with the assumption that the exception discussed above would be applicable. At this time, FCW does not have approval from the appropriate public road authority (WYDOT) to relocate the road and the exception does not apply. As a result, BLM has determined that the portion of the Eagle Butte West LBA Tract that includes Highway 14-16, its ROW, and a 100-ft buffer zone on either side of the ROW must be considered unsuitable for mining under Unsuitability Criterion Number 3 at this time.

FCW and WYDOT are working on a plan to relocate Highway 14-16, which would allow recovery of the coal underlying the highway, the ROW and the buffer zone. If the road relocation is approved, the exception to Unsuitablity Criterion Number 3 would be applicable and the unsuitability determination for the coal underlying Highway 14-16, the ROW, and the associated buffer zone could be reconsidered.

Although lands within the Highway 14-16 ROW and associated buffer zone are now determined to be unsuitable for mining, they are included in the LBA tract. If the Eagle Butte West LBA Tract is leased, but FCW does not get approval to relocate the road and the unsuitability designation remains in place, including these lands in the tract would allow recovery of all the mineable coal adjacent to and outside of the highway buffer zone and would comply with the coal leasing regulations, which do not allow leasing in less than 10-acre aliquot parts. If a permit to relocate the road is approved, including these lands in the tract would allow recovery of the coal underlying the highway ROW and associated buffer zone. A stipulation stating that no mining activity may be conducted within the Highway 14-16 ROW and associated 100-foot buffer zone until a permit to move the highway is approved will be attached if a lease is issued for this tract. The exclusion of the coal underlying the highway ROW and associated buffer zone from mining activity by lease stipulation honors the finding of unsuitability for mining under Unsuitability Criterion Number 3 for Highway 14-16.

The third coal screening procedure, a multiple land use conflict analysis, must be completed to identify and “eliminate additional coal deposits from further consideration for leasing to protect resource values of a locally important or unique nature not included in the unsuitability criteria”, in accordance with 43

CFR 3420.1-4(e)(3). The 2001 Buffalo RMP update addresses two types of multiple land use conflicts: municipal/residential conflicts and multiple mineral development (coal versus oil and gas) conflicts.

The municipal/residential multiple land use conflict was addressed in the 1985 Buffalo RMP by applying buffers around the municipal planning boundaries for the major municipalities within the BLM Buffalo Field Office area, including Gillette. The Gillette Buffer Zone, which extends three miles beyond the City of Gillette Planning District (Figure 1-3), was established at the request of the city in 1979 during the planning process when the predecessor to the Buffalo RMP (the Buffalo Management Framework Plan) was amended. The Buffalo Management Framework Plan included a provision that prohibited new coal leasing within the Gillette Buffer Zone. The Buffer Zone provision was carried forward into the BLM Buffalo RMP (1985) and the BLM Buffalo RMP update (2001). The purpose of the buffer zone is to allow for community expansion and open space. At the time the Gillette Buffer Zone was established, several existing coal leases associated with existing approved coal mining operations were located within its northern and eastern boundaries (Figure 1-3). These mining operations were allowed to continue operations within the buffer zone.

In 1987, the Wyodak Mine (Figure 1-3) applied for a lease modification to acquire a small portion of federal coal within the buffer zone that would be bypassed if it was not mined with the adjacent leased coal. The City of Gillette passed a resolution in favor of approving Wyodak's proposed lease modification (Gillette City Council Resolution 634, 12/7/1987). In response to Wyodak's application and the City of Gillette's resolution, the Buffalo RMP was amended in 1988 to allow lease modifications, exchanges, and emergency coal leasing within the Gillette Buffer Zone in situations where coal adjacent to existing mines would be bypassed if coal leasing was not allowed within the buffer zone, and where coal leasing would not conflict with city planning. These leasing actions cannot extend more than one mile beyond the existing coal lease boundaries. The RMP amendment also specified that, before any new coal is leased within the buffer zone, the coal screening process, including application of the coal unsuitability criteria, would be conducted and the Gillette City Council would be consulted.

The decertification of the Powder River Federal Coal Region in 1990 allowed the BLM to begin processing applications to lease federal coal under the Leasing on Application regulations. On July 25, 1991, the operator of the Eagle Butte Mine (AMAX Land Company at that time) filed an application for a tract of federal coal that extended one mile into the Gillette Buffer Zone. The City of Gillette passed a resolution in support of AMAX's proposed LBA on July 1, 1991.

The 1988 amendment to the Buffalo RMP did not specifically identify Leasing on Application as being allowed within the Gillette Buffer Zone. The regulations that apply to emergency coal leasing, found at 43 CFR 3425, are the same regulations that apply to Leasing on Application (the LBA process).

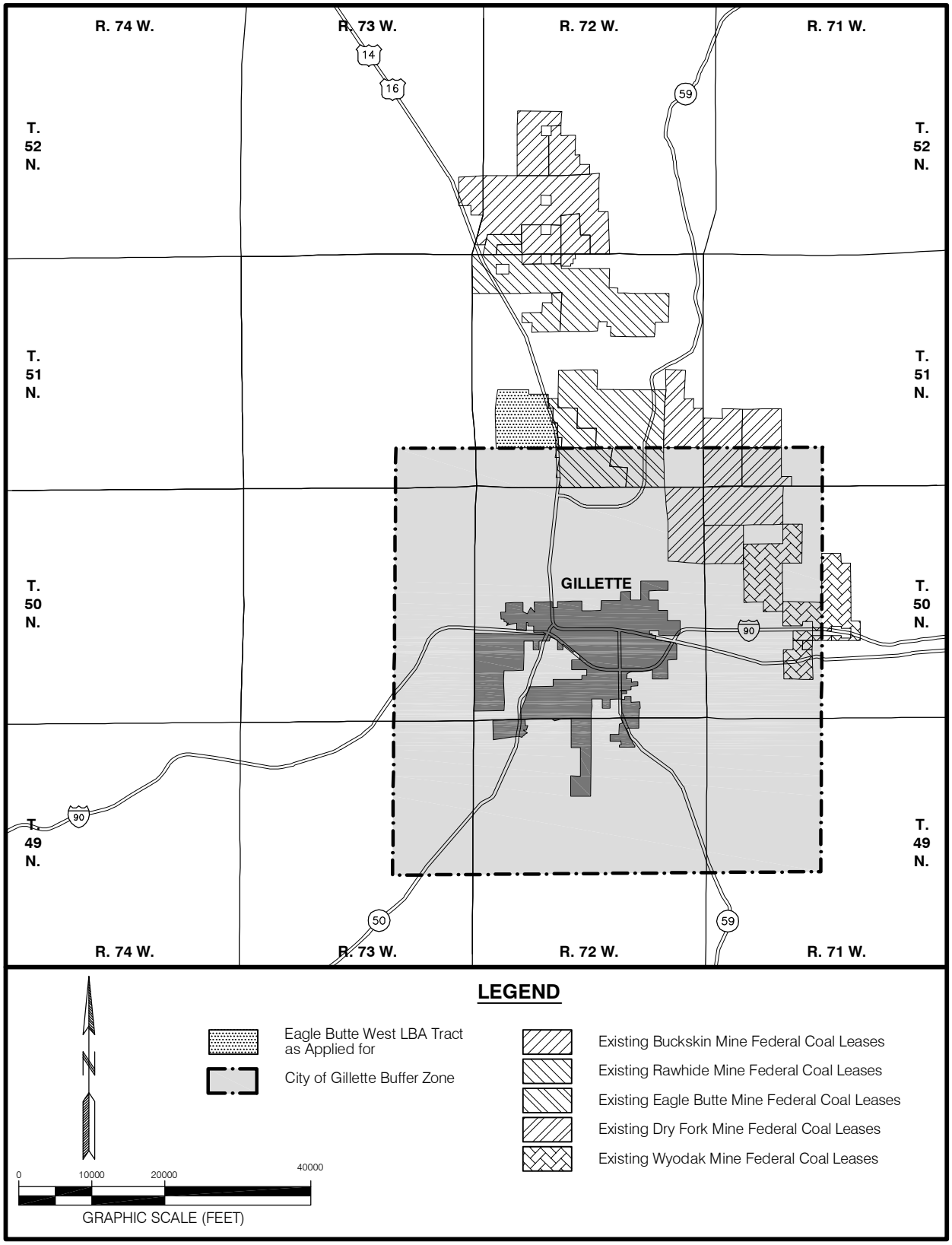


Figure 1-3. City of Gillette Buffer Zone.

Therefore, on August 17, 1993, the manager of the BLM Buffalo Field Office approved a change to the Buffalo RMP that added LBAs to the types of leasing actions that can be considered within the Gillette Buffer Zone.

A portion of the Eagle Butte Mine West Extension LBA Tract as originally applied for by RAG on December 28, 2001 was within the Gillette Buffer Zone, between the Gillette-Campbell County Airport runways. The City of Gillette provided a letter to RAG dated May 1, 2002, stating they had no objection to Eagle Butte Mine's plan to expand mining operations onto the Eagle Butte Mine West Extension LBA Tract (now called the Eagle Butte West LBA Tract), as it had been presented to them. On October 20, 2003, the BLM received an application to modify the Eagle Butte West LBA Tract. The modified tract configuration (the tract as applied for) does not extend into the Gillette Buffer Zone.

The 2001 Buffalo RMP includes two decisions related to multiple mineral development conflicts in Campbell, Converse, and Sheridan Counties. With respect to oil and gas leasing in coal mining areas, the RMP update determines that oil and gas tracts that would interfere with coal mining operations would not be offered for lease but that, where possible, oil and gas leases will be issued with specific conditions to prevent a development conflict with coal mining operations. With respect to coal leasing in oil and gas fields, the 2001 Buffalo RMP update states that coal leasing in producing oil and gas fields would be deferred unless or until coal development would not interfere with the economic recovery of the oil and gas resources, as determined on a case-by-case basis.

Both conventional oil and gas and CBNG wells are present inside and around the Eagle Butte West LBA Tract. BLM's evaluation of the potential for conflict with the development of oil and gas resources within the LBA tract is included in the Mineral Resources discussion in Section 3.3 of this EIS. BLM's policy and guidance on conflicts between surface coal mine and CBNG development is to optimize the recovery of both resources and ensure that the public receives a reasonable return, as explained in BLM Instruction Memorandum No. 2006-153 (BLM 2006a).

The fourth coal screening procedure requires consultation with surface owners who meet the criteria defined in the regulations at 43 CFR 3400.0-5(gg)(1) and (2). Surface owner consultation was completed during the preparation of coal screening analyses published in 2001 Buffalo RMP. Qualified private surface owners in the Gillette coal development potential area were provided the opportunity to express their preference for or against surface mining of federal coal under their private surface estate during both these screenings (see Chapter 7 for a definition of a "qualified surface owner"). No federal coal lands within the Eagle Butte West LBA Tract were eliminated from further consideration for leasing due to qualified surface owner conflicts at that time. The surface of the Eagle Butte West LBA Tract as applied for is owned by FCW, and FCW does not meet the qualified surface owner criteria, as defined in the

regulations. BLM will review the surface ownership in any tract that is considered for leasing prior to holding a lease sale for the tract. If any private surface owners who are determined to be qualified are identified at that time, surface owner consultation will be completed.

In summary, the lands in the FCW coal lease application have been subjected to the four coal planning screens and determined to be acceptable for further consideration for leasing. Thus, a decision to lease the federal coal lands in this application would be in conformance with the current BLM Buffalo RMP.

1.6 Consultation and Coordination

Initial Involvement

BLM received the Eagle Butte West coal lease application on December 28, 2001. The application was initially reviewed by the BLM, Wyoming State Office, Division of Mineral and Lands. The BLM ruled that the application and lands involved met the requirements of regulations governing coal leasing on application (43 CFR 3425).

A notice announcing the receipt of the Eagle Butte West coal lease application published in the *Federal Register* on April 29, 2002 served as public notice that this coal lease application had been received. Copies of the notice were sent to voting and nonvoting members of the PRRCT, including the governors of Wyoming and Montana, the Northern Cheyenne Tribe, the Crow Tribal Council, OSM, USFWS, National Park Service, and U.S. Geological Survey. The April 29, 2002 *Federal Register* notice refers to the tract as the Eagle Butte Mine West Extension LBA Tract. The tract was subsequently renamed the Eagle Butte West LBA Tract.

The PRRCT reviewed this lease application at public meetings held on May 30, 2002, in Casper, Wyoming, and again on April 27, 2005, in Gillette, Wyoming. At those meetings, the applicant presented information about their existing mine and the pending lease application to the PRRCT. At both meetings, the PRRCT recommended that the BLM continue to process this application. The major steps in processing an LBA are shown in Appendix C.

The BLM published a Notice of Intent to Prepare an Environmental Impact Statement and Notice of Scoping in the *Federal Register* on May 2, 2005. The publication announced the time and location of a public scoping meeting and requested public comment on the application. Letters requesting public comment and announcing the time and location of the public scoping meeting were mailed to all parties on the distribution list in April 2005.

A public scoping meeting was held on May 17, 2005 in Gillette, Wyoming. At the public meeting, the applicant orally presented information about their mine and their need for the coal. The presentation was followed by a question and answer period, during which 22 oral comments were made. The scoping period

extended from May 2 through August 1, 2005, during which time BLM received written, e-mailed, and telephoned-in comments from 16 entities.

Chapter 5 provides a list of other federal, state, and local governmental agencies that were consulted in preparation of this EIS and the distribution list for this EIS.

Issues and Concerns

Issues and concerns that have been expressed by the public and government agencies relating to the potential impacts of leasing the Eagle Butte West LBA Tract specifically, and to previous coal lease applications in general include:

- potential conflicts with existing conventional oil and gas development and existing and proposed CBNG development;
- cumulative impacts of mineral development on all other resources;
- validity and currency of resource data;
- potential impacts to public access, particularly if Highway 14-16 is moved;
- potential impacts to occupied dwellings and the school building located near the tract;
- potential impacts to the structural integrity of the Gillette-Campbell County Airport;
- potential impacts to aircraft landing at and taking off from the airport and any possible disruptions of the airport's operations by mining activities;
- potential impacts to threatened and endangered species and other species of concern;
- potential air quality impacts (including cumulative impacts to visibility);
- potential surface and groundwater quality and quantity impacts;
- potential impacts of and possible mitigation for nitrogen oxide emissions resulting from blasting of coal and overburden;
- the need to include reasonably foreseeable actions such as the construction and operation of the DM&E railroad and power plants in the cumulative analysis;
- the need to address increasing coal production in the PRB in the cumulative analysis;
- potential impacts on cultural and paleontological resources;
- potential impacts to wetland resources; and
- short- and long-term impacts on aquatic and terrestrial wildlife species.

Draft EIS

Parties on the distribution list were sent copies of this Draft EIS, and copies were made available for review at the BLM offices in Casper and Cheyenne, Wyoming.

A notice announcing the availability of the Draft EIS was published in the *Federal Register* by the EPA on October 20, 2006. A 60-day comment period

on the Draft EIS commenced with publication of the EPA's notice of availability and ended on December 19, 2006. The BLM published a Notice of Availability/Notice of Public Hearing in the *Federal Register* on October 20, 2006. The BLM's *Federal Register* notice announced the date and time of a public hearing, which was held on November 14, 2006, at 7:00 pm at the Clarion Hotel in Gillette, Wyoming. The purpose of the public hearing was to solicit public comments on the Draft EIS and on the fair market value, the maximum economic recovery, and the proposed competitive sale of federal coal from the LBA tract. The applicant and one member of the public made statements during the hearing. The BLM published a notice of public hearing in the Gillette News-Record on October 31 and November 7, 2006. A transcript of the public hearing is available for public review.

Final EIS and Future Involvement

BLM received eight written comments on the Draft EIS. These comments are included, with agency responses, as Appendix I in this Final EIS. Availability of the Final EIS will be published in the *Federal Register* by the BLM and the EPA. After a 30-day availability period, BLM will make a decision to hold or not to hold a competitive lease sale for the federal coal in the Eagle Butte West LBA Tract. A public ROD for the tract will be mailed to parties on the mailing list, including those who commented on this EIS during the NEPA process. The public and/or the applicant can appeal the BLM decision to hold or not to hold a competitive sale and issue a lease for the tract. The BLM decision must be appealed within 30 days from the date the Notice of Availability for the Record of Decision is published in the *Federal Register*. The decision can be implemented at that time if no appeal is received. If a competitive lease sale is held, the lease sale will follow the procedures set forth in 43 CFR 3422, 43 CFR 3425, and BLM Handbook H-3420-1 (Competitive Coal Leasing).

Department of Justice Consultation

After a competitive coal lease sale, but prior to issuance of a lease, the BLM must solicit the opinion of the Department of Justice on whether the planned lease issuance creates a situation inconsistent with federal antitrust laws. The Department of Justice is allowed 30 days to make this determination. If the Department of Justice has not responded in writing within the 30 days, the BLM can proceed with issuance of the lease.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and alternatives to this action. The Proposed Action is to hold a competitive lease sale and issue a lease for the federal coal lands included in the Eagle Butte West LBA[1] Tract as applied for by FCW. This alternative assumes the tract would be developed as a maintenance tract for the existing Eagle Butte Mine.

Under the Proposed Action, the tract would be offered for lease as applied for at a sealed-bid, competitive lease sale, subject to standard and special lease stipulations developed for the PRB and that tract. The boundaries of the tract would be consistent with the tract configuration proposed by the applicant. The Proposed Action assumes that the applicant would be the successful bidder on the tract and that the tract would be mined as a maintenance lease for an existing mine.

NEPA requires the consideration and evaluation of other reasonable ways to meet proposal objectives while minimizing or avoiding environmental impacts. Thus, NEPA requires the evaluation of a No Action Alternative and a practical range of other "reasonable" action alternatives that may avoid or minimize project impacts. Reasonable alternatives are defined by NEPA as those that are technically, economically, and environmentally practical and feasible. Reasonable alternatives are formulated to address issues and concerns raised by the public and agencies during scoping. These alternatives should represent another means of satisfying the stated purpose and need for the federal action.

BLM Competitive Coal Leasing Manual (BLM Manual 3420-1) requires the BLM to evaluate modifying the configuration of federal coal tracts based on providing for maximum economic recovery of the coal resource, maintaining or increasing the potential for competition, and avoiding future bypass or captive tract situations. For NEPA purposes, BLM evaluates alternate tract configurations as alternatives to the Proposed Action. In evaluating this lease application, BLM has identified a study area for the tract, which includes the tract as applied for and adjacent unleased federal coal, shown in Figure 2-1. Under Alternative 1, the study area is evaluated for the purpose of identifying potential alternate tract configurations to the Proposed Action that would be technically, economically, or environmentally preferable to the Proposed Action.

The Leasing on Application regulation at 43 CFR 3425.1-9 states that: "The authorized officer may add or delete lands from an area covered by an application for any reason he/she determines to be in the public interest." Accordingly, under Alternative 1, BLM could increase or decrease the size of the tract as applied for.

[1] Refer to page xv for a list of abbreviations and acronyms used in this document.

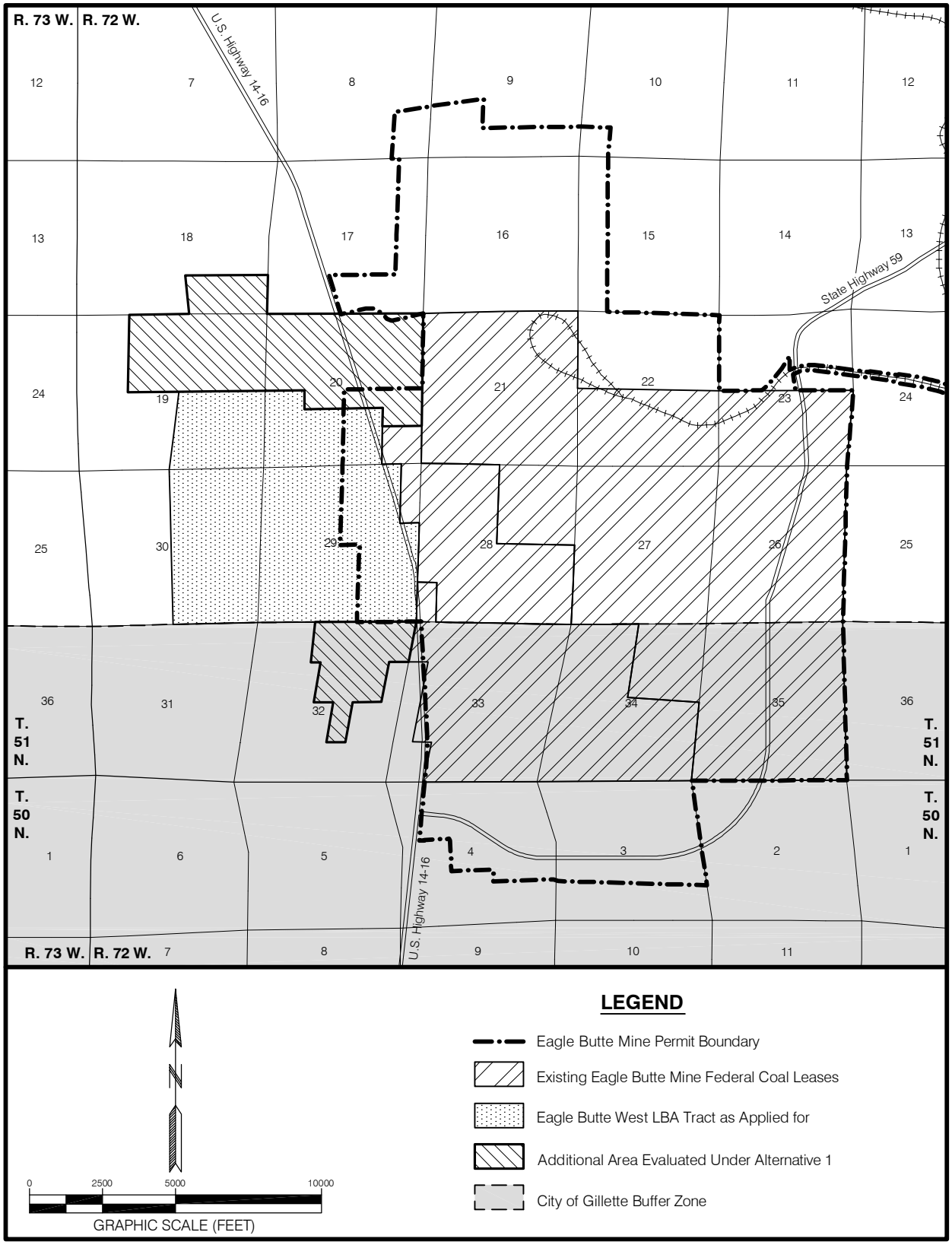


Figure 2-1. Eagle Butte West LBA Tract Alternatives.

The No Action Alternative (Alternative 2) is to reject the Eagle Butte West lease application. Under the No Action Alternative, the tract would not be offered for competitive sale, and the coal contained within the tract would not be mined as proposed. Rejection of the application would not affect currently permitted mining activities on existing leases at the existing Eagle Butte Mine and selection of the No Action Alternative would not preclude an application to lease the rejected tract in the future. Portions of the surface of the LBA tract have been disturbed in connection with mining operations on Eagle Butte Mine's existing leases.

Other alternatives considered but not analyzed in detail include:

- holding a competitive lease sale and issuing a lease for federal coal lands included in the Eagle Butte West LBA Tract (as applied for or as modified by BLM), with the assumption that the tract would be developed as a new mine (Alternative 3); and

- delaying the sale of the Eagle Butte West LBA Tract as applied for in order to take advantage of higher coal prices and/or to allow recovery of the potential CBNG resources in the tract prior to mining (Alternative 4). Under this alternative, it is assumed that the tract could be developed later as a maintenance tract or a new mine start, depending on how long the sale was delayed.

LBA tracts are nominated for leasing by companies with an interest in acquiring them but, as discussed in Chapter 1, the LBA process is, by law and regulation, an open, public, competitive sealed-bid process. If a tract is offered for lease, the applicant for that tract may or may not be the high bidder when the lease sale is held. The Proposed Action and Alternative 1 considered in this EIS assume that FCW would be the successful bidder if the federal coal included in the tract is offered for lease, and that the Eagle Butte West LBA Tract would be mined as a maintenance tract for the permitted Eagle Butte Mine.

If a decision is made to hold a competitive lease sale and a lease is issued, the lessee must obtain a permit to conduct coal mining operations before mining can begin on the tract. As discussed in Chapter 1, Section 1.3, this permit application would undergo detailed review by state and federal agencies as part of the approval process. The detailed permit application could potentially differ from the more general mining plan used to analyze the impacts of the Proposed Action and Alternative 1 in this EIS, but the differences would not be expected to substantially change the impacts described here. These differences would typically be related to the details of mining and reclaiming the tract but major factors, like the approximate number of tons of coal to be mined and yards of overburden to be removed, the acres disturbed, etcetera, would not be substantially different from the plan used in this analysis.

Under the Proposed Action and Alternative 1, it is assumed that an area larger than the tract would have to be disturbed in order to recover all of the coal in the tract. The disturbances outside the coal removal area would be due to activities like overstripping, matching undisturbed topography, and construction of flood control and sediment control structures.

2.1 Proposed Action

Under the Proposed Action, the Eagle Butte West LBA Tract as applied for by FCW would be offered for lease at a sealed-bid, competitive lease sale, subject to standard and special lease stipulations developed for the PRB (Appendix D). The boundaries of the tract would be consistent with the tract configuration proposed in the Eagle Butte West lease application (Figure 2-1). The Proposed Action assumes that FCW would be the successful bidder on the Eagle Butte West LBA Tract if it is offered for sale.

The legal description of the proposed Eagle Butte West LBA Tract coal lease lands as applied for by FCW under the Proposed Action is as follows:

T.51N., R.72W., 6th P.M., Campbell County, Wyoming

Section 19:	Lots 13, 14, 19, and 20;	187.79 acres
Section 20:	Lots 10(S½), 11(S½), and 12 through 15;	201.74 acres
Section 29:	Lots 1(W½), 2 through 7, 8(W½ and SE¼), and 9 through 16;	635.45 acres
Section 30:	Lots 5, 6, 11 through 14, 19, and 20;	372.66 acres
Total:		1,397.64 acres

The Land description and acreage are based on the BLM Status of Public Domain Land and Mineral Titles approved Coal Plat as of April 4, 2005. The coal estate in the tract described above is federal and the surface estate is owned by FCW. Ownership of the oil and gas estate is discussed in Section 3.11.

A portion of U.S. Highway 14-16 crosses the eastern edge of the Eagle Butte West LBA Tract (Figure 2-1). SMCRA prohibits surface mining operations on lands within 100 ft of the outside line of the ROW for a public highway. As discussed in Chapter 1, Section 1.5, the coal underlying Highway 14-16, its ROW, and a buffer zone extending 100 ft on either side of the ROW has been determined to be unsuitable for mining in accordance with SMCRA and as specified in coal leasing Unsuitability Criterion Number 3 (43 CFR 3461).

There is an exception to this prohibition in the regulations at 30 CFR 761.11(d), which can be applied if the appropriate public road authority (WYDOT) allows the road to be relocated or closed. FCW and WYDOT are working on a plan to relocate U.S. Highway 14-16. If FCW obtains approval from WYDOT to move Highway 14-16, the exception to the prohibition on mining within the highway ROW and buffer zone could be applied and the unsuitability determination could be reconsidered. In that case, FCW would be able to recover the coal underlying the highway ROW and buffer zone. If FCW does not obtain approval to move U.S. Highway 14-16, the coal underlying the highway ROW and buffer zone would remain unsuitable for mining and would not be recovered.

The federal coal underlying Highway 14-16, its ROW, and the adjacent buffer zone is included in the tract because it would allow maximum recovery of the mineable coal adjacent to but outside of the highway ROW and buffer zone if the road is not moved; it would also allow recovery of the coal under the highway if the road is moved. If a lease is issued for this tract, a stipulation will be attached to the lease stating that no mining activity may be conducted in the portion of the lease within the ROW and buffer zone for U.S. Highway 14-16 unless approval is obtained from the appropriate authority to move the highway.

If U.S. Highway 14-16 is moved, FCW estimates that the Eagle Butte West LBA Tract as applied for includes approximately 238 million tons of mineable coal. FCW assumes that about 96 percent of that coal, or about 228 million tons of coal, could be recovered from the Eagle Butte West LBA Tract, based on historical recovery practices. If they acquire the tract and the highway is moved, a total of 568 million tons of coal would be mined after January 1, 2006, with an estimated 228 million tons coming from the LBA tract.

If the highway is not moved, FCW estimates that approximately 211 million tons of coal would be mineable and approximately 203 million tons of coal could be recovered from the Eagle Butte West LBA Tract as applied for. If they acquire the tract and if the highway is not moved, a total of 543 million tons of coal would be mined after January 1, 2006, with an estimated 203 million tons coming from the LBA tract. Based upon this estimate of recoverable reserves, about 15 percent of the in-place coal reserves included within the LBA tract would not be recovered under normal mining practices and due to the presence of the unmineable reserves within the highway ROW and associated buffer zone.

BLM independently evaluates the volume and average quality of the coal resources included in proposed LBA tracts as part of the fair market value determination process. If WYDOT approves the relocation of Highway 14-16, the estimated cost to FCW will be considered by BLM in the fair market value determination for the Eagle Butte West LBA Tract. If the highway is not moved, the fact that the coal within the highway ROW and associated buffer zone cannot be recovered will be considered by BLM in the fair market value determination for the LBA tract. BLM's estimate of the mineable federal coal reserves included in the tract may not

be in agreement with the mineable coal reserve and coal quality estimates provided by the applicant. BLM's estimate of the mineable federal coal reserves included in the tract under BLM's preferred alternative (Alternative 1) is discussed in Section 2.2 and will be published in the sale notice if the tract is offered for sale. Some coal quality information in the area of the Eagle Butte West LBA Tract is included in Section 3.3 of this document.

The Eagle Butte West LBA Tract would be mined as an integral part of the Eagle Butte Mine under the Proposed Action. Since the Eagle Butte West LBA Tract would be an extension of the existing Eagle Butte Mine, the facilities and infrastructure would be the same as those identified in the WDEQ/LQD Mine Permit 428 Term T5, approved November 1, 2005 and the BLM R2P2, which was approved October 26, 2005.

FCW's currently approved air quality permit from the WDEQ/AQD for the Eagle Butte Mine allows up to 35 million tons of coal per year to be mined. The Eagle Butte Mine produced:

- 18.6 million tons of coal in 2000;
- 24.8 million tons of coal in 2001;
- 24.9 million tons of coal in 2002;
- 24.7 million tons of coal in 2003;
- 23.0 million tons of coal in 2004;
- 24.1 million tons of coal in 2005, and
- 25.3 million tons of coal in 2006

(Wyoming Department of Employment 2001, 2002, 2003, 2004, 2005a, and 2006a).

As of December 31, 2005, approximately 420.4 million tons of coal had been mined from within the current permit area of the Eagle Butte Mine. Under the currently approved mining plan (the No Action Alternative), the Eagle Butte Mine would mine the remaining 340 million tons of recoverable coal reserves on the existing Eagle Butte leases in approximately 13.6 years at an average production rate of approximately 25 million tons per year. Under the Proposed Action and if Highway 14-16 is moved, FCW estimates that average annual coal production would continue to be approximately 25 million tons, mine life would be extended by about 9.1 additional years, and coal production at the Eagle Butte Mine would continue for nearly 23 years beginning in 2006. If U.S. Highway 14-16 is not moved and average annual coal production continues to be approximately 25 million tons, mine life would be extended by about 8.1 additional years and coal production would continue for nearly 22 years beginning in 2006.

Prior to disturbance and in advance of mining, mine support structures such as roads, power lines, substations, and flood and sediment control measures would be built as needed. Little Rawhide Creek runs north-south through the existing mine and the eastern portion of the LBA tract. Approximately 3.5 miles of the

natural channel has been diverted to date within the Eagle Butte Mine's current permit area. FCW would propose another diversion of Little Rawhide Creek if they acquire a lease for the Eagle Butte West LBA Tract. One overhead powerline, one buried telephone line and two buried pipelines would require relocation prior to mining.

Topsoil removal with suitable heavy equipment, such as rubber-tired scrapers, would proceed ahead of overburden removal. Whenever possible, direct haulage to a reclamation area would be done but, due to scheduling, some topsoil would be temporarily stockpiled. As required by the reclamation plan, heavy equipment again would be used to haul and distribute the stockpiled topsoil.

The Eagle Butte Mine has an approved Temporary Cessation of Operations area that is positioned to accommodate mining advancement to the west into the Eagle Butte West LBA Tract area. The Temporary Cessation of Operations area, which consists of an elongated trench running north-south adjacent and parallel to U.S. Highway 14-16, would facilitate placement of initial boxcut overburden material from the LBA tract. Mining would then be conducted in two separate pits; one located within the current permit area and one located within the proposed lease area. Overburden removal has been and would continue to be conducted using trucks and shovels. Other equipment used during overburden removal and backfilling would include dozers, scrapers, excavators, front-end loaders, motorgraders, fuel/lube trucks, and water trucks. Most overburden and all coal have been and would continue to be drilled and blasted to facilitate efficient excavation. The design of the Eagle Butte Mine seeks to confine disturbance to the active mine blocks. As overburden is removed, most would be directly placed into areas where coal has already been removed.

Once the overburden has been replaced, it is sampled and verified to be suitable for reclamation, graded to approximate final contour, ripped, and finally topsoiled. Material that is found to be unsuitable for reclamation (i.e., material that is not suitable for use in reestablishing vegetation or that may affect groundwater quality due to high concentrations of certain constituents, such as selenium, or adverse pH levels) would either be removed and treated, or adequately covered with suitable overburden material prior to grading and topsoiling. Elevations consistent with an approved PMT plan would be established as quickly as possible. Under certain conditions, the PMT may not be immediately achievable. This occurs when there is an excess of material that may require temporary stockpiling, when there is insufficient material available from current overburden removal operations, or when future mining could redisturb an area already mined. Once a seedbed has been formed, vegetation that is consistent with the postmining land use would be reestablished.

Coal would be produced from two seams that FCW refers to as the Roland and Smith. The combined thickness of the two coal seams averages about 110 ft, and ranges from about 33 to 133 ft inside the Eagle Butte West LBA Tract. The

mineable coal seams are referred to as the Anderson and Canyon, Wyodak-Anderson, or Wyodak coal beds at other localities in the eastern PRB. The Roland coal seam is not present on the entire tract; decreasing the total coal thickness in the areas where it is not present. The parting between Roland and Smith coal seams ranges from one to 13 ft where both seams are present. Coal would be mined at several working faces to enable blending of the coal to meet customer quality requirements, to comply with BLM lease requirements for maximum economic recovery of the coal resource, and to optimize coal removal efficiency with available equipment. Coal would be loaded with electric-powered shovels into off-highway haul trucks for transport to crushing facilities. Coal haul roads would be temporary structures built within the mine areas. Currently, a single covered truck dump, or stilling shed, is used for all coal mined at the Eagle Butte Mine. A system of crushers, feeders, and transfer conveyors move the prepared coal to interim storage in four concrete silos located adjacent to the unit train loadout facility. All coal transfer location points and crushing operations are equipped with baghouse-type dust collectors or PECs. While the existing facilities have sufficient capacity at the projected rates of coal production, additional facilities may be constructed in order to improve operating efficiency and air quality protection. For example, a covered overland conveyor and near-pit crushing facility may be constructed on the proposed LBA tract, although no definite plans have been made to do so.

Full-time employment at the Eagle Butte Mine is currently 223. If FCW acquires the Eagle Butte West LBA Tract under the Proposed Action, they anticipate that employment levels would remain the same for the additional eight to nine years that it would take to mine the coal included in the tract. This is based on the assumption that the average annual coal production rate would remain at approximately 25 million tons per year.

As discussed in Chapter 1, the Eagle Butte West LBA Tract is adjacent to existing leases at the Eagle Butte Mine, but is not adjacent to leases at any of the other existing mines in this area (see Figure 1-1). If a company other than FCW acquires the tract, the rate of coal production, mining sequence, equipment, and facilities would be different than if FCW acquired the tract as a maintenance lease, as described above. However, the area of disturbance and the impacts of removing the coal would not be substantially different from the area of disturbance and the impacts of FCW mining the tract.

2.1.1 Regulatory Compliance, Mitigation and Monitoring

SMCRA and Wyoming State Law require surface coal mines to collect extensive baseline information and implement extensive monitoring programs and mitigation measures. The currently approved mine permit for the Eagle Butte Mine includes these requirements. Monitoring programs and mitigation measures that are required by regulation are considered to be part of the Proposed Action and Alternative 1 for the Eagle Butte West LBA Tract. These data collection

requirements, mitigation plans, and monitoring commitments are in place for the No Action Alternative, as part of the current approved permit to conduct mining operations for the existing Eagle Butte Mine. These data collection requirements, mitigation plans, and monitoring commitments would be extended to include mining operations on the Eagle Butte West LBA Tract, if it is leased and permitted for mining by the Eagle Butte Mine. A mining and reclamation plan for mining operations on the Eagle Butte West LBA Tract would have to be approved before mining operations could be conducted on the tract, regardless of who acquires it. The major mitigation and monitoring measures that are required by state or federal regulation are summarized in Table 2-1. More specific information about some of these mitigation and monitoring measures and their results at the Eagle Butte Mine are described in Chapter 3.

If impacts are identified during the leasing process that are not addressed by the existing required mitigation measures, BLM can require additional mitigation measures, in the form of stipulations on the new lease, within the limits of its regulatory authority. In general, the levels of mitigation and monitoring required for surface coal mining by SMCRA and Wyoming State law are more extensive than those required for other surface disturbing activities; however, concerns may periodically be identified that are not monitored or mitigated under existing procedures.

2.1.2 Hazardous and Solid Waste

Under the Proposed Action and Alternative 1, the procedures and requirements for handling of hazardous and solid wastes would be the same as the procedures and requirements for the existing mining operation. Solid waste that is produced at the existing Eagle Butte Mine consists of floor sweepings, shop rags, lubricant containers, welding rod ends, metal shavings, worn tires, packing material, used filters, and office and food wastes. A portion of the solid wastes produced at the Eagle Butte Mine is disposed of within the mine's permit boundary in accordance with WDEQ-approved solid waste disposal plans. Solid waste is also disposed of at the Campbell County landfill. Sewage is handled by WDEQ-permitted sewage treatment system present on the existing mine facilities. Maintenance and lubrication of most of the equipment takes place at existing shop facilities at the Eagle Butte Mine.

Major lubrication, oil changes, etcetera, of most equipment are performed inside the service garage and lubrication building at the Eagle Butte Mine, where used oil and grease are currently contained and deposited in storage tanks. All of the collected used oils and grease are then beneficially recycled off site. These practices would not change if the applicant acquires the LBA tract.

FCW has reviewed the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Re-authorization Act* (SARA) *of 1986* (as amended) and EPA's *List of Extremely Hazardous Substances* as defined

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives.

Resource	Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]	Monitoring[1]
Topography & Physiography	Restoring to approximate original contour or other approved topographic configuration.	LQD checks as-built vs. approved topography with each annual report.
Geology & Minerals	Identifying & selectively placing or mixing chemically or physically unsuitable overburden materials to minimize adverse effects to vegetation or groundwater.	LQD requires monitoring in advance of mining to detect unsuitable overburden.
Soil	Salvaging soil suitable to support plant growth for use in reclamation; Protecting soil stockpiles from disturbance and erosional influences; Selectively placing at least four ft of suitable overburden on the graded backfill surface below replaced topsoil to meet guidelines for vegetation root zones.	Monitoring vegetation growth on reclaimed areas to determine need for soil amendments; Sampling regraded overburden for compliance with root zone criteria.
Air Quality	Dispersion modeling of mining plans for annual average particulate pollution impacts on ambient air; Using particulate pollution control technologies; Using work practices designed to minimize fugitive particulate emissions; Using EPA- or state-mandated BACT, including: Fabric filtration or wet scrubbing of coal storage silo and conveyor vents, Watering or using chemical dust suppression on haul roads and exposed soils, Containment of truck dumps and primary crushers, Covering of conveyors, Prompt revegetation of exposed soils, High efficiency baghouse dust collection systems or PECs, or atomizers/foggers on the crusher, conveyor transfer, storage bin and train loadout, meeting a standard of 0.01 grains per dry standard cubic foot (dscf) of exit volume, Watering of active work areas, Reclamation plan to minimize surface disturbances subject to wind erosion, Paving of access roads, Haul truck speed limits, Limited material drop heights for shovels and draglines.	On-site air quality monitoring for PM_{10} or TSP; Off-site ambient monitoring for PM_{10} or TSP; On-site compliance inspections.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Eagle Butte Mine in its current approved mining and reclamation plan (the No Action Alternative). If the Eagle Butte West LBA Tract were leased, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan revision covering the Eagle Butte West LBA Tract that must be approved before mining can occur on the tract under the Proposed Action or Alternative 1.

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives (Continued).

Resource	Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]	Monitoring[1]
Air Quality (continued)	Following voluntary and required measures to avoid exposing the public to NO_2 from blasting clouds, including: Phone notification of neighbors and workers prior to blasting, Monitoring weather and atmospheric conditions prior to decisions to blast, Timing blasts to avoid temperature inversions and to minimize inconvenience to neighbors, Closing public roads when appropriate to protect the public, Minimizing blast sizes, Posting signs on major public roads.	
Surface Water	Building and maintaining sediment control ponds or other devices during mining; Restoring approximate original drainage patterns during reclamation; Restoring stock ponds and playas during reclamation.	Monitoring storage capacity in sediment ponds; Monitoring quality of discharges; Monitoring streamflow and water quality.
Groundwater Quantity	Evaluating cumulative impacts to water quantity associated with proposed mining; Replacing existing water rights that are interrupted, discontinued, or diminished by mining with water of equivalent quantity.	Monitoring wells track water levels in overburden, coal, interburden, underburden, and backfill.
Groundwater Quality	Evaluating cumulative impacts to water quality associated with proposed mining; Replacing existing water rights that are interrupted, discontinued, or diminished by mining with water of equivalent quality.	Monitoring wells track water quality in overburden, coal, interburden, underburden, and backfill.
Alluvial Valley Floors	Identifying all AVFs that would be affected by mining; Determining significance to agriculture of all identified AVFs affected by mining (WDEQ); Protecting downstream AVFs during mining; Restoring essential hydrologic function of all AVFs affected by mining.	Monitoring to determine restoration of essential hydrologic functions of any declared AVF.
Wetlands	Identifying all wetlands that would be affected by mining; Identifying jurisdictional wetlands (COE); Replacing all jurisdictional wetlands that would be disturbed by mining; Replacing functional wetlands as required by surface managing agency, surface landowner, or WDEQ/LQD.	Monitoring of reclaimed wetlands using same procedures used to identify pre-mining jurisdictional wetlands.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Eagle Butte Mine in its current approved mining and reclamation plan (the No Action Alternative). If the Eagle Butte West LBA Tract were leased, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan revision covering the Eagle Butte West LBA Tract that must be approved before mining can occur on the tract under the Proposed Action or Alternative 1.

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives (Continued).

Resource	Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]	Monitoring[1]
Vegetation	Permanently revegetating reclaimed areas according to a comprehensive revegetation plan using approved permanent reclamation seed mixtures consisting predominantly of species native to the area; Reclaiming 20 percent of reclaimed area with native shrubs at a density of one per square meter; Controlling erosion on reclaimed lands prior to seeding with final seed mixture using mulching, cover crops, or other approved measures; Chemically and mechanically controlling weed infestation; Direct hauling of topsoil; Selectively planting shrubs in riparian areas; Planting sagebrush; Creating depressions and rock piles; Using special planting procedures around rock piles; Posting reclamation bond covering the cost of reclamation.	Monitoring of revegetation growth & diversity until release of final reclamation bond (minimum 10 years); Monitoring of erosion to determine need for corrective action during establishment of vegetation; Use of controlled grazing during revegetation evaluation to determine suitability for post-mining land uses.
Wildlife	Restoring pre-mining topography to the maximum extent possible; Planting a diverse mixture of grasses, forbs, and shrubs in configurations beneficial to wildlife; Designing fences to permit wildlife passage; Raptor-proofing power transmission poles; Creating artificial raptor nest sites; Increasing habitat diversity by creating rock clusters and shallow depressions on reclaimed land; Cottonwood plantings along reclaimed drainages; Replacing drainages, wetlands, and AVFs disturbed by mining; Reducing vehicle speed limits to minimize mortality; Instructing employees not to harass or disturb wildlife; Following approved raptor mitigation plans.	Baseline and annual wildlife monitoring surveys; Monitoring for Migratory Bird Species of Management Concern in Wyoming.
Threatened, Endangered, Proposed, and Candidate Species	Avoiding bald eagle disturbance; Restoring bald eagle foraging areas disturbed by mining; Restoring mountain plover habitat disturbed by mining; Using raptor safe power lines; Surveying for Ute ladies'-tresses;	Baseline and annual wildlife monitoring surveys.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Eagle Butte Mine in its current approved mining and reclamation plan (the No Action Alternative). If the Eagle Butte West LBA Tract were leased, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan revision covering the Eagle Butte West LBA Tract that must be approved before mining can occur on the tract under the Proposed Action or Alternative 1.

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives (Continued).

Resource	Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]	Monitoring[1]
Threatened, Endangered, Proposed, and Candidate Species (continued)	Surveying for mountain plover; Searching for black-footed ferrets if prairie dog colonies are on or move onto tract; Surveying for black-tailed prairie dog; Same as Wildlife Resource above.	Baseline and annual wildlife monitoring surveys.
Land Use	Suitably restoring reclaimed area for historic uses (grazing and wildlife);	Monitoring of controlled grazing prior to bond release evaluation.
Cultural Resources	Conducting Class I & III surveys to identify cultural properties on all state and federal lands and on private lands affected by federal undertakings; Consulting with SHPO to evaluate eligibility of cultural properties for the NRHP; Avoiding or recovering data from significant cultural properties identified by surveys, according to an approved plan; Notifying appropriate federal personnel if historic or prehistoric materials are uncovered during mining operations; Instructing employees of the importance of and regulatory obligations to protect cultural resources.	Monitoring of mining activities during topsoil stripping; cessation of activities and notification of authorities if unidentified sites are encountered during topsoil removal.
Native American Concerns	Notifying Native American tribes with known interest in this area of leasing action and request for help in identifying potentially significant religious or cultural sites.	No specific monitoring program.
Paleontological Resources	Notifying appropriate federal personnel if potentially significant paleontological sites are discovered during mining.	No specific monitoring program.
Visual Resources	Restoring landscape character during reclamation through return to approximate original contour and revegetation with native species.	No specific monitoring program.
Noise	Protecting employees from hearing loss.	MSHA inspections.
Transportation Facilities	Relocating existing pipelines, if necessary, in accordance with specific agreement between pipeline owner and coal lessee.	No specific monitoring program.
Socioeconomics	Paying royalty and taxes as required by federal, state, and local regulations. No mitigation measures are proposed.	Surveying and reporting to document volume of coal removed.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Eagle Butte Mine in its current approved mining and reclamation plan (the No Action Alternative). If the Eagle Butte West LBA Tract were leased, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan revision covering the Eagle Butte West LBA Tract that must be approved before mining can occur on the tract under the Proposed Action or Alternative 1.

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives (Continued).

Resource	**Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]**	**Monitoring[1]**
Hazardous & Solid Waste	Disposing of solid waste and sewage within permit boundaries according to approved plans; Storing and recycling waste oil; Maintaining of files containing Material Safety Data Sheets for all chemicals, compounds, and/or substances used during course of mining; Ensuring that all production, use, storage, transport, and disposal of hazardous materials is in accordance with applicable existing or hereafter promulgated federal, state, and government requirements; Complying with emergency reporting requirements for releases of hazardous materials as established in CERCLA, as amended; Preparing and implementing spill prevention control and countermeasure plans, spill response plans, inventories of hazardous chemical categories pursuant to Section 312 of SARA, as amended; Preparing emergency response plans.	No specific monitoring other than required by these other regulations and response plans.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Eagle Butte Mine in its current approved mining and reclamation plan (the No Action Alternative). If the Eagle Butte West LBA Tract were leased, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan revision covering the Eagle Butte West LBA Tract that must be approved before mining can occur on the tract under the Proposed Action or Alternative 1.

in 40 CFR 355 (as amended) for hazardous substances used at the Eagle Butte Mine. FCW maintains files containing Material Safety Data Sheets for all chemicals, compounds, and/or substances that are or would be used during the course of mining.

FCW is responsible for ensuring that all production, use, storage, transport, and disposal of hazardous and extremely hazardous materials as a result of mining are in accordance with all applicable existing or hereafter promulgated federal, state, and local government rules, regulations, and guidelines. All mining activities involving the production, use, and/or disposal of hazardous or extremely hazardous materials are and would continue to be conducted so as to minimize potential environmental impacts.

FCW must comply with emergency reporting requirements for releases of hazardous materials. Any release of hazardous or extremely hazardous substances in excess of the reportable quantity, as established in 40 CFR 117, is reported as required by CERCLA, as amended. The materials for which such notification must be given are the extremely hazardous substances listed in Section 302 of the *Emergency Planning and Community Right to Know Act* and the hazardous substances designated under Section 102 of CERCLA, as amended. If a reportable quantity of a hazardous or extremely hazardous substance is released, immediate notice must be given to the WDEQ Solid and Hazardous Waste Division, WDEQ Water Quality Division, and all other appropriate federal and state agencies.

Each mining company is expected to prepare and implement several plans and/or policies to ensure environmental protection from hazardous and extremely hazardous materials. These plans/policies include:

- Spill Prevention Control and Countermeasure Plans;
- Spill Response Plans;
- Stormwater Pollution Prevention Plans;
- Inventories of Hazardous Chemical Categories Pursuant to Section 313 of SARA, as Amended; and
- Emergency Response Plans.

All mining operations are also required to be in compliance with regulations promulgated under the Resource Conservation and Recovery Act, Federal Water Pollution Control Act (Clean Water Act), Safe Drinking Water Act, Toxic Substances Control Act, Mine Safety and Health Act, Department of Transportation, and the Federal Clean Air Act. In addition, mining operations must comply with all attendant state rules and regulations relating to hazardous material reporting, transportation, management, and disposal.

Compliance with these rules is the current practice at the Eagle Butte Mine. Acquisition of the Eagle Butte West LBA Tract by FCW would not change these

current practices nor the type and quantity of any wastes generated and disposed of by the mine.

2.2 Alternative 1

Under Alternative 1 for the Eagle Butte West LBA Tract, BLM would reconfigure the tract and hold a competitive coal sale for the lands included in the reconfigured tract and issue a lease to the successful bidder. The modified tract would be subject to standard and special lease stipulations developed for the PRB and for this tract if it is offered for sale (Appendix D). Alternative 1, holding a competitive coal sale for a modified tract, is the BLM's Preferred Alternative.

Alternative 1 for the Eagle Butte West LBA Tract assumes that FCW would be the successful bidder on the tract if a lease sale is held and that the federal coal would be mined to extend the life of existing Eagle Butte Mine. Other assumptions are the same as for the Proposed Action.

As applied for, the Eagle Butte West LBA Tract consists of a single block of federal coal (Figure 1-2). In order to evaluate the potential that an alternate configuration of the tract would provide for more efficient recovery of the federal coal, increase competitive interest in the Eagle Butte West LBA Tract, and/or reduce the potential that some of the remaining unleased federal coal in this area would be bypassed in the future, BLM identified a study area. The BLM study area includes the tract as applied for and unleased federal coal adjacent to the northern and southern edges of the tract as applied for (Figure 2-1). Under this alternative, BLM could add some or all of the adjacent lands to the tract, or BLM could reduce the size of the tract, as discussed in Section 2.0. Under Alternative 1, the area BLM is evaluating in addition to the tract as applied for includes the following lands:

T.51N., R.72W., 6th P.M., Campbell County, Wyoming

Section 18:	Lots 19 and 20;	83.89 acres
Section 19:	Lots 6 through 8 and 10 through 12;	290.46 acres
Section 20:	Lots 1 through 9, 10(N½), and 11(N½);	399.90 acres
Section 32:	Lots 1, 2, 3(E½), 6(E½E½), 7, 8(W½), and 10(W½E½ and E½W½);	200.66 acres
Total:		974.91 acres

Land descriptions and acreage are based on the BLM Status of Public Domain Land and Mineral Titles approved Coal Plat as of April 4, 2005.

FCW estimates that these 974.91 additional acres contain approximately 148.7 million tons of in-place, mineable coal.

As originally applied for, in 2001, the Eagle Butte West LBA Tract included additional coal north and south of the current application area. In 2003, FCW modified their application area by adding coal to the west of their original application and subtracting coal from the northern and southern portions of their original application. The northern boundary of the modified Eagle Butte West LBA Tract was configured by FCW to allow the mine to maintain the setback distance from occupied dwellings and the Rawhide School that is required by WDEQ/LQD for conducting blasting operations, while the current location of the southern boundary was modified to reflect potential concerns with the location of the Gillette-Campbell County Airport. In identifying a study area, BLM included additional federal coal resources north and south of the current application area, as shown in Figure 2-1. BLM wanted to evaluate that federal coal in order to determine if it would be possible to safely recover additional coal in these areas because this coal will likely be bypassed if it is not leased at this time. After evaluating the tract configuration, BLM concluded that regulatory and safety considerations preclude extending the Eagle Butte West LBA Tract in either a north or a south direction due to the presence of the occupied dwellings, school, and airport. BLM did not reduce the size of the tract because the modified tract was configured to allow recovery of the federal coal while maintaining the setback distances for conducting blasting operations established by WDEQ/LQD for safety purposes. BLM did make a decision to add approximately 30 acres to the northeast corner of the tract. Although most of the coal included in this addition to the tract would not be recoverable due to the required setback distances, including this coal in the tract would potentially allow more efficient recovery of the coal up to the required setback distance.

BLM's preferred tract configuration is to add approximately 30 acres to the northeast corner of the tract as applied for (Figure 2-2). Under Alternative 1, BLM would add the following lands to the Eagle Butte West LBA Tract as applied for:

<u>T.51N., R.72W., 6th P.M., Campbell County, Wyoming</u>

Section 20: Lot 10(NW¼) and Lot 11 (N½);	30.13 acres

The legal description of BLM's preferred configuration of the Eagle Butte West LBA Tract under Alternative 1 is as follows:

<u>T.51N., R.72W., 6th P.M., Campbell County, Wyoming</u>

Section 19: Lots 13, 14, 19, and 20;	187.79 acres
Section 20: Lots 10(NW¼, S½) and 11 through 15;	231.87 acres

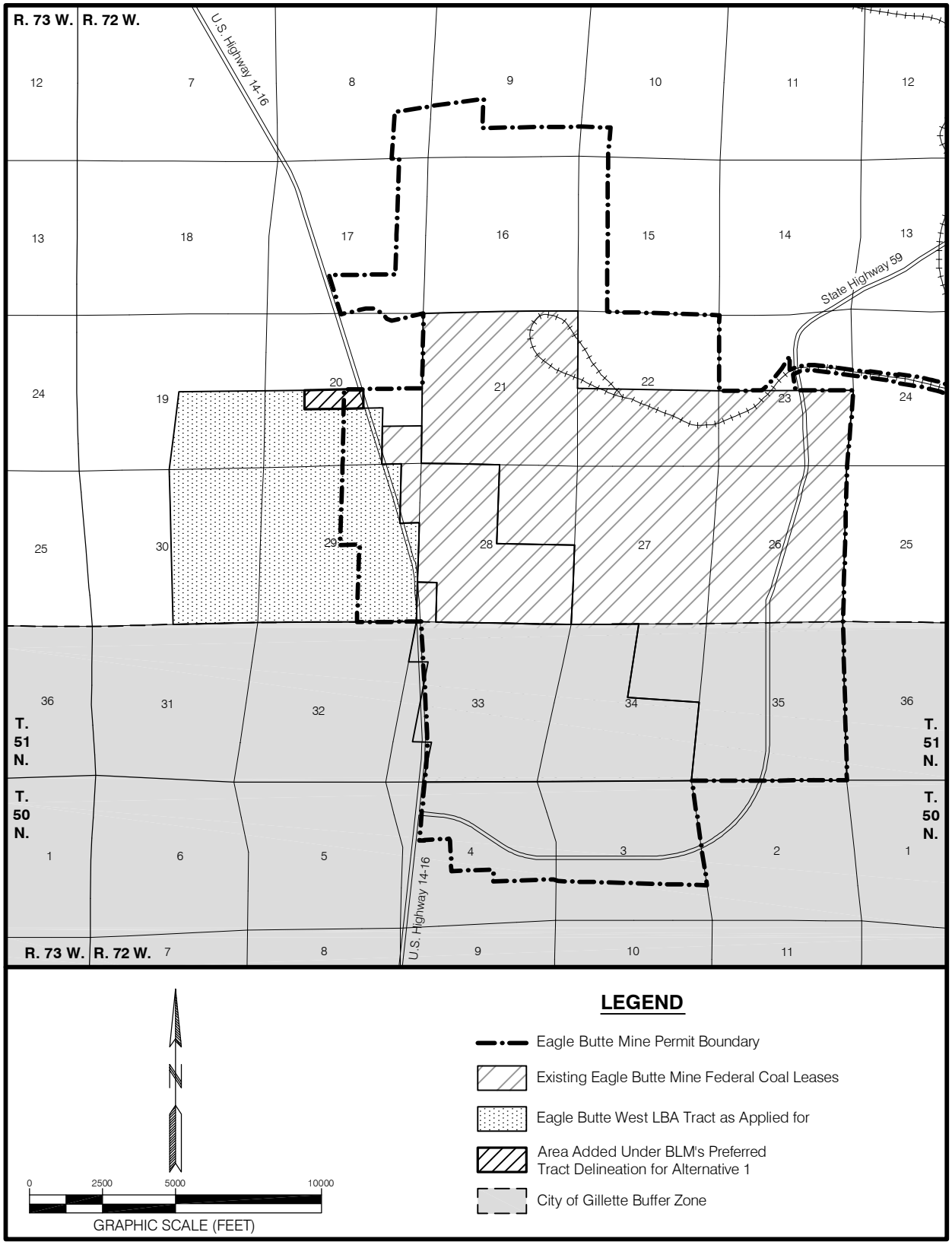


Figure 2-2. Eagle Butte West LBA Preferred Alternative Tract Configuration.

Section 29:	Lots 1(W½), 2 through 7, 8(W½ and SE¼), and 9 through 16;	635.45 acres
Section 30:	Lots 5, 6, 11 through 14, 19, and 20;	372.66 acres
Total:		1,427.77 acres

The land description and acreage are based on the BLM Status of Public Domain Land and Mineral Titles approved Coal Plat as of April 4, 2005. The coal estate in the tract described above is federal and the surface estate is owned by FCW. Ownership of the oil and gas estate is discussed in Section 3.11.

Some of the coal in the Eagle Butte West LBA Tract under this alternative is overlain by U.S. Highway 14-16 and SMCRA prohibits surface mining operations on lands within 100 ft of the outside line of the ROW for a public highway [SMCRA Section 522(e)(4) and 30 CFR 761.11(d)]. As discussed in Sections 1.5 and 2.1, the coal underlying the highway, its ROW, and a buffer zone extending 100 ft on either side of the ROW has been determined to be unsuitable for mining in accordance with SMCRA and as specified in coal leasing Unsuitability Criterion Number 3 (43 CFR 3461).

As discussed in Section 2.1, there is an exception to this prohibition against mining the coal underlying the highway ROW and associated buffer zone that can be applied if the appropriate public road authority allows the road to be relocated or closed [SMCRA Section 522(e)(4) and 30 CFR 761.11(d)(2)]. FCW and WYDOT are working on a plan to relocate U.S. Highway 14-16. If FCW obtains approval from WYDOT to move Highway 14-16, the exception to the prohibition on mining within the highway ROW and buffer zone could be applied and the unsuitability determination could be reconsidered. In that case, FCW would be able to recover the coal underlying the highway ROW and buffer zone. If FCW does not obtain approval to move U.S. Highway 14-16, the coal underlying the highway ROW and buffer zone would remain unsuitable for mining and would not be recovered.

The federal coal underlying Highway 14-16, its ROW, and the adjacent buffer zone is included in the tract because it would allow maximum recovery of the mineable coal adjacent to but outside of the highway ROW and buffer zone if the road is not moved; it would also allow recovery of the coal under the highway if the road is moved. If a lease is issued for this tract, a stipulation will be attached to the lease stating that no mining operations may be conducted in the portion of the lease within the highway ROW and buffer zone unless approval is obtained from the appropriate authority to move U.S. Highway 14-16.

Section 522(e)(5) of SMCRA and the regulations at 30 CFR 761.11 (e), (f), and (g), which are the basis for Unsuitability Criterion Number 3 [43 CFR 3461.5(c)(1)], also prohibit mining within 300 ft of any public building, school, church, community or institutional building, or public park; or within 300 ft of an

occupied dwelling. A public school, the public road to the school, and several occupied dwellings are located in the north half (N½) of Section 20, T.51N., R.72W., within the northern portion of the additional area evaluated under Alternative 1 for the Eagle Butte West LBA Tract (Figure 2-1). Specifically, the Rawhide Elementary School is located in the NE¼NW¼NW¼ of Section 20, T.51N., R.72W., and there are occupied residences in a subdivision located in the NE¼ of Section 20, T.51N., R.72W. The coal underlying the school and occupied dwellings was included in the BLM study area for geological evaluation purposes because it is unmined federal coal that will likely be bypassed if it is not leased at this time, but this coal is unsuitable for mining, based on the regulatory requirements discussed above. The federal coal underlying the school and the occupied dwellings in the N½ of Section 20, T.51N., R.72W. is not included in the tract under BLM's preferred tract configuration (Figure 2-2). This area is still considered to be part of the BLM study area and is included in the following discussions.

The southern portion of the additional area evaluated under Alternative 1, lies within the City of Gillette Buffer Zone (Figure 2-1) and is also adjacent to facilities at the Gillette-Campbell County Airport. BLM included this coal in the study area for geological evaluation purposes because it is unmined federal coal that will likely be bypassed if it is not leased at this time. The BLM's preferred tract configuration does not include any coal located within the City of Gillette Buffer Zone (Figure 2-2), but the area is still considered to be part of the BLM study area in the following discussions.

If U.S. Highway 14-16 is not moved, FCW estimates that the Eagle Butte West LBA Tract under BLM's preferred tract configuration (Figure 2-2) includes approximately 214.2 million tons of mineable coal reserves. Using FCW's projected recovery factor of 96 percent of the mineable coal reserves, about 206.1 million tons of the mineable coal would be recoverable. At the average annual coal production rate of 25 million tons per year, mining this coal would extend the life of the mine by about 8.2 additional years.

If the highway is moved, FCW estimates that the Eagle Butte West LBA Tract includes approximately 241.2 million tons of mineable coal reserves and that approximately 231.1 million tons of that coal would be recoverable. At the average annual coal production rate of 25 million tons per year, mining this coal would extend mine life by about 9.2 additional years.

BLM independently evaluates the volume and average quality of the coal resources included in any federal coal lands that are considered for leasing. BLM's evaluation indicates that the Eagle Butte West LBA Tract includes approximately 255 million tons of mineable coal under BLM's preferred tract configuration, assuming that Highway 14-16 is moved. Additional information from BLM's evaluation will be published in the sale notice for the tract, if it is offered for sale.

If WYDOT approves the relocation of U.S. Highway 14-16, the estimated cost to FCW will be considered by BLM in the fair market value determination for the LBA tract under Alternative 1. If the highway is not moved, the fact that the coal within the highway ROW and the associated buffer zone cannot all be recovered will be considered by BLM in the fair market value determination for the Eagle Butte West LBA Tract under Alternative 1.

2.3 Alternative 2

Under Eagle Butte West LBA Tract Alternative 2, the No Action Alternative, FCW's application to lease the coal included in the Eagle Butte West LBA Tract would be rejected, the tract would not be offered for competitive sale at this time, and the coal included in the tract would not be mined.

Rejection of the application would not affect already permitted mining activities and employment on the existing leases at the Eagle Butte Mine. The Eagle Butte Mine currently leases approximately 4,884 acres of federal coal and 640 acres of state coal; all of which are within the existing mine permit boundary. A total of approximately 6,076 acres will eventually be affected in mining the current leases. If the Eagle Butte West LBA Tract is not leased, FCW estimates that the average annual production at the Eagle Butte Mine after January 1, 2006 will continue to be approximately 25 million tons, and the average full-time employment level is projected to be 223 persons. FCW may scale back the average annual production at the Eagle Butte Mine to 12 million tons from 2011 through 2028; if employment is reduced in proportion to production, approximately half of the workforce (113 persons) would be lost during those years.

In order to compare the economic and environmental consequences of mining these lands versus not mining them, this EIS was prepared under the assumption that the Eagle Butte West LBA Tract would not be mined in the foreseeable future if the No Action Alternative is selected. However, selection of the No Action Alternative would not preclude leasing and mining of this tract in the future. If the decision is made to reject the Eagle Butte West lease application at this time, the tract could be leased as a maintenance lease in the future while the adjacent mine is in operation. If it is not leased while the existing adjacent mine is in operation, it may or may not be leased in the future. The tract being evaluated in this EIS does not include enough coal reserves to economically justify mining by a new operation; however, the coal reserves included in the tract could potentially be combined with adjacent unleased federal coal in this area to create a larger tract, which could be mined by a new operation in the future.

2.4 Alternative 3

Under this alternative, as under the Proposed Action and Alternative 1, the BLM would hold a separate, competitive, sealed-bid sale for the lands included in the Eagle Butte West LBA Tract. Alternative 3 assumes, however, that the successful

qualified bidder would be someone other than the applicant and that this bidder would plan to open a new mine to develop the coal resources included in the Eagle Butte West coal lease application.

A company or companies acquiring this coal for a new stand-alone mine would require considerable initial capital expenses, including the construction of new surface facilities (i.e., offices, shops, warehouses, coal processing facilities, coal loadout facilities, and rail spur), extensive baseline data collection, and development of new mining and reclamation plans. In addition, a company or companies acquiring this coal for a new start mine would have to compete for customers with established mines in a competitive market.

BLM currently estimates that a tract would potentially need to include as much as 500 to 600 million tons of coal in order to attract a buyer interested in opening a new mine in the Wyoming PRB. This is based on several assumptions. First, it is assumed that an operator would construct facilities capable of producing 30 mmtpy, in order to take advantage of the economies of scale offered by the coal deposits in the PRB. Secondly, it is assumed that 20 to 30 years of coal reserves would be needed to justify the expense of building the facilities described above. Given these assumptions, under the Proposed Action or Alternative 1, the tract does not include sufficient coal resources to consider opening a new mine. Therefore, it is unlikely that a company or companies would lease the Eagle Butte West LBA Tract in order to open a new mine.

The potential difficulty in obtaining an air quality permit is another issue that could discourage new mine starts in the PRB. A new mine would create a new source of air quality impacts. As discussed in Chapter 3, the WDEQ/AQD administers a permitting program to assist the agency in managing the state's air resources. Under this program, anyone planning to construct, modify, or use a facility capable of emitting designated pollutants into the atmosphere must obtain an air quality permit to construct. Coal mines fall into this category.

In order to obtain a construction permit, an operator may be required to demonstrate that the proposed activities will not increase air pollutant levels above annual standards established by the Wyoming Air Quality Standards and Regulations, which can be found on the internet at http://deq.state.wy.us/aqd/standards.asp. There were no exceedances of the 24-hour PM_{10} standards anywhere in the PRB through year 2000. From 2001 through 2005, there were 29 monitored exceedances of the 24-hour PM_{10} standard at seven operating mines in the Wyoming PRB. Nineteen of these exceedances occurred in 2001 and 2002, while two, three, and five violations occurred in 2003, 2004, and 2005, respectively (Shamley 2006). In the first months of 2007, there were nine exceedances at five mines. Although none of the exceedances occurred at the Eagle Butte Mine, three of the exceedances occurred in the group of mines located north and east of Gillette that includes the Eagle Butte Mine (Figure 1-1). Although many of these exceedances have been attributed to high winds, concerns

about future potential exceedances of the NAAQS may make it more difficult for an operator planning on opening a new mine to demonstrate that new operations would not result in air pollution levels that are above annual Wyoming standards.

In view of the issues discussed above, development of new mine on the Eagle Butte West LBA Tract is considered unlikely and this alternative is not analyzed in detail in this EIS.

The environmental impacts of developing a new mine to recover the coal resources in the Eagle Butte West LBA Tract would be greater than under the Proposed Action, Alternative 1, or the No Action Alternative because of the need for new facilities, new rail lines, new employment, and the creation of additional sources of particulates (dust). In the event that a lease sale is held and the applicant is not the successful bidder, the successful bidder would be required to submit a detailed mining and reclamation plan for approval before any of the tract could be mined, and this NEPA analysis would be reviewed and supplemented as necessary prior to approval of that mining and reclamation plan.

2.5 Alternative 4

Under Alternative 4, the BLM would delay the sale of the Eagle Butte West LBA Tract as applied for. The prices received for coal from the PRB have generally increased in recent years. If that trend continues, the bonus and royalty payments to the government might be higher if the tract is offered for sale at a later date. Also, delaying the sale of the tract would allow CBNG resources to be more completely recovered prior to mining. Under this alternative, it is assumed that the tract could be developed later as either a maintenance tract or a new start mine, depending on how long the sale was delayed.

There is no assurance at this time that delaying the sale would result in a higher coal price when the coal is leased or mined. Damage to railroad tracks in Wyoming and other states limited coal shipments during much of 2005. These shipping constraints combined with increasing world energy demands and natural disasters in other parts of the country led to large increases coal prices in 2005. Rail capacity increased in 2006 and prices moderated somewhat.

There are two major sources of revenue to state and federal governments from the leasing and mining of federal coal: 1) the competitive bonus bid paid at the time the coal is leased, and 2) federal and state royalties and taxes collected when the coal is sold.

If coal prices do increase, the fair market value of the coal resources in the LBA tract could potentially increase, which could result in an increased bonus bid when the coal is leased. However, postponing a lease sale would not necessarily lead to higher royalty or tax income to the state or federal governments. Royalty and tax payments are the larger of the two revenue sources and they increase

automatically when coal prices increase, because they are collected at the time the coal is sold. They cannot be collected until the coal is leased and permitted, which takes several years. If leasing is delayed, then by the time the coal is mined, the higher coal prices may or may not persist. If the higher coal prices do persist, they may enable the coal lessee to negotiate longer term contracts at higher prices, which would result in longer term, higher royalty and tax revenues. On the other hand, if an existing mine runs out of coal reserves before prices rise, it would potentially have to shut down before additional coal could be leased and permitted for mining. Under that scenario, the fair market value of the coal could actually decrease because the added expense of reopening a mine or starting a new mine would have to be factored into the fair market value.

Other considerations include the value of leaving the mineable coal for future development versus the value of making low-sulfur coal available now, in anticipation of cleaner fuel sources being developed in the future. Continued leasing of PRB coal enables coal-fired power plants to meet CAA requirements without constructing new plants, revamping existing plants, or switching to existing alternative fuels, which may significantly increase power costs for individuals and businesses. If cleaner fuel sources are developed in the future, they could be phased in with less economic impact to the public.

A range of the potential future economic benefits of delaying leasing until coal prices rise could be quantified in an economic analysis, but the benefits would have to be discounted to the present, which would make them similar to the Proposed Action and Alternative 1.

CBNG resources are currently being recovered from oil and gas leases on the Eagle Butte West LBA Tract and there are several mechanisms in place that can be used to allow continuing recovery of the CBNG resources prior to mining if the federal coal in the tract is leased now. These include:

- BLM can attach a Multiple Mineral Development stipulation to the lease, which states that BLM has the authority to withhold approval of coal mining operations that would interfere with the development mineral leases issued prior to the coal lease.

- Mining of the Eagle Butte West LBA Tract cannot occur until the coal lessee has a permit to mine the tract approved by the WDEQ/LQD and a MLA mining plan approved by the Secretary of the Interior. Before the MLA mining plan can be approved, BLM must approve the R2P2 for mining the tract. Prior to approving the R2P2, BLM can review the status of CBNG development on the tract and the mining sequence proposed by the coal lessee. The permit approval process generally takes the coal lessee several years. This would allow time for a large portion of the CBNG resources to be recovered from the tract.

- BLM has a policy in place on CBNG-coal conflicts (BLM Instruction Memorandum No. 2006-153) that directs BLM decision makers to optimize the recovery of both resources and ensure that the public receives a reasonable return (BLM 2006a).

This alternative was not analyzed in detail because it would not produce substantially different impacts from other alternatives analyzed in detail. Rental and royalty provisions in the proposed lease provide for the U.S. to benefit if coal prices increase by the time of mining. Moreover, recovery of a large portion of the remaining economically-recoverable CBNG resources on the tract would be anticipated after lease issuance because of the mechanisms discussed above. The environmental impacts of mining the coal later as part of an existing mine would be expected to be similar and about equal to the Proposed Action and Alternative 1. If a new mine start is required to mine the coal, the environmental impacts would be expected to be greater than if it were mined as an extension of an existing mine.

2.6 Summary of Alternatives and Environmental Consequences

2.6.1 Background

The decision-making process for public lands in Wyoming is conducted in compliance with NEPA, which requires all federal agencies to involve interested publics in their decision making, consider reasonable alternatives to the proposed actions, develop measures to mitigate environmental impacts, and prepare environmental documents that disclose the impacts of proposed actions and alternatives.

This final EIS analyzes three different alternatives for the Eagle Butte West LBA Tract described in the discussion above.

2.6.2 Summary of Alternatives

The Eagle Butte West LBA Tract under the Proposed Action and BLM's preferred tract configuration under Alternative 1 are shown on Figures 2-1 and 2-2, respectively. Summary comparisons of projected coal production, surface disturbance, mine life, and federal and state revenues for the Proposed Action, BLM's preferred tract configuration under Alternative 1, and the No Action Alternative for the Eagle Butte West LBA Tract are presented in Tables 2-2 and 2-3. Table 2-2 presents the comparisons assuming that Highway 14-16 is moved and the underlying coal is recovered. Table 2-3 presents the comparisons assuming that Highway 14-16 is not moved and the underlying coal is not recovered.

Table 2-4 presents a comparative summary of the direct and indirect environmental impacts of implementing each alternative as compared to the No

Action Alternative. The No Action Alternative assumes completion of currently permitted mining at the Eagle Butte Mine for comparison to anticipated mining if the Eagle Butte West LBA Tract is leased. Table 2-5 presents a comparative summary of cumulative environmental impacts of implementing each alternative. The environmental consequences of the Proposed Action and Alternatives 1 and 2 are analyzed in Chapter 3. These summary impact tables are derived from the following explanation of impacts and magnitude. NEPA requires all agencies of the federal government to include, in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on:

(i) the environmental impact of the Proposed Action,
(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
(iii) alternatives to the Proposed Action,
(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
(v) any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented [42 USC § 4332(C)].

Impacts can be beneficial or adverse, and they can be a primary result of an action (direct) or a secondary result (indirect). They can be permanent, long-term (persisting beyond the end of mine life and reclamation) or short-term (persisting during mining and reclamation and through the time the reclamation bond is released). Impacts also vary in terms of significance. The basis for conclusions regarding significance are the criteria set forth by the Council on Environmental Quality (40 CFR 1508.27) and the professional judgment of the specialists doing the analyses. Impact significance may range from negligible to substantial; impacts can be significant during mining but be reduced to insignificance following completion of reclamation.

Table 2-2. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for Eagle Butte West LBA Tract and Eagle Butte Mine – Assuming Highway 14-16 is Moved and the Underlying Coal is Recovered.

Item	No Action Alternative (Existing Eagle Butte Mine)	Added by Proposed Action	Added by Alternative 1 (Preferred Tract Configuration)
In-Place Coal (as of 1/1/06)	374.0 mmt	238.0 mmt	243.7 mmt
Mineable Coal (as of 1/1/06)	354.0 mmt	238.0 mmt	241.2 mmt
Recoverable Coal (as of 1/1/06)[1]	340.0 mmt	228.0 mmt	231.1 mmt
Coal Mined Through 2005	420.4 mmt	--	--
Lease Area[2]	4,884.0 ac	1,397.6 ac	1,427.8 ac
Total Area To Be Disturbed[2]	6,076.0 ac	2,460.0 ac	2,460.0 ac
Permit Area[2]	7,471.0 ac	2,460.0 ac	2,460.0 ac
Average Annual Post-2005 Coal Production	25.0 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2005)	13.6 yrs	9.1 yrs	9.2 yrs
Average Number of Employees	223	0	0
Total Projected State Revenues (post-2005)[3]	$ 384.4 million	$ 293.5 – $ 373.2 million	$ 297.4 – $ 378.2 million
Total Projected Federal Revenues (post-2005)[4]	$ 261.6 million	$ 211.1 – $ 290.9 million	$ 214.0 – $ 294.8 million

[1] Assumes 96 percent recovery of mineable coal. The estimated tons of recoverable coal added under the Proposed Action and Alternative 1 are based on the assumptions that the coal beneath the north half of Section 20 (under Alternative 1) would not be mined, and that the coal beneath U.S. Highway 14-16 ROW and associated buffer zone would be mined.

[2] The lease area includes federal coal leases only and does not include state coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

[3] Revenues to the State of Wyoming include income from severance tax, property and production taxes, sales and use taxes, and Wyoming's share of federal royalty payments, bonus bids, and AML fees. State revenues are based on $5.80 per ton (projected for 8,400-Btu coal) price × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus $0.35 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus payment on LBA leased coal of $0.30 to $0.97 per ton (based on the range of bonus payments for the last 6 LBAs sold in 2004 and 2005) × amount of mineable coal minus federal's 50 percent share, plus $0.023 per ton estimate for sales and use taxes × amount of recoverable coal, plus $0.26 per ton estimate for Ad Valorem taxes × amount of recoverable coal, plus $0.31 per ton estimate for severance taxes × amount of recoverable coal.

[4] Federal revenues are based on $5.80 per ton (projected for 8,400-Btu coal) price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus $0.35 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus $5.80 per ton (for 8,400-Btu coal) price × amount of recoverable coal × black lung tax of 4.0 percent, plus bonus payment on LBA leased coal of $0.30 to $0.97 per ton (based on the range of bonus payments for the last 6 LBAs sold in 2004 and 2005) × amount of mineable coal minus state's 50 percent share.

Table 2-3. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for Eagle Butte West LBA Tract and Eagle Butte Mine – Assuming Highway 14-16 is Not Moved and the Underlying Coal is Not Recovered.

Item	No Action Alternative (Existing Eagle Butte Mine)	Added by Proposed Action	Added by Alternative 1 (Preferred Tract Configuration)
In-Place Coal (as of 1/1/06)	374.0 mmt	238.0 mmt	243.7 mmt
Mineable Coal (as of 1/1/06)	354.0 mmt	211.0 mmt	214.2 mmt
Recoverable Coal (as of 1/1/06)[1]	340.0 mmt	203.0 mmt	206.1 mmt
Coal Mined Through 2005	420.4 mmt	--	--
Lease Area[2]	4,884.0 ac	1,397.6 ac	1,427.8 ac
Total Area To Be Disturbed[2]	6,076.0 ac	2,395.0 ac	2,415.0 ac
Permit Area[2]	7,471.0 ac	2,460.0 ac	2,460.0 ac
Average Annual Post-2005 Coal Production	25.0 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2005)	13.6 yrs	8.1 yrs	8.2 yrs
Average Number of Employees	223	0	0
Total Projected State Revenues (post-2005)[3]	$ 384.4 million	$ 261.1 - $ 331.8 million	$ 264.2 - $ 336.0 million
Total Projected Federal Revenues (post-2005)[4]	$ 261.6 million	$ 187.9 - $ 258.5 million	$ 190.7 - $ 262.5 million

1 Assumes 96 percent recovery of mineable coal. The estimated tons of recoverable coal added under the Proposed Action and Alternative 1 are based on the assumptions that the north half of Section 20 (under Alternative 1) would not be mined, and the coal beneath the U.S. Highway 14-16 ROW and associated buffer zone would not be mined.

2 The lease area includes federal coal leases only and does not include state coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

3 Revenues to the State of Wyoming include income from severance tax, property and production taxes, sales and use taxes, and Wyoming's share of federal royalty payments, bonus bids, and AML fees. State revenues are based on $5.80 per ton (projected for 8,400-Btu coal) price × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus $0.35 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus payment on LBA leased coal of $0.30 to $0.97 per ton (based on the range of bonus payments for the last 6 LBAs sold in 2004 and 2005) × amount of mineable coal minus federal's 50 percent share, plus $0.023 per ton estimate for sales and use taxes × amount of recoverable coal, plus $0.26 per ton estimate for Ad Valorem taxes × amount of recoverable coal, plus $0.31 per ton estimate for severance taxes × amount of recoverable coal.

4 Federal revenues are based on $5.80 per ton (projected for 8,400-Btu coal) price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus $0.35 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus $5.80 per ton (for 8,400-Btu coal) price × amount of recoverable coal × black lung tax of 4.0 percent, plus bonus payment on LBA leased coal of $0.30 to $0.97 per ton (based the range of bonus payments for the last 6 LBAs sold in 2004 and 2005) × amount of mineable coal minus state's 50 percent share.

Table 2-4. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative 1, and the No Action Alternative for the Eagle Butte West LBA Tract[2].

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
TOPOGRAPHY & PHYSIOGRAPHY		
Lower surface elevation	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Permanent topographic moderation, which could result in:		
Microhabitat reduction	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Habitat diversity reduction	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Big game carrying capacity reduction	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Reduction in water runoff and peak flows	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Increased precipitation infiltration	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Reduction in erosion	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Potential enhanced vegetative productivity	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Potential acceleration of groundwater recharge	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Diversion of Little Rawhide Creek during mining	Moderate, short term on existing mine area	Same as No Action on expanded mine area
GEOLOGY AND MINERALS		
Removal of coal	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Removal and replacement of topsoil and overburden	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Physical characteristic alterations in replaced overburden	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Loss of unrecovered CBNG though venting and/or depletion of hydrostatic pressure	Minor to moderate, permanent on existing mine area	Same as No Action on expanded mine area
Loss of access for development of sub-coal oil and gas resources and other minerals	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Destruction of paleontological resources that are not exposed on the surface	Moderate, permanent on the existing mine area	Same as No Action on expanded mine area
AIR QUALITY		
Particulate Emissions:		
Elevated concentrations associated with projected average production of 25 mmtpy in compliance with ambient standard	Moderate, short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
Potential for public exposure to particulate emissions along U.S Highway 14-16 and in occupied dwellings, businesses and school located in area	Minor to moderate, short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
Potential for human health impacts as a result of exposure to particulate emissions	Minor to moderate, short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
NO_x Emissions from Machinery:		
Elevated concentrations associated with projected average production of 25 mmtpy in compliance with ambient standard	Moderate, short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative1, and the No Action Alternative for the Eagle Butte West LBA Tract[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
AIR QUALITY (Continued)		
Potential for public exposure to NO_x emissions from machinery along U.S. Highway 14-16 and for occupied dwellings, airport, businesses and school located in area	Moderate, short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
Potential for human health impacts as a result of exposure to NO_x emissions	Minor to moderate, short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
NO_x Emissions from Blasting in Compliance with Eagle Butte Mine permit Blasting Conditions :		
Potential for public exposure	No projected events	Same as No Action for from 8 to 9 additional years
Potential for human health impacts as a result of exposure to NO_x emissions	No projected events	Same as No Action for from 8 to 9 additional years
Visibility:		
Elevated concentrations of fine particulate matter associated with projected average coal production of 25 mmtpy	Moderate, short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
Acidification of Lakes:		
SO_2 emissions derived from burning Eagle Butte coal to produce power	Moderate, short term in vicinity of power plants	Same as No Action on expanded mine for from 8 to 9 additional years
WATER RESOURCES		
Groundwater		
Removal of coal and overburden aquifers	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Replacement of existing coal and overburden with unconsolidated backfill material	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Depressed water levels in overburden and coal aquifers adjacent to mine	Moderate, short to long term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area
Change in hydraulic properties in backfilled areas	Negligible, long term on existing mine area	Same as No Action on expanded mine area
Increase in TDS concentrations in backfilled areas	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Use of subcoal aquifers for water supply	Negligible, short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
Surface Water		
Diversion and disruption of a portion of the Little Rawhide Creek drainage basin and associated reservoirs	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Reconstruction of surface drainage systems	Permanent on existing mine areas	Same as No Action on expanded mine area
Increased runoff and erosion rates on disturbed lands due to vegetation removal	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Increased infiltration on reclaimed lands due to topographic moderation	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative 1, and the No Action Alternative for the Eagle Butte West LBA Tract[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
WATER RESOURCES (Continued)		
Increased runoff on reclaimed lands due to loss of soil structure	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Potential for adverse downstream effects as a result of sediment produced by large storms	Moderate, long term for existing approved mining operations	Same as No Action for extended mining operations
Water Rights		
Disruption of water supply for water-rights holders with wells completed in the coal or overburden aquifer within the five-foot drawdown area or with surface water rights within the disturbance area	Minor to moderate, long term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area
ALLUVIAL VALLEY FLOORS		
Little Rawhide Creek within the existing mine permit area, including the portion of the creek within the LBA tract, has been declared an AVF non-significant to agriculture. Based on evaluation, it is believed that the portion of Prong Draw within the tract does not include an AVF.		
Removal and restoration of AVFs determined not to be significant to agriculture	Moderate, short term on existing leases	Same as No Action on expanded mine area
Disruptions to streamflows supplying downstream AVFs	Negligible, short term on existing leases	Same as No Action on expanded mine area
WETLANDS		
Removal of jurisdictional wetlands and loss of wetland function until reclamation occurs	Moderate, short term on existing leases; jurisdictional wetlands would be replaced as required under Section 404 of the Clean Water Act	Same as No Action on expanded mine area
Removal of non-jurisdictional wetlands	Negligible on existing leases; non-jurisdictional wetlands would be replaced as required by the surface land owner or WDEQ/LQD	Same as No Action on expanded mine area
SOILS		
Changes in physical properties after reclamation:		
Increased near-surface bulk density and decreased soil infiltration rate resulting in increased potential for soil erosion	Moderate, long term on existing mine area	Same as No Action on expanded mine area
More uniformity in soil type, thickness, and texture	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative 1, and the No Action Alternative for the Eagle Butte West LBA Tract[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
SOILS (Continued)		
Decreased runoff due to topographic modification	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Changes in biological properties in soils that are stockpiled before placement:		
Reduction in organic matter	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Reduction in microorganism population	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Reduction in seeds, bulbs, rhizomes and live plant parts	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Changes in chemical properties:		
More uniform soil nutrient distribution	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
VEGETATION		
During mining:		
Progressive removal of existing vegetation	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Increased erosion	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Wildlife and livestock habitat loss	Moderate, short term on existing mine area	Same as No Action on expanded mine area
After revegetation:		
Changes in vegetation patterns	Negligible, long term on existing mine area	Same as No Action on expanded mine area
Reduction in vegetation diversity	Negligible, long term on existing mine area	Same as No Action on expanded mine area
Reduction in shrub density	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Decreased big game habitat carrying capacity	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Decreased habitat for shrub dependent species	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Potential invasion of non-native plant species	Moderate, short term on existing mine area	Same as No Action on expanded mine area
WILDLIFE		
Displacement of all wildlife from active mining areas	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Increased competition on adjacent undisturbed or reclaimed lands, especially big game	Moderate, short term on adjacent area	Same as No Action on adjacent area
Restriction of wildlife movement, especially big game	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Increased mortality of small mammals	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Surface and noise disturbance of active sage-grouse leks	Moderate, short to long term on existing mine area	Same as No Action on expanded mine area
Disturbance of sage-grouse nesting and winter habitat during mining	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Loss of sage-grouse nesting habitat after reclamation	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Abandonment of raptor nests	Negligible, short term on existing mine area	Same as No Action on expanded mine area
Loss of foraging habitat for raptors	Negligible, short to long term on existing mine area	Same as No Action on expanded mine area
Loss of nesting and foraging habitat for Migratory Birds of Management Concern	Negligible, short to long term on existing mine area	Same as No Action on expanded mine area

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative1, and the No Action Alternative for the Eagle Butte West LBA Tract[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
WILDLIFE (Continued)		
Reduction in waterfowl resting and feeding habitat	Negligible, short term on existing mine area	Same as No Action on expanded mine area
Loss of habitat for aquatic species, amphibians and reptiles during mining	Negligible, short term on existing mine area	Same as No Action on expanded mine area
Road kills by mine-related traffic	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Reduction in habitat carrying capacity and habitat diversity on reclaimed lands	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Potential reduction in microhabitats on reclaimed lands	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Localized avoidance of foraging areas by big game	Minor, short term on existing mine area	Same as No Action on expanded mine area
THREATENED, ENDANGERED, PROPOSED, AND CANDIDATE SPECIES (See Appendix E)		
Black-footed ferret	As determined by previous consultation with USFWS for all species	No effect
Bald eagle		May affect, not likely to adversely affect
Ute ladies'-tresses		May affect, not likely to adversely affect
LAND USE AND RECREATION		
Reduction of livestock grazing	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Loss of wildlife habitat	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Loss of access for sub-coal oil and gas development	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Removal of oil and gas production facilities	Moderate, short term on existing mine area	Same as No Action on expanded mine area
CULTURAL RESOURCES		
Sites that are not eligible for NRHP	Ineligible sites may be destroyed without further work on existing mine area	Same as No Action on expanded mine area
Sites that are eligible for NRHP	Impacts to sites that are eligible for the NHRP are not permitted; eligible sites would be avoided or mitigated through data recovery prior to mining on existing mine area	Same as No Action on expanded mine area
Sites that are unevaluated for eligibility	Impacts to unevaluated sites are not permitted; unevaluated sites would be evaluated prior to mining on existing mine area	Same as No Action on expanded mine area
NATIVE AMERICAN CONCERNS	No impact identified on existing mine area	Same as No Action on expanded mine area

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative 1, and the No Action Alternative for the Eagle Butte West LBA Tract[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
VISUAL RESOURCES		
During mining:		
Alteration of landscape by mining facilities and operations	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Visibility of mining operations from highway	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Following reclamation:		
Smoother sloped terrain	Negligible, long term on existing mine area	Same as No Action on expanded mine area
Reduction in sagebrush density	Moderate, short to long term on existing mine area	Same as No Action on expanded mine area
NOISE		
Increased noise levels as a result of mining activities	Moderate to substantial, short term noise impacts to occupied dwellings, school, businesses, and airport located within 2,500 feet of mining activities	Same as No Action on expanded mine area
TRANSPORTATION FACILITIES		
Use of rail systems and existing Eagle Butte Mine rail infrastructure to ship coal	Moderate, for duration of existing approved mining operations	Same as No Action for from 8 to 9 additional years
Employee and service contractor use of highways to and from mine sites	Moderate, for duration of existing approved mining operations	Same as No Action for from 8 to 9 additional years
Relocation of pipelines	Negligible, short to long term on existing mine area	Same as No Action on expanded mine area
Relocation of utility lines	Negligible, short to long term on existing mine area	Same as No Action on expanded mine area
Relocation of Highway 14-16, if approved by WYDOT, to allow recovery of coal under lease	No impact at this time	Moderate to substantial, long term to permanent
Mining operations near Highway 14-16, with or without approval of relocation	Moderate for duration of existing approved mining operations	Same as No Action for from 8 to 9 additional years
Mining operations near Gillette-Campbell County Airport	Moderate for duration of existing approved mining operations	Moderate (Proposed Action) to substantial (Alternative 1) for up to 12 additional years
Mining operations impacting future airport expansion plans	No Impact	Delayed for from 8 to 9 years
HAZARDOUS AND SOLID WASTE		
Waste generated by mining operations	Negligible for duration of existing approved mining operations	Same as No Action for from 8 to 9 additional years

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative 1, and the No Action Alternative for the Eagle Butte West LBA Tract[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
SOCIOECONOMICS		
Employment	Moderate, beneficial short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
Revenues from royalties and taxes to the state government	Moderate, beneficial short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
Revenues from royalties and taxes to the federal government	Moderate, beneficial short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
Revenues from taxes to local economy	Moderate, beneficial short term for existing approved mining operations	Same as No Action for from 8 to 9 additional years
Additional housing and infrastructure needs	No impact related to existing approved mining operations	Same as No Action for from 8 to 9 additional years

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-5. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2].

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE, TYPE, AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
TOPOGRAPHY & PHYSIOGRAPHY		
Alteration of topography following reclamation of coal disturbance areas	Permanent topographic moderation following reclamation	Same as No Action
Alteration of topography to accommodate coal-related, oil and gas, and oil- and gas-related facilities	Long term to permanent limited changes in discrete, scattered areas	Same as No Action
GEOLOGY AND MINERALS		
Recovery of coal resulting in reduction in coal resources and disturbance and replacement of overburden and topsoil	Moderate, long term to permanent	Same as No Action
Surficial disturbance and reclamation on oil and gas well sites and associated facilities	Moderate, long term to permanent	Same as No Action
PALEONTOLOGY		
Coal, coal-related, oil and gas, and oil- and gas-related development disturbance of PFYC Class 5 Wasatch and Class 3 Fort Union Formations	Permanent potential adverse effects to scientifically significant fossils that are present but not visible prior to disturbance	Same as No Action
AIR QUALITY		
Impacts to Montana near-field receptors		
24-hour PM_{10}	A maximum modeled impact in one area above NAAQS for the baseline year and both coal production scenarios for 2010	Same as No Action
All other parameters	Modeled impacts in compliance with NAAQS and Montana AAQS	Same as No Action
Impacts to Wyoming near-field receptors		
24-hour PM_{10}	Modeled impact above NAAQS at some receptors for both coal production scenarios for 2010	Same as No Action
Annual PM_{10}	Maximum modeled impact above WAAQS at one receptor for the upper production scenario for 2010	Same as No Action
All other parameters	Modeled impacts in compliance with NAAQS and WAAQS	Same as No Action

[1] Cumulative impact discussion in this table and in Chapter 4 is based on the PRB Coal Review analyses (BLM 2005a-g, 2006b, and in preparation).
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-5. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE, TYPE, AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
AIR QUALITY (Continued)		
Non-regulatory PSD Impacts at Class I and Sensitive Class II Areas		
Class I Northern Cheyenne Indian Reservation	Modeled impacts above Class I increment levels for 24-hour PM_{10}, annual PM_{10}, 24-hour SO_2, 3-hour SO_2 for baseline year and both coal production scenarios for 2010; above Class I increment for annual NO_2 for upper coal production scenario for 2010	Same as No Action
Class I Washakie Wilderness Area and Wind Cave National Park and Class II Crow Indian Reservation	Modeled impacts above Class I increment levels for 24-hour PM_{10} for baseline year and both coal production scenarios for 2010	Same as No Action
All other Class I and Sensitive Class II modeled receptors	Modeled impacts within Class I increment levels for baseline year and both coal production scenarios for 2010	Same as No Action
Visibility Impacts	199 or more days with a change of 1.0 dv or greater at three Class I areas and seven sensitive Class II areas for the baseline year and both coal productions scenarios for 2010	Same as No Action
Acid deposition Impacts	All modeled impacts below the depositions threshold values for nitrogen and sulfur compounds	Same as No Action
Florence Lake	Modeled impact above 10 percent ANC	Same as No Action
Upper Frozen Lake	Modeled impact above 1 µeq/L	Same as No Action
All other modeled sensitive lakes	Modeled impact below threshold values	Same as No Action
GROUNDWATER RESOURCES		
Removal of coal aquifer and replacement with backfill material	Moderate, permanent for mining areas	Same as No Action
Lowering of water levels in aquifers around the mines	Moderate, long term in area immediately west of mines	Same as No Action
Water level decline in sub-coal aquifers as a result of all development	No cumulative impacts anticipated	Same as No Action
Change in groundwater quality as a result of all development	No cumulative impacts anticipated	Same as No Action
Overlapping drawdown in the coal aquifer caused by surface mining and CBNG development	Additive, long term in area immediately west of surface coal mines	Same as No Action

[1] Cumulative impact discussion in this table and in Chapter 4 is based on the PRB Coal Review analyses (BLM 2005a-g, 2006b, and in preparation).
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-5. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE, TYPE, AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
SURFACE WATER RESOURCES		
Surface disturbance of intermittent and ephemeral streams and scattered ponds and reservoirs as a result of coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term	Same as No Action
Discharge of coal mining and CBNG produced waters into intermittent and ephemeral streams	Moderate, short term	Same as No Action
Sediment input into intermittent and ephemeral streams and scattered ponds and reservoirs as a result of coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term	Same as No Action
ALLUVIAL VALLEY FLOORS		
Coal mining disturbance of AVFs determined to be significant to agriculture	Not permitted by regulation	Same as No Action
Coal mining disturbance of AVFs determined not to be significant to agriculture	AVFs disturbed by mining must be restored to essential hydrologic function No cumulative impacts anticipated	Same as No Action
SOILS		
Coal mining, coal-related, oil and gas, and oil- and gas-related disturbance and replacement of soil resources	Moderate, short term and long term impacts through accelerated wind or water erosion, declining soil quality factors through compaction, reduced microbial populations and organic matter, and potential mixing of soil zones	Same as No Action
CBNG water disposal impacts to soil resources	Potential increase in soil alkalinity depending on SAR levels in water and method of water disposal	Same as No Action
VEGETATION		
Coal mining, coal-related, oil and gas, and oil- and gas-related removal and replacement of native vegetation	Moderate, short to long term impacts due to potential differences in species composition and presence and size of woody species on reclaimed lands	Same as No Action
Coal mining, coal-related, oil and gas, and oil- and gas-related impacts to Special Status Plant Species	Potential incremental loss or alteration of potential or known habitat	Same as No Action
Coal mining, coal related, oil and gas, and oil- and gas-related dispersal of noxious and invasive species	Potential displacement of native species and changes in species composition	Same as No Action

1 Cumulative impact discussion in this table and in Chapter 4 is based on the PRB Coal Review analyses (BLM 2005a-g, 2006b, and in preparation).
2 All impacts are assumed to be adverse unless noted otherwise.

Table 2-5. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE, TYPE, AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
WETLAND AND RIPARIAN VEGETATION		
CBNG-related discharge of produced water	Moderate, short to long term creation of wetlands in areas that previously supported upland vegetation	Same as No Action
WILDLIFE		
Direct and indirect coal mining, coal-related, oil and gas, and oil- and gas-related development impacts to game and non-game species, including direct mortality, habitat fragmentation, animal displacement, noise and increased human presence	Moderate, short term	Same as No Action
Coal mining, coal-related, oil and gas, and oil- and gas-related disturbance of game and nongame species habitat during project development and operation	Moderate, short term loss of all types of habitat present in disturbed areas	Same as No Action
Coal mining, coal related, oil and gas, and oil- and gas-related habitat changes after reclamation	Moderate, long term change in habitat with potential changes in associated wildlife populations	Same as No Action
FISHERIES		
Alteration or loss of habitat due to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short to long term	Same as No Action
Changes in water quality as a result of surface disturbance or introduction of contaminants into drainages caused by coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short to long term	Same as No Action
Changes in available habitat as a result of water withdrawals or discharges related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term	Same as No Action
SPECIAL STATUS SPECIES		
Direct and indirect coal mining, coal-related, oil and gas, and oil- and gas-related development impacts, including direct mortality, breeding area, nest or burrow abandonment, noise and increased human presence	Moderate, short term	Same as No Action
Coal mining, coal-related, oil and gas, and oil- and gas-related disturbance of habitat during project development and operation	Moderate, short term loss of all types of special status species habitat present in disturbed areas	Same as No Action
Coal mining, coal related, oil and gas, and oil- and gas-related habitat changes after reclamation	Moderate, long term change in habitat with potential changes in associated populations of special status species	Same as No Action

[1] Cumulative impact discussion in this table and in Chapter 4 is based on the PRB Coal Review analyses (BLM 2005a-g, 2006b, and in preparation).
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-5. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE, TYPE, AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
LAND USE AND RECREATION		
Loss of forage and range improvements and restriction of livestock movement due to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term	Same as No Action
Disturbance of developed recreation sites by coal mining, coal-related, oil and gas, and oil- and gas-related development	Negligible, short term	Same as No Action
Reduction or degradation of opportunities for dispersed recreation activities related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term on existing mine area	Same as No Action
CULTURAL RESOURCES		
Disturbance of cultural resource sites	Moderate, permanent	Same as No Action
TRANSPORTATION AND UTILITIES		
Movement of segments of existing highways, pipelines, transmission lines, or railroads to accommodate coal mining development	Moderate, long term to permanent, disruptive effects would be minimized	Same as No Action
Increased vehicular traffic on roads and highways due to coal mining, coal-related, oil and gas, and oil- and gas-related development, and associated impacts including traffic accidents, road wear, air emissions, dust, noise, and vehicle collisions with wildlife and livestock	Moderate, short term	Same as No Action
Construction and operation of additional railroad and pipeline facilities and transmission lines to transport coal, oil and gas, and electricity	Moderate, short to long term	Same as No Action
SOCIOECONOMICS		
Increases in employment related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, short to long term	Same as No Action
Increases in personal income due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, beneficial, short to long term	Same as No Action
Increase in population due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, short to long term	Same as No Action
Expansion of housing supply due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, short to long term	Same as No Action

1 Cumulative impact discussion in this table and in Chapter 4 is based on the PRB Coal Review analyses (BLM 2005a-g, 2006b, and in preparation).
2 All impacts are assumed to be adverse unless noted otherwise.

Table 2-5. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE, TYPE, AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
SOCIOECONOMICS (Continued)		
Increases in school enrollment due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term	Same as No Action
Need for additional local government facilities and services due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short to long term	Same as No Action
Increased federal state and local revenues related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, beneficial, short to long term	Same as No Action

[1] Cumulative impact discussion in this table and in Chapter 4 is based on the PRB Coal Review analyses (BLM 2005a-g, 2006b, and in preparation).
[2] All impacts are assumed to be adverse unless noted otherwise.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources in the general analysis area for the Eagle Butte West LBA[1] Tract (the affected environment) and analyzes the direct and indirect impacts to those resources that would be associated with mining the tract if it is leased under the Proposed Action or under the BLM's preferred tract configuration for Alternative 1 (the environmental consequences).

> Additional, more detailed information about the affected environment in the general analysis area is contained in a separate document entitled *Supplementary Information on the Affected Environment in the General Analysis Area for the Eagle Butte West Coal Lease Application EIS,* which is available on request.

The probable environmental consequences of the No Action Alternative (Alternative 2, not issuing a lease for the tract) with respect to the environmental resources are also considered in this analysis.

In addition, this chapter considers regulatory compliance; mitigation; monitoring; residual impacts; the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and the irreversible and irretrievable commitments of resources that would occur with implementation of the Proposed Action or the BLM's preferred tract configuration under Alternative 1. As discussed in Chapter 2, regulatory compliance and mitigation and monitoring measures that are required by federal and/or state law are considered to be part of the Proposed Action and Alternative 1.

Critical elements of the human environment (BLM 1988) that could potentially be affected by the Proposed Action or the BLM's preferred tract configuration under Alternative 1 include air quality, cultural resources, Native American religious concerns, T&E species, migratory birds, hazardous or solid wastes, water quality, wetlands/riparian zones, invasive non-native species, and environmental justice. Five other critical elements (areas of critical environmental concern, prime or unique farmlands, floodplains, wild and scenic rivers, and wilderness) are not present in the analysis area and are not addressed further. In addition to the critical elements that are potentially present in the general analysis area, this EIS discusses the status and potential effects of mining the LBA tract on topography and physiography, geology and mineral resources, soils, water quantity, alluvial valley floors, vegetation, wildlife, land use and recreation, paleontological resources, visual resources, noise, transportation resources, and socioeconomics.

[1] Refer to page xv for a list of abbreviations and acronyms used in this document.

The resources that are addressed in this EIS were identified during the scoping process or interdisciplinary team review as having the potential to be affected.

Figure 3-1 shows the general analysis area for most environmental resources. The general analysis area for the tract includes the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the entire additional area evaluated under Alternative 1) and the anticipated permit amendment study area for the Eagle Butte Mine. The anticipated permit amendment study area is generally defined as those lands adjacent to and outside of Eagle Butte Mine's current permit area that the applicant mine anticipates would be included within the amended mine permit area if the tract is leased.

Table 3-1 shows the total leased and total mine disturbance areas for the existing Eagle Butte Mine (which represents the No Action Alternative). As indicated in Table 3-1, Eagle Butte's current federal coal leases include approximately 4,884 acres and, under the currently approved mining and reclamation plan, the mine would disturb a total of approximately 6,076 acres in order to recover that coal. According to Eagle Butte Mine's 2004 Annual Report submitted to WDEQ/LQD, the mine had disturbed a total of about 3,556 acres as of December 2004 (FCW 2004b). Of that area of disturbance, approximately 1,535 acres were occupied by permanent or temporary facilities (stockpiles, hydrologic control structures, mine buildings and coal loading facilities, railroad loop, environmental monitoring areas, etc.), 795 acres were being actively mined, and 1,226 acres had been mined and reclaimed or were in the process of being reclaimed (FCW 2004b).

If the Eagle Butte West LBA Tract is leased to the applicant as a maintenance tract under the Proposed Action or the BLM's preferred tract configuration for Alternative 1, the permit area for the adjacent Eagle Butte Mine would have to be amended to include the new lease area before it could be disturbed by mining activities. Table 3-1 also shows how the leased area and disturbance area would change for the tract as applied for and for the BLM's preferred tract configuration under Alternative 1. The estimates of recoverable coal, associated disturbance, and mine life shown in Table 3-1 and elsewhere in this chapter assume that U.S. Highway 14-16 is not moved. If WYDOT approves relocation of Highway 14-16, the estimated tons of recoverable coal, associated disturbance, and mine life would increase as discussed in Sections 2.1 and 2.2 and in Table 2-2. A portion of the LBA tract lies inside the current mine permit area (Figure 3-1). If the tract is leased, the area that would have to be added to the existing mine permit area would be that portion of the LBA tract that lies outside the existing permit boundary plus an adjacent strip of land that would be used for highwall reduction after mining and such mine-related activities as construction of diversions, flood and sediment control structures, roads, and stockpiles. Portions of the LBA tract under the Proposed Action and the BLM's preferred tract configuration for Alternative 1 lie east of U.S. Highway 14-16, as shown in Figure 3-1. Some of these areas of the tract have been disturbed by the current Eagle Butte mining operation in order to recover the coal in the existing coal leases (Figure 2-1). The

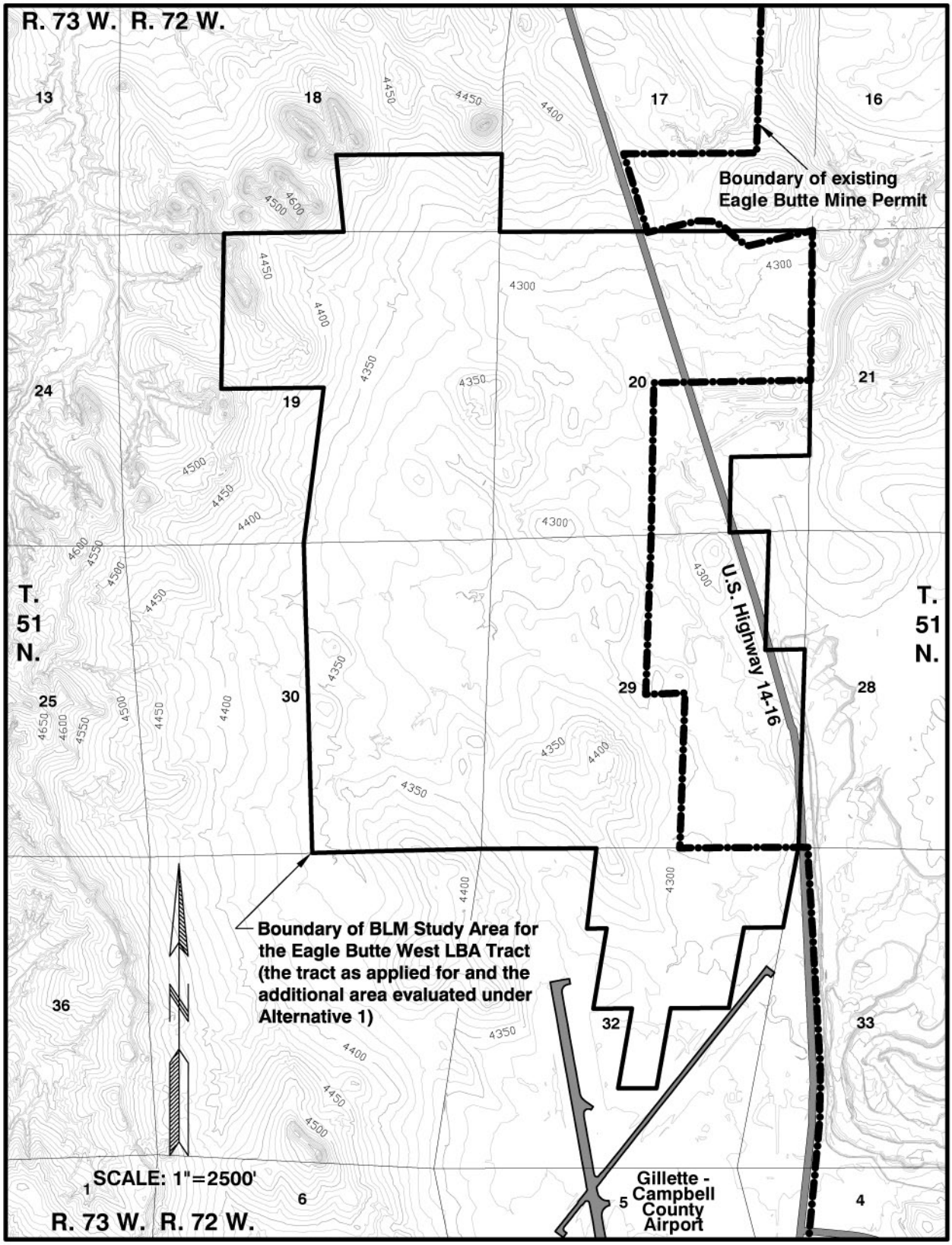


Figure 3-1. General Analysis Area.

Table 3-1. Comparison of Existing and Proposed Eagle Butte Mine Disturbance Area and Mining Operations – Assuming that U.S. Highway 14-16 is Not Moved and the Coal Underlying the Highway is Not Recovered.[1]

	No Action Alternative (Existing Permit Area)	**Proposed Action**	**BLM Study Area Under Alternative 1[2]**	**BLM Preferred Tract Configuration Under Alternative 1[3]**
Additional Lease Area (Acres)	---	1,397.6	2,372.6	1,427.8
Total Lease Area (Acres)[4]	4,884.0	6,281.6	7,256.6	6,311.8
Increase in Lease Area (Percent)	---	28.6	48.6	29.2
Estimated Additional Coal Removal Area (Acres)		1,333.0	1,989.0	1,352.0
Estimated Additional Mine Disturbance Area (Acres)[5]	---	2,395.0	2,505.0	2,415.0
Estimated Total Mine Disturbance Area (Acres)	6,076.0	8,471.0	8,581.0	8,491.0
Increase in Estimated Disturbance Area (Percent)	---	39.4	41.2	39.8
Estimated Additional Recoverable Coal (Million Tons)[6]	---	203.0	299.9	206.1
Estimated Recoverable Coal for Mine as of 1/06 (Million Tons)	340.0	543.0	639.9	546.1
Increase in Estimated Recoverable Coal as of 1/06 (Percent)	---	59.7	88.2	60.6

1 If the highway is moved, there would be approximately 65 additional acres disturbed and approximately 25 million additional tons of coal would be recovered under the Proposed Action.
2 The BLM study area includes the tract as applied for and the additional area evaluated by BLM under Alternative 1.
3 The BLM's preferred tract configuration under Alternative 1 is shown in Figure 2-2.
4 Includes federal and state coal.
5 Total Disturbance Area = area to be mined + area disturbed for mine facilities, access roads, haul roads, highwall reduction, railroad facilities, stockpiles, etc.
6 Estimated Recoverable Coal Resources = tons of mineable coal x recovery factor (96 percent).

environmental consequences of leasing the Eagle Butte West LBA Tract under the Proposed Action or the BLM's preferred tract configuration for Alternative 1 would be similar in nature, but selection of the Proposed Action would disturb a slightly smaller area of land surface.

Surface mining and reclamation have been ongoing in the eastern PRB for about three decades. During this time, effective mining and reclamation technologies have been developed and continue to be refined. Mining and reclamation operations are regulated under SMCRA and Wyoming statutes. WDEQ technically reviews all mine permit application packages to ensure that the mining and reclamation plans comply with all state permitting requirements and that the

proposed coal mining operations comply with the performance standards of the DOI-approved Wyoming program. BLM attaches special stipulations to all coal leases (Appendix D), and there are a number of federal and state permit approvals that are required in order to conduct surface mining operations (Appendix A). The regulations are designed to ensure that surface coal mining impacts are mitigated.

Impacts can range from beneficial to adverse and they can be a primary result of an action (direct) or a secondary result (indirect). They can be permanent, long-term (persisting beyond the end of mine life and reclamation), or short-term (persisting during mining and reclamation and until the time the reclamation bond is released). Impacts also vary in terms of significance. The basis for conclusions regarding significance are the criteria set forth by the Council on Environmental Quality (40 CFR 1508.27) and the professional judgment of the specialists doing the analyses. Impact significance may range from negligible to substantial; impacts can be significant during mining but be reduced to insignificance following completion of reclamation.

3.1 General Setting

The general analysis area is located in the PRB, a part of the Northern Great Plains that includes most of northeastern Wyoming. Vegetation is primarily sagebrush and mixed grass prairie.

3.1.1 Climate and Meteorology

The climate in the general analysis area is typical of a semi-arid, high plains environment with relatively large seasonal and diurnal variations in temperature and seasonal variation in precipitation. The average annual precipitation at a NOAA meteorological station (Gillette 9ESE), located about 11 miles southeast of the Eagle Butte Mine, is 15.64 inches (WRCC 2006). June (2.72 inches) and May (2.60 inches) are the wettest months, and February (0.55 inch) is the driest. Snowfall averages 56.7 inches per year, with most occurring in March (10.4 inches) and April (8.6 inches). Potential evapotranspiration, at approximately 31 inches (NOAA 1969), exceeds annual precipitation. Summers are relatively short and warm, while winters are longer and cold. The average daily mean temperature is 45.2 degrees F. The highest recorded temperature was 107 degrees F and the lowest was minus 40 degrees F. July is the warmest month, with a mean daily temperature of 71.0 degrees F, and January is the coldest month, with a mean daily temperature of 21.7 degrees F. The frost-free period is 100-130 days.

In the general analysis area, surface wind speeds average approximately 10 mph throughout the year. The area experiences extreme wind gusts, especially during thunderstorm activity that occurs in June, July, and August. Distinct diurnal changes occur, with average wind velocities increasing during the day and decreasing during the night. Local variations in wind speed and direction are

primarily due to differences in topography. Wind speeds are highest in the winter and spring (October through April) and are predominantly from the western and northern sectors. During the warmer months (May through September), wind speeds are calmer and directions are more random, although winds from the northern or southeastern sectors are slightly more predominant.

During periods of strong wind, dust may impact air quality across the region. An average of 15 air-stagnation events occurs annually in the PRB with an average duration of two days each (BLM 1974).

3.2 Topography and Physiography

3.2.1 Affected Environment

The general analysis area is a high plains area within the eastern portion of the PRB. The PRB is an elongated, asymmetrical structural downfold that is bounded by the Black Hills on the east; the Big Horn Mountains on the west; the Hartville Uplift, Casper Arch, and Laramie Mountains on the south; and the Miles City Arch and the Yellowstone River on the north. The Eagle Butte Mine is located on the gently dipping eastern limb of the structural downfold. The regional dip in the area of the mine is to the west.

Landforms of the area consist of a dissected rolling upland plain with low relief, broken by low red-capped buttes, mesas, hills, and ridges. Playas are common in the basin, as are buttes and plateaus capped by clinker or sandstone. Elevations in the PRB range from less than 2,500 ft to greater than 6,000 ft above sea level. The major river valleys have wide, flat floors and broad floodplains. The drainages dissecting the area are incised, typically are ephemeral or intermittent, and do not provide year-round water sources.

The general analysis area is drained by Little Rawhide Creek, which is the most prominent topographic feature. The topography is generally level to gently rolling, dissected by locally shallow gullies and the broader meandering floodplain of Little Rawhide Creek, an intermittent stream. Unmined lands surrounding the tract are characterized by low rolling hills; there is a prominent ridgeline immediately to the west. Surface mine lands, both active and reclaimed, dominate the landscape east of the LBA tract and U.S. Highway 14-16. Elevations within the BLM study area shown in Figure 3-1 range from about 4,240 ft to 4,560 ft above sea level, slopes range from flat to around 40 percent, and 73 percent of the surface has a slope of five percent or less.

Habitat types within the LBA tract and adjacent area include seeded pastures, sagebrush-grassland, upland-grassland, and areas of previous disturbance. Nearly 65 percent of the BLM study area is currently agriculture pasture and disturbed land. Other habitats present in limited extent include bottomland or riparian areas, sparse trees, and some open water along Little Rawhide Creek,

primarily in the southern portion. Little Rawhide Creek passes through the eastern portion of the tract from south to north, and its tributary, Prong Draw, passes through the central portion of the tract from southwest to northeast. Overall, the Eagle Butte West LBA Tract is similar in topography and physiography to the rest of the Eagle Butte Mine permit area.

3.2.2 Environmental Consequences

3.2.2.1 Proposed Action and Alternative 1

Surface coal mining would permanently alter the topography of the LBA tract if it is leased and mined. Topsoil would be removed from the land and stockpiled or placed directly on recontoured areas. Overburden would be blasted and stockpiled or directly placed into the already mined pit, and coal would be removed. The existing topography on the LBA tract would be substantially changed during mining. A highwall with a vertical height equal to overburden plus coal thickness would exist in the active pits. If necessary, the Little Rawhide Creek would be diverted into a temporary channel to prevent pits from being flooded.

Typically, a direct permanent impact of coal mining and reclamation is topographic moderation. After reclamation, the restored land surfaces are generally gentler, with more uniform slopes and restored basic drainage networks. The original topography of the Eagle Butte West LBA Tract ranges from relatively flat to gently rolling hills. Slopes range from flat to around 40 percent, as discussed above, and the average slope is about four percent. The expected postmining topography would be similar to the premining topography, but somewhat gentler and more uniform. Following reclamation, the average surface elevation on the LBA tract as proposed would be approximately 69 ft lower due to coal removal. The removal of the coal would be partially offset by the swelling that occurs when the overburden (and interburden, if present) is blasted, removed, and replaced. Table 3-2 presents the approximate postmining surface elevation change for the LBA tract as applied for and the BLM's preferred tract configuration under Alternative 1. After the coal is removed, the land surface would be restored to approximate original contour or to a configuration approved by WDEQ/LQD when the mining and reclamation permit for the existing mine is amended to include coal removal from the LBA tract.

Direct adverse impacts resulting from topographic moderation include a reduction in microhabitats (e.g., cutbank slopes) for some wildlife species and a reduction in habitat diversity. The reduction in slope-dependent shrub communities and associated habitat would be slight, due to the lack of steep, premining topography on the tract. These impacts may result in a long-term reduction in carrying capacity for some species. A direct beneficial impact of the lower and flatter terrain would be reduced water runoff, which would allow increased infiltration and result in a minor reduction in peak flows. This may help counteract the potential for increased erosion that could occur as a result of the higher near-

Table 3-2. Comparison of Average Overburden and Coal Thicknesses and Approximate Postmining Surface Elevation Changes Under the No Action and Action Alternatives.

	No Action Alternative (Existing Leases)	**Proposed Action (As Applied For LBA Tract)**	**Alternative 1 Preferred Tract Configuration**
Average Overburden Thickness (ft)	200.0	325.0	325.0
Average Interburden Thickness (ft)	5.3	8.0	8.0
Average Coal Thickness (ft)	100.0	110.0	110.0
Swell Factor (percent)	11	11	11
Coal Recovery Factor (percent)	96	96	96
Postmining Elevation Change[1]	73.4 ft lower	69.0 ft lower	69.0 ft lower

[1] Reclaimed (postmining) elevation surface change calculated as: (overburden + interburden thickness) + (overburden swell) – (coal thickness × coal recovery factor).

surface bulk density of the reclaimed soils (Section 3.8.2). It may also increase vegetative productivity, and potentially accelerate recharge of groundwater.

The approximate original drainage pattern would be restored, and stock ponds would be replaced to provide livestock and wildlife watering sources. These topographic changes would not conflict with regional land use, and the postmining topography would be designed to adequately support anticipated land use.

These impacts are occurring on the existing Eagle Butte Mine coal leases as coal is mined and mined-out areas are reclaimed. For the Proposed Action and for the BLM's preferred tract configuration under Alternative 1, the areas that would be permanently topographically changed would increase as shown in Table 3-1. As discussed in Section 3.0, the estimated recoverable coal, associated disturbance, and mine life shown in Table 3-1 assume that Highway 14-16 is not moved.

3.2.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal would not occur on the LBA tract. Mining operations and the associated impacts to topography and physiography would continue as permitted on the existing Eagle Butte Mine leases. Table 3-2 presents the approximate postmining surface elevation change for the existing mine. The portion of the Eagle Butte West LBA Tract lying west of U.S. Highway 14-16 would not be disturbed to recover the coal in the existing leases, which are east of the highway.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.2.3 Regulatory Compliance, Mitigation and Monitoring

The mined-out area must be restored to approximate original contour or other topographic configuration approved by WDEQ/LQD. The topographic configuration would be developed and approved as part of the required mining and reclamation plan for the Eagle Butte Mine. WDEQ/LQD monitors topographic restoration by checking the as-built topography in the annual report filed by the mine to see if it conforms to the approved topography.

3.2.4 Residual Impacts

Topographic moderation is a permanent consequence of mining. The indirect impacts of topographic moderation on wildlife habitat diversity would also be considered permanent.

3.3 Geology, Mineral Resources, and Paleontology

3.3.1 General Geology and Coal Resources

3.3.1.1 Affected Environment

Stratigraphic units that would be impacted if the tract under consideration for leasing is mined include, in descending order, recent (Quaternary age) alluvial and eolian deposits, the Eocene age Wasatch Formation (the overburden), and the Paleocene age Fort Union Formation (which contains the target coal seams). Figure 3-2 is a chart showing the stratigraphic relationships of the surface and subsurface geologic units in the general analysis area. Additional information about these units is included in the Groundwater section of this document (Section 3.5).

Surficial deposits in the general analysis area include alluvial and eolian deposits and weathered Wasatch Formation. Alluvial deposits occupy the Little Rawhide Creek valley and the lowermost section of a tributary, Prong Draw, where it joins the mainstem of Little Rawhide Creek.

The Eocene Wasatch Formation forms most of the overburden in the general analysis area. The boundary between the Wasatch Formation and the underlying Paleocene Fort Union Formation is not distinct. From a practical standpoint, the top of the mineable coal zone is considered as the contact between the two formations. As indicated in Table 3-2, overburden thicknesses average about 325 feet in the Eagle Butte West LBA Tract as applied for and in the BLM's preferred tract configuration under Alternative 1. The Wasatch overburden in the general analysis area consists of interbedded sand, clay, silty claystone, and very thin coal beds. Thick sand layers up to 200 ft thick were encountered during exploration drilling in the area. As discussed in Section 3.2.1, the regional dip in this area is to the west; as a result, the overburden thickness is generally thinner to the east

Geologic Unit			Hydrologic Characteristics
RECENT ALLUVIUM HOLOCENE			Typically fine grained and poorly sorted sands interbedded with silts and clays in ephemeral drainages. Occasional very thin, clean interbedded sand lenses. More laterally extensive, thicker, and coarse-grained along the larger stream courses. Excessive dissolved solids generally make this aquifer unsuitable for domestic and agricultural use and marginal for livestock (Class III) use standards. Low infiltration capacity in ephemeral draws unless covered by sandy eolian blanket. Low to moderate infiltration along Little Rawhide Creek.
CLINKER HOLOCENE TO PLEISTOCENE			Baked and fused bedrock resulting from burning coal seams which ignite on the outcrop from lightning, manmade fires or spontaneous combustion. The reddish clinker (locally called scoria, red dog, etc.) formed by melting and partial fusing of overburden above the burning coal. The baked rock varies greatly in the degree of alteration; some is dense and glassy while some is vesicular and porous. It is commonly used as a road construction material and is an aquifer wherever saturated. Considered to be part of the Wasatch Formation.
WASATCH FORMATION EOCENE			Lenticular fine sands interbedded in predominantly very fine grained siltstone and claystone may yield low to moderate quantities of poor to good quality water. The discontinuous nature and irregular geometry of these sand bodies result in low overall permeabilities and very slow groundwater movement in the overburden on a regional scale. Water quality in the Wasatch Formation generally does not meet Wyoming Class I (drinking water) standards due to the dissolved mineral content. Some wells do, however, produce water of considerably better quality that does meet the Class I standard.
FORT UNION FORMATION PALEOCENE	TONGUE RIVER MEMBER	W — R, S	The coal serves as a regional groundwater aquifer and exhibits highly variable aquifer properties. Permeability and porosity associated with the coal arise almost entirely from fractures. Coal water typically does not meet Class I or Class II (irrigation) use standards. In most cases, water from coal wells is suitable for livestock use. The coal water is used throughout the region as a source of stock water and occasionally for domestic use. W = Wyodak Coal; R = Roland; S = Smith.
	LEBO MEMBER		The Lebo member, also referred to as the "Lebo Confining Layer" or "Lebo Shale". Has a mean thickness of 711 ft in the PRB and a thickness of about 400 ft in the vicinity of Gillette. The Lebo typically yields small quantities of poor quality groundwater. Where sand content is locally large, caused by channel or deltaic deposits, the Lebo may yield as much as 10 gpm.
	TULLOCK MEMBER		The Tullock member has a mean thickness of 785 ft in the PRB and a mean sand content of 53 percent which indicates that the unit generally functions well as a regional aquifer. Yields of 15 gpm are common but vary locally and may be as much as 40 gpm. Records from the SEO indicate that maximum yields of approximately 300 gpm have been achieved from this aquifer. Water quality in the Tullock Member often meets Class I standards. The extensive sandstone units in the Tullock Member are commonly developed regionally for domestic and industrial uses. The City of Gillette is currently using eight wells completed in this zone to meet part of its municipal water requirements.
LANCE FORMATION UPPER CRETACEOUS	UPPER LANCE		Silty, calcareous sandstones and interbedded sandy shales, claystones, and coals. Provides yields generally less than 20 gpm. Higher yields can occur where sand thicknesses are greatest. Water quality is typically fair to good. Also referred to as the "Upper Lance Confining Layer".
	FOX HILLS SANDSTONE		Marine sandstones and sandy shales. Has a mean thickness of 666 ft and a mean sand content over 50 percent in the PRB. Yields up to 200 gpm are common; however, yields can be significantly less. Water quality is good, with TDS concentrations commonly less than 1,000 mg/L. The City of Gillette is currently using five wells completed in this aquifer to meet municipal water
LEWIS FORMATION UPPER CRETACEOUS	PIERRE SHALE		This unit is comprised predominantly of marine shales with only occasional local thin sandstone lenses. Maximum yields are minor and overall the unit is not water bearing. Water obtained from this unit is poor with high concentrations of sodium and sulfate as the predominant ions in solution.

Compiled from Hodson et al. (1973) and Lewis and Hotchkiss (1981).

Figure 3-2. Stratigraphic Relationship and Hydrologic Characteristics of Upper Cretaceous, Lower Tertiary, and Recent Geologic Units, PRB, Wyoming.

and increases to the west. Within the general analysis area, overburden thickness ranges from about 183 ft to 460 ft.

As shown in Figure 3-2, the Fort Union Formation is divided into three members: the Tongue River, the Lebo, and the Tullock, in descending order.

The mineable coal seams in the PRB are part of the Tongue River Member of the Fort Union Formation. At the Eagle Butte Mine and within the Eagle Butte West LBA Tract, there are two mineable coal seams. Locally, these coal seams are referred to as the Roland (upper seam) and Smith (lower seam), separated by a shale parting of variable thickness. The mineable coal seams are referred to as the Anderson and Canyon, Wyodak-Anderson, and Wyodak coal beds by other mines in the eastern PRB. The "Wyodak-Anderson Zone" is the official USGS nomenclature. In the Eagle Butte Mine area, the Roland seam ranges from zero to 70 ft thick, with an average thickness of 40 ft. The Smith seam in places reaches thicknesses of over 100 ft, with an average thickness of 70 ft.

Within the BLM study area (the Eagle Butte West LBA Tract as applied for and the additional area evaluated under Alternative 1), the combined thickness of the two coal seams averages about 110 ft (Table 3-2). However, the Roland seam is not present on the entire tract; the total coal thickness decreases in the areas where it is not present. The thickness of coal ranges from approximately 33 ft to 133 ft. Interburden between the two seams, where both seams are present, varies from about 1 ft to 13 ft.

The Fort Union coal seams are subbituminous and are generally low-sulfur, low-ash coals. Typically, the coal being mined north of Gillette has a lower heating value and higher sulfur content than the coal being mined south of Gillette. According to the analyses (which were done on an as-received basis) of exploration drilling samples collected in the BLM study area for Eagle Butte West LBA Tract, the average heating value of the coal is approximately 8,350 Btu/lb, with an average of about 0.35 percent sulfur, 1.9 percent sodium, 4.7 percent ash, and 31 percent moisture.

3.3.1.2 Environmental Consequences

3.3.1.2.1 Proposed Action and Alternative 1

The geology from the base of the lowest coal seam mined to the land surface would be subject to permanent change after the coal is removed from the LBA tract as applied for or from the BLM's preferred tract configuration under Alternative 1. The subsurface characteristics of these lands would be radically altered by mining. The replaced overburden and interburden (backfill) would be a mixture of the geologically distinct layers of sandstone, siltstone, and shale that currently exist.

Mining would remove an average of 325 ft of overburden, eight ft of interburden, and 110 ft of coal from about 1,333 acres for the tract as applied for up to about 1,352 acres for the BLM's preferred tract configuration under Alternative 1. These figures represent the estimated area of actual coal removal, assuming that U.S. Highway 14-16 is not moved. Table 3-2 presents the average overburden and coal thicknesses for the Eagle Butte West LBA Tract as applied for and for the BLM's preferred tract configuration under Alternative 1.

The replaced overburden and interburden would be a relatively homogeneous (compared to the premining layered overburden and interburden) and partly recompacted mixture averaging about 374 ft in thickness under both the Proposed Action and Alternative 1. Approximately 203 million additional tons of coal would be recovered from the tract as applied for, and an estimated 206.1 million tons would be recovered from the BLM's preferred tract configuration under Alternative 1.

3.3.1.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal would not occur on the Eagle Butte West LBA Tract. Mining operations and coal removal would continue as permitted on the existing Eagle Butte Mine coal leases for about 13.6 years. Table 3-2 presents the average overburden, interburden, and coal thicknesses for the existing Eagle Butte Mine permit area. The portion of the Eagle Butte West LBA Tract lying west of Highway 14-16 would not be disturbed to recover the remaining coal in the existing leases east of the highway.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.3.1.3 Regulatory Compliance, Mitigation and Monitoring

Drilling and sampling programs are conducted on existing leases by all mine operators to identify overburden material that may be unsuitable for reclamation (i.e., material that is not suitable for use in reestablishing vegetation or that may affect groundwater quality due to high concentrations of certain constituents, such as selenium, or adverse pH levels). As part of the mine permitting process, each mine operator develops a management plan to ensure that this unsuitable material is not placed in areas where it may affect groundwater quality or revegetation success. Each mine operator also develops backfill monitoring plans as part of the mine permitting process to evaluate the quality of the replaced overburden. These plans are in place for the existing Eagle Butte Mine and would be developed for the Eagle Butte West LBA Tract if it is leased.

3.3.1.4 Residual Impacts

Geology from the base of the coal to the surface would be subject to significant, permanent change.

3.3.2 Other Mineral Resources

3.3.2.1 Affected Environment

3.3.2.1.1 Conventional Oil and Gas

The following discussion is based on a report on conventional and CBNG resources in the area of the Eagle Butte West LBA Tract prepared by the BLM's Reservoir Management Group (WSO-RMG 2005a).

WSO-RMG's review of IHS Energy data indicates that the Muddy, Dakota and Minnelusa formations have been productive to date in T.51N., Rs.72 and 73W. The nearest producing wells produce both oil and gas from the Kitty Field, two miles or more west of the LBA study area, and the Mill-Gillette Field, two miles or more to the east. Both fields produce from the Cretaceous-age Muddy Formation. There has been one productive Minnelusa well in these two townships, located in Section 1, T.51N., R.72W.; it produced only a few barrels of oil and a small amount of gas.

Nine conventional tests have been drilled in a 12-section area encompassing or immediately adjacent to the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1), including four within the study area itself. According to WOGCC records, all were drilled and abandoned without any reported production. Although no oil or gas was produced, the records suggest that the Minnelusa, Dakota and Muddy formations were tested. The most recent conventional test well in the 12-section area was drilled in 1985.

See Section 3.11 for discussion of the ownership of the oil and gas resources in the LBA tract.

3.3.2.1.2 Coal Bed Natural Gas (CBNG)

CBNG has been commercially produced in the PRB since 1989 when production began at the Rawhide Butte Field, immediately west of the Eagle Butte Mine (De Bruin and Lyman 1999). The Rawhide Butte Field is located within the northern portion of the general analysis area. Extensive development of CBNG in the Roland-Smith/Wyodak-Anderson coal zone has occurred in the vicinity of the Eagle Butte West LBA Tract. WOGCC records show that as of May 19, 2006, 68 wells had been drilled for CBNG production and 19 wells were capable of producing from the Roland-Smith/Wyodak-Anderson coal zone in the sections

that include the Eagle Butte West LBA Tract as applied for and the additional area evaluated by BLM under Alternative 1 (WOGCC 2006). Extensive CBNG development has also occurred immediately north, west, and south of the LBA tract.

CBNG is being produced locally from other deeper seams in the PRB. For example, west of the Eagle Butte West LBA Tract, in T.51N., R.73W., one well completed in the Dannar coal seam (approximately 1,300 ft deep) reported production of CBNG. Several Dannar coal well completions were reported during 2005 and 2006 in Sections 30 and 31, T.51N., R.72W.; five of these wells are located within the BLM study area for the Eagle Butte West LBA Tract. These wells started reporting production of water in 2006, but reported no gas production to the WOGCC through November of 2006 (WOGCC 2007).

The following discussion is based on a report on conventional and CBNG resources in the area of the Eagle Butte West LBA Tract prepared by the BLM's Reservoir Management Group (WSO-RMG 2005a).

CBNG wells were initially drilled on 40-acre spacing in the Wyoming PRB. Production/reservoir analyses that have been submitted to the WOGCC in various public hearings indicate that CBNG wells in the PRB will produce reserves from larger areas than 40 acres. As a result, the WOGCC established an 80-acre spacing pattern as the default spacing for CBNG wells completed in the PRB within the Fort Union and Wasatch Formations. Most CBNG wells on and near the Eagle Butte West LBA Tract were drilled on a 40-acre pattern, either because the wells were drilled either before the spacing was changed to 80 acres or under the authorization of spacing exceptions granted by WOGCC. Certain townships in the PRB are exempt from the 80-acre spacing pattern rule, including T.51N., R.72W. (WOGCC 2005a). All 40-acre spacing units within the proposed Eagle Butte West LBA Tract have been drilled or proposed for drilling. Only four 40-acre spacing units within the BLM study area have not been drilled or proposed for drilling. There has been little recent interest in drilling additional wells for completion in the Roland-Smith/Wyodak-Anderson coal zone in this area. According to WOGCC and IHS Energy records, the most recent Roland-Smith/Wyodak-Anderson well in the 12-section area encompassing or immediately adjacent to the BLM study area was completed in September 2003.

For the purposes of this EIS, the BLM WSO-RMG reviewed the existing CBNG resource and production data in the general analysis area (WSO-RMG 2005a). The BLM WSO-RMG and USGS have collected extensive CBNG data, including coal gas content, from a number of coal cores at locations near existing PRB mines. The cores were taken from depths comparable to the coal seams in the Eagle Butte West LBA Tract (reported depth 325 ft.), ranging from 134 to 407 ft. Although none of the samples were near the Eagle Butte Mine area (cores were collected near the Rawhide mine in deeper seams), the core data generally

indicated that coal seams were substantially depleted of CBNG in the vicinity of the mines when the near-mine cores were collected in 2000.

Measured gas content was minimal in all of the cores. Desorbed gas measurements from more than 300 core samples range from 37 to less than 0.1 scf/ton (USGS 2005). Average total gas content from the core desorption analyses is approximately 6.8 scf per ton; the median value is 4.8 scf/ton; and the most common measurement (rounded to a whole number) is 2.0 scf/ton.

Gas content in the Roland-Smith/Wyodak-Anderson coal in the area of the Eagle Butte Mine would have been expected to be comparable to these averages in 2000. Based on the gas content estimates derived from the desorption analyses and the estimates of the volume of coal included in the Eagle Butte West LBA Tract, the estimated gas-in-place in the Eagle Butte West LBA Tract would have ranged from approximately 1.1 bcf to 1.5 bcf of CBNG in 2000. For the BLM study area, the estimated gas-in-place in 2000 would have ranged from 1.6 bcf to 2.3 bcf (WSO-RMG 2005a).

Previous analyses by BLM WSO-RMG, USGS, CBNG operators and others have shown that dewatering the coals, both by CBNG production and mine dewatering, reduces the hydrostatic pressure in the coals and allows the CBNG to desorb and escape from the coal. These effects continue over time with continued dewatering. Production has continued since 2000, and it is likely that desorption has continued since 2000; as a result, coal gas content and the gas-in-place on the tract would currently be expected to be less than in 2000.

Due to the extensive prior development, there is sufficient production data available to estimate well life and reserves for the existing CBNG wells/spacing units located in the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1). BLM WSO-RMG prepared decline analyses, using IHS Energy's "Powertools" software, for all the CBNG wells in T.51N., R.72W., where the LBA tract is located.

Since the area has been nearly completely developed, the wells within the 12-section area encompassing or immediately adjacent to the BLM study area were considered sufficient for all analyses prepared for this review. BLM WSO-RMG reviewed the wells within this 12-section area individually. Overall, BLM WSO-RMG estimated that the average EUR for the active wells within the 12-section area is approximately 290.5 mmcf and total economic life is approximately 12 years. Most of the active wells within the 12-section area are projected to be uneconomic to produce by the end of 2008. Only two wells are projected to continue to produce beyond 2010.

The ownership of oil and gas resources in the LBA tract, which includes the CBNG resources, is discussed in Section 3.11.

3.3.2.1.3 Other Minerals

Bentonite, uranium, and scoria are commercially produced in the PRB in addition to conventional oil and gas and CBNG (WSGS 2004 and 2005a).

Layers of bentonite (decomposed volcanic ash) of varying thickness are present throughout the PRB. Some of the thicker layers are mined around the edges of the PRB. Bentonite has a large capacity to absorb water, and because of this characteristic it is used in a number of processes and products, including drilling mud and cat litter. No mineable bentonite reserves have been identified on the Eagle Butte West LBA Tract under the Proposed Action or the additional area evaluated by BLM under Alternative 1.

There are substantial uranium resources in Johnson, Campbell, and Converse Counties. There are currently two operating in-situ uranium recovery sites in the PRB, which were recently combined into one operation that is located in central Converse County (WSGS 2005a). No known uranium reserves exist within the general analysis area.

Scoria, also called clinker or burn has been and continues to be a major source of aggregate for road construction in the area due to the shortage of more competent materials. Scoria consists of sediments that were baked, fused, or melted in place when the underlying coal burned spontaneously. Scoria is present within the northern portion of the Eagle Butte Mine permit area, predominantly within Sections 15 and 16, T.51N., R.72W. Scoria does not occur on the LBA tract as applied for or the BLM's preferred tract configuration under Alternative 1. Small, localized deposits are present in the extreme northwest corner of the additional area evaluated under Alternative 1, in Sections 18 and 19, T.51N., R.72W. See Section 3.5.1.1.2 for additional information on scoria.

A search of the BLM mining claim index revealed that no active mining claims are presently located on the Eagle Butte West LBA Tract.

3.3.2.2 Environmental Consequences

3.3.2.2.1 Proposed Action and Alternative 1

During mining, other minerals present on the LBA tract could not be developed. Some of these minerals could, however, be developed after mining. The conventional oil and gas reservoirs and the CBNG reservoirs below the Roland-Smith coal would not be directly disturbed by removal of the mineable coal. The oil and gas lessees could drill wells to recover oil and gas resources from any oil and gas or CBNG reservoirs below the mineable coal seams following mining and reclamation. This would only occur if they believe that the value of the reserves would justify the expense of drilling the wells.

Although the area included in the BLM study area for the Eagle Butte West LBA Tract generally appears to be unfavorable for additional conventional oil and gas discoveries, the entire study area has not been tested. The formations producing conventional oil and gas in the BLM study area occur at much greater depths than would be affected by mining. The average depth of the productive formations ranges from approximately 8,000 – 8,500 ft. for the Muddy and Dakota Formation wells to nearly 9,900 – 10,000 ft. for the Minnelusa Formation wells. At these depths there would be no direct effects from mining. However, conflicts could arise between the conventional oil and gas production and mining if conventional wells are in production at the time the well locations are to be mined.

Before mining operations could begin, all CBNG wells would have to be abandoned, and all gas production equipment would have to be removed to a level below the coal. CBNG resources that have not been recovered from the Roland-Smith/Wyodak-Anderson zone prior to mining would be lost when the coal is removed.

CBNG production requires withdrawal of water from the coal seams to reduce hydrostatic pressure and enable methane desorption from the coals. Mine-related dewatering of the coal seams reduces hydrostatic pressure and allows the methane to escape in the same way that CBNG well dewatering of the coal seam does. BLM WSO-RMG's review and other CBNG reservoir analyses indicate that depletion of the hydrostatic pressures and methane resources starts to occur adjacent to mining areas a short time after mining begins. Coal mining operations have been ongoing for more than 20 years and are continuing at the Eagle Butte Mine and other adjacent surface coal mines in this area. The ongoing reduction of hydrostatic pressure in the coal due to mining has been accelerated by extensive CBNG production from surrounding lands.

BLM WSO-RMG's analyses of the production and reservoirs indicate that the CBNG resource within the Roland-Smith/Wyodak-Anderson seam has been substantially depleted, either by mining or by recovery from producing wells. Only a few wells remain in production on or adjacent to the LBA tract and it seems likely that these will have exhausted their economic reserves prior to initiation of mining in the LBA tract. Most production or reservoir analyses submitted to WOGCC at various public hearings indicate that a CBNG well will generally produce reserves from larger areas than 40 acres; therefore, it is likely that any undrilled spacing units in the BLM study area have been drained by production from the existing wells and nearby mining activity. Overall, BLM WSO-RMG's analyses suggest that there are insufficient reserves remaining in the tract to support additional drilling. As a result, mining the proposed Eagle Butte West LBA Tract is unlikely to affect, or to be affected by, CBNG production from the Roland-Smith/Wyodak-Anderson coal seams.

Production from the coal zones underlying the Roland-Smith/Wyodak-Anderson could be delayed as the parcel is mined. If production from these lower seams is

established on the LBA tract in the future, additional measures would be required to accommodate both mining and CBNG production (see Section 3.3.2.3).

Section 3.11.1 includes a discussion on the ownership of the oil and gas resources on the LBA tract and the oil and gas facilities in the area of the tract.

3.3.2.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal would not occur on the Eagle Butte West LBA Tract. Mining operations would continue to limit the development of other mineral resources described above on the existing Eagle Butte Mine coal leases. Mineral development limitations related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.3.2.3 Regulatory Compliance, Mitigation and Monitoring

No conventional oil and gas reservoirs containing producible quantities of oil and gas are known to underlie the Eagle Butte West LBA Tract, and the reservoir analyses conducted by the BLM WSO-RMG indicate that most of the recoverable CBNG resources in the Roland-Smith/Wyodak-Anderson coal beds on the Eagle Butte West LBA Tract have probably been produced by the existing wells. Potential does exist for conflicts between coal operations and CBNG wells completed in coal zones below the Roland-Smith/Wyodak-Anderson.

If the federal coal in the tract is leased and conflicts do develop between the operators of the oil and gas wells and the surface coal mine operator, there are several mechanisms that can be used to facilitate recovery of the conventional oil and gas and CBNG resources prior to mining:

- BLM will attach a Multiple Mineral Development stipulation to the Federal coal lease, which states that BLM has the authority to withhold approval of coal mining operations that would interfere with the development of mineral leases issued prior to the coal lease (see Appendix D).

- Conventional oil and gas wells must be abandoned while mining and reclamation operations are in progress but could be recompleted or redrilled following mining if the value of the remaining reserves would justify the expense of reestablishing production.

- BLM has a policy in place on CBNG-coal conflicts (BLM Instruction Memorandum No. 2006-153), which directs BLM decision-makers to optimize the recovery of both resources and ensure that the public receives a reasonable return (BLM 2006a). This memorandum offers royalty incentives to CBNG operators to accelerate production in order to recover the natural gas while simultaneously allowing uninterrupted coal mining operations. In addition, this memorandum also states that it is the policy of the BLM to encourage oil and gas and coal companies to resolve conflicts between themselves; when requested, the BLM will assist in facilitating agreements between the companies.

- Mining of the Eagle Butte West LBA Tract cannot occur until the coal lessee has a permit to mine the tract approved by the WDEQ/LQD and a MLA mining plan approved by the Secretary of the Interior. Before the MLA mining plan can be approved, BLM must approve the R2P2 for mining the tract. Prior to approving the R2P2, BLM can review the status of CBNG and conventional oil and gas development on the tract and the mining sequence proposed by the coal lessee. The permit approval process generally takes the coal lessee several years, during which time CBNG resources can be recovered.

- Prior to mining the Federal coal, the coal lessee can negotiate an agreement with owners and operators of existing oil and gas facilities on the tract, including owners and operators of oil and gas well and pipeline facilities, regarding removal and relocation of those facilities prior to mining.

3.3.2.4 Residual Impacts

CBNG resources not recovered prior to mining would be vented to the atmosphere and permanently lost.

3.3.3 Paleontology

3.3.3.1 Affected Environment

The formation exposed on the surface of the Eagle Butte West LBA Tract is the sedimentary Eocene Wasatch Formation, which is known to produce fossil vertebrates of scientific significance throughout Wyoming, including the PRB (Delson 1971, Winterfeld 1978, EVG 2001).

BLM ranks areas according to their potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. The Wasatch Formation is ranked as fulfilling BLM Paleontology Condition No. 1, which is described in the Paleontological Resource Management Handbook 8270-I as “areas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils”. According to the handbook, “consideration of paleontological resources

will be necessary if the Field Office review of available information indicates that such fossils are present in the area".

The BLM in Wyoming uses an additional planning tool, called the PFYC, to classify geological units, usually at the formation or member level, according to the probability that they will yield paleontological resources that are of concern to land managers. This classification system is based largely on how likely a geologic unit is to produce scientifically significant fossils. BLM considers the Wasatch Formation to fulfill either the PFYC Class 4 or Class 5, depending on the nature of bedrock exposures present. PFYC classes 4 and 5 are described as follows:

> Class 4 - These geologic units are Class 5 units (see below) that have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation.
>
> Class 5 - Fossilferous geologic units that regularly and predictably produce vertebrate fossils and/or scientifically significant non-vertebrate (plant and invertebrate) fossils, and that are at risk of natural degradation and/or human-caused adverse impacts.

Although the Wasatch Formation is known to produce fossil vertebrates of scientific significance in Wyoming, outcrops of the Wasatch Formation in the PRB are not generally well-exposed and the conditions of deposition of the formation have contributed to a low preservation potential for fossils. Vertebrate fossils that have been described from the Wasatch Formation include mammals such as early horses, tapiroids, condylarths, primates, insectivores, marsupials, creodonts, carnivores, and multituberculates; reptiles such as crocodilians, alligators, lizards, and turtles; birds; eggs; amphibians; and fish. Non-marine invertebrates such as mollusks and ostrocods have also been described from the Wasatch.

Fossil plant material is common in the Wasatch Formation. The fossil plants inventoried are primarily leaves and fossilized wood. The leaves usually occur as lignitic impressions in sandstone and siltstone and as compact masses in shale. Leaves are the most abundant fossils found during paleontological surveys and are frequently encountered during mining operations. Fossilized wood often occurs near the top of a coal seam, in carbonaceous shale or within channel sandstone. Exposures of fossil logs are common, but usually very fragmentary. Like fossil leaves, fossil logs can be readily collected in the PRB.

Paleontological surveys were conducted in conjunction with the cultural resource inventories of the current Eagle Butte Mine permit area and the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated under Alternative 1). Pedestrian examinations for fossil indications were conducted along rock outcrops. One of the primary goals of the paleontological surveys was to locate unique pockets of fossilized bone such as those reported elsewhere in the Wasatch Formation in the PRB. Such

concentrations of fossilized bone were not found, nor were any fossil vertebrates. Two relatively unique occurrences of tree stumps were found in 1974 within Sections 27 and 34, T.51N., R.72W, within the existing Eagle Butte Mine permit area. The only other fossils inventoried to date have been wood fragments.

No significant or unique paleontological resource localities have been recorded on federal lands in the general analysis area and no specific mitigation has been recommended for paleontology.

3.3.3.2 Environmental Consequences

3.3.3.2.1 Proposed Action and Alternative 1

The rock outcrops present on the Eagle Butte West LBA Tract were examined for the presence of fossils, as discussed above, and no scientifically significant fossils were located. Fossils with scientific significance could be present on the tract but not exposed at the surface. If the tract is leased as applied for or under the BLM's preferred tract configuration for Alternative 1, paleontological resources located on the tract that are not exposed on the surface would be destroyed when the overburden is removed.

3.3.3.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal would not occur on the LBA tract. Mining operations and the associated potential impacts to paleontological resources described above would continue as permitted on the existing Eagle Butte Mine coal leases. Disturbance related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.3.3.3 Regulatory Compliance, Mitigation and Monitoring

If the Eagle Butte West LBA Tract is leased, BLM will attach a stipulation to the lease requiring the operator to report significant paleontological finds to the authorized federal agency and suspend production in the vicinity of the find until an approved paleontologist can evaluate the paleontological resource (Appendix D).

3.3.3.4 Residual Impacts

Paleontological resources that are not identified and removed prior to or during mining operations would be lost.

3.4 Air Quality

3.4.1 Background

The air quality of any region is controlled primarily by the magnitude and distribution of pollutant emissions and the regional climate. The transport of pollutants from specific source areas is strongly affected by local topography. In the mountainous western United States, topography is particularly important in channeling pollutants along valleys, creating upslope and downslope circulations that may entrain airborne pollutants, and blocking the flow of pollutants toward certain areas. In general, local effects are superimposed on the general weather regime and are most important when the large-scale wind flow is weak.

Wyoming can be characterized as having a combination of both highland and mid-latitude semiarid climates. The dominant factors that affect the climate of the area are elevation, local relief, and the mountain barrier effect. This barrier effect can produce marked temperature and precipitation differences between windward and leeward slopes. Generally, temperature decreases and precipitation increases with increasing elevation. See Section 3.1.1 for additional information about the climate in the general analysis area.

The general analysis area, shown in Figure 3-1, is located in the east-central portion of the PRB, a part of the Northern Great Plains that includes most of northeastern Wyoming. As discussed in Section 3.2.1, the topography is primarily rolling plains and tablelands of moderate relief (with occasional valleys and buttes). Elevations range from about 4,240 ft to 4,560 ft above sea level. Slopes in the general analysis area are generally flat and no topographic features that would be expected to profoundly affect the local wind flow patterns or pollutant transport are present. The Big Horn Mountains lie approximately 60 miles to the west and the Black Hills lie approximately 60 miles to the east.

3.4.1.1 Regulatory Framework

Regulations applicable to surface coal mining may include NAAQS/WAAQS, PSD, NSPS, and the Federal Operating Permit Program (Title V). These regulatory programs are described below.

Air pollution impacts are limited by local, state, tribal, and federal air quality regulations and standards, and implementation plans established under the federal Clean Air Act, which was last amended in 1990. The Clean Air Act required EPA to establish National Ambient Air Quality Standards (NAAQS) for

pollutants considered harmful to public health and the environment. In Wyoming, air pollution impacts are managed by WDEQ/AQD, under the WAQSR and the EPA-approved State Implementation Plan. The State of Wyoming has established state ambient air quality standards (or WAAQS). A fundamental requirement of the federal and state regulations is that ambient concentrations for specific criteria pollutants do not exceed the NAAQS or WAAQS, respectively.

The EPA has established NAAQS for six pollutants, which are known as "criteria pollutants". These six pollutants are carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur oxides. The WAAQS for these pollutants are as stringent as or more stringent than the NAAQS, and are enforceable under WAQSR. Selected NAAQS and WAAQS are shown in Table 3-3. The EPA and the State of Wyoming have established these standards at levels deemed necessary to preclude adverse impacts on human health and welfare. The NAAQS and WAAQS are health-based criteria for the maximum acceptable concentrations of criteria pollutants at all locations to which the public has access.

The NAAQS for particulate matter shown in Table 3-3 include revisions to the national standards for particulate matter that took effect in December of 2006. The State of Wyoming must enter into rulemaking to revise the WAAQS for particulate matter so that they remain as stringent as or more stringent than the NAAQS. Additional discussion of the changes in the NAAQS for particulate matter is included in Section 3.4.2.

Pursuant to the Clean Air Act, the EPA has developed classifications for distinct geographic regions known as air basins and for major MSAs. Under these classifications, for each federal criteria pollutant, each air basin (or portion of a basin or MSA) is classified as in "attainment" if the area has "attained" compliance with (not exceeded) the adopted NAAQS for that pollutant or is classified as "non-attainment" if the levels of ambient air pollution exceed the NAAQS for that pollutant. Areas for which sufficient ambient monitoring data are not available are designated as "unclassified" for those particular pollutants. States designate areas within their borders as being in "attainment" or "non-attainment" with the AAQS. Existing air quality throughout most of the PRB in Wyoming is in attainment with all ambient air quality standards, as demonstrated by comparing the background concentration levels with the AAQS concentration levels presented in Table 3-3. However, the Sheridan, Wyoming area has been designated as a non-attainment area (PM_{10} – moderate) where the applicable standards have been violated in the past.

A company initiating a project must go through the WDEQ/AQD New Source Review permitting process to obtain either a construction or modification permit or a permit waiver. During the New Source Review permitting process, applicants must demonstrate compliance with the AAQS standards; this can be done by modeling or other methods approved by the WDEQ/AQD Administrator. A project will typically model for criteria pollutants that would be emitted by the project in

Table 3-3. Assumed Background Air Pollutant Concentrations, Applicable AAQS, and PSD Increment Values (in µg/m³).

Criteria Pollutant	Averaging Time[1]	Background Concentration	Primary NAAQS[2]	Secondary NAAQS[2]	WAAQS	PSD Class I Increments[3]	PSD Class II Increments[3]
Carbon monoxide	1-hour	3,336[4]	40,000	40,000	40,000	---	---
	8-hour	1,381	10,000	10,000	10,000	---	---
Nitrogen dioxide	Annual	5[5]	100	100	100	2.5	25
Ozone	8-hour	70[6]	157	157	157	---	---
Sulfur dioxide	3-hour	181[7]	---	1,300	1,300	25	512
	24-hour	62[7]	365	---	260	5	91
	Annual	13[7]	80	---	60	2	20
PM_{10}[8]	24-hour	54[9]	150	150	150	8	30
	Annual	13[9]	--	--	50	4	17
$PM_{2.5}$[8]	24-hour	13[10]	35	35	65	---	---
	Annual	4[10]	15	15	15	---	---

1 Annual standards are not to be exceeded; short-term standards are not to be exceeded more than once per year.
2 Primary standards are designed to protect public health; secondary standards are designed to protect public welfare.
3 All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD Increment Consumption Analysis.
4 Data collected by Amoco at Ryckman Creek for an eight-month period during 1978-1979, summarized in Riley Ridge EIS (BLM 1983).
5 Data collected at Thunder Basin National Grassland, Campbell County, Wyoming in 2002.
6 Data collected at Thunder Basin National Grassland, Campbell County, Wyoming in 2002-2004 (8-hour 4th high).
7 Data collected by Black Hills Power & Light at Wygen 2, Campbell County, Wyoming in 2002.
8 On October 17, 2006, EPA published final revisions to the NAAQS for particulate matter that took effect on December 18, 2006. The revision strengthens the 24-hour $PM_{2.5}$ standard from 65 to 35 µg/m³ and revokes the annual PM_{10} standard of 50 µg/m³. The State of Wyoming will enter into rulemaking to revise the WAAQS.
9 Data collected at the Eagle Butte Mine, Campbell County, Wyoming in 2002.
10 Data collected at the Buckskin Mine in 2002.
Source: (BLM 2005b and WDEQ/AQD)

order to show the project's contribution to ambient air quality concentrations. The assumed background pollutant concentrations included in Table 3-3 were provided by WDEQ/AQD (BLM 2005a). The assumed background pollutant concentrations are below applicable NAAQS and WAAQS for all criteria pollutants and averaging times.

The PSD regulation is intended to prevent deterioration of air quality in areas that are in attainment with the NAAQS. The Clean Air Act requires EPA to place each airshed within the U.S. into one of three PSD area classifications. PSD Class I is the most restrictive air quality category. Mandatory federal Class I areas were designated by Congress and include international parks, national wilderness areas greater than 5,000 acres in size, national memorial parks greater than 5,000 acres in size, and national parks greater than 6,000 acres in size which were in existence on August 7, 1977 [40 CFR 52.21(e)]. These classifications may not be redesignated. All areas not established as Class I were designated as Class II areas, which allow a relatively greater deterioration of air quality over that in existence in 1977, although still within the NAAQS. No Class III areas, which would allow air quality to degrade to the NAAQS, have been designated. The federal land managers have also identified certain federal assets with Class II status as "sensitive" Class II areas for which air quality and/or visibility are valued resources. The Clean Air Act also provides for specific visibility protection of mandatory federal Class I areas.

Table 3-4 is a list of mandatory federal Class I areas, tribal Class I areas, and federal Class II areas that are of special interest in the region and their distance from the Eagle Butte West tract general analysis area. Wind Cave National Park, Badlands Wilderness Area, and the Northern Cheyenne Indian Reservation are the closest Class I areas to the Eagle Butte West LBA Tract. Most of the PRB in Wyoming is designated as PSD Class II with less stringent requirements. Even though the development activities being considered in this EIS would occur within areas designated as PSD Class II, the potential impacts are not allowed to cause incremental effects greater than the more stringent Class I thresholds to occur inside any distant PSD Class I area.

The PSD regulation prevents deterioration of air quality in attainment areas by establishing increments, or maximum allowable increases in the ambient concentration of PM_{10}, NO_2, and SO_2 for Class I and Class II areas. As shown in Table 3-3, the allowable incremental impacts for NO_2, PM_{10}, and SO_2 within PSD Class I areas are very limited.

Future development projects that have the potential to emit more than 250 tpy of any criteria pollutant (or certain listed sources that have the potential to emit more than 100 tpy) would be required to undergo a regulatory PSD increment consumption analysis under the federal New Source Review permitting regulations. Development projects subject to the PSD regulations must also demonstrate the use of BACT and show that the combined impacts of all PSD

Table 3-4. Approximate Distances and Directions from the Eagle Butte West Tract General Analysis Area to PSD Class I and Class II Sensitive Receptor Areas.

Receptor Area	Distance (miles)	Direction to Receptor
Mandatory Federal PSD Class I Area		
Badlands Wilderness Area[1]	160	SE
Bridger Wilderness Area	215	SW
Fitzpatrick Wilderness Area	215	SW
Gates of the Mountain Wilderness Area	340	NW
Grand Teton National Park	250	W
North Absaroka Wilderness Area	205	W
Red Rocks Lake Wilderness Area	300	W
Scapegoat Wilderness Area	390	NW
Teton Wilderness Area	230	W
Theodore Roosevelt National Park (North Unit)	235	NE
Theodore Roosevelt National Park (South Unit)	205	NE
U.L. Bend Wilderness Area	235	NW
Washakie Wilderness Area	210	W
Wind Cave National Park	115	SE
Yellowstone National Park	225	W
Tribal Federal PSD Class I		
Fort Peck Indian Reservation	250	N
Northern Cheyenne Indian Reservation	95	NNW
Federal PSD Class II		
Absaroka-Beartooth Wilderness Area	235	NW
Agate Fossil Beds National Monument	160	SE
Badlands National Park	135	SE
Bighorn Canyon National Recreation Area	130	W
Black Elk Wilderness Area	105	SE
Cloud Peak Wilderness Area	80	W
Crow Indian Reservation	100	NW
Devils Towner National Monument	40	NE
Fort Belknap Indian Reservation	310	NW
Fort Laramie National Historic Site	150	SE
Jewel Cave National Monument	95	SE
Mount Rushmore National Memorial	110	E
Popo Agie Wilderness Area	205	SW
Soldier Creek Wilderness Area	150	SE

[1] The U.S. Congress designated the Wilderness Area portion of Badlands National Park as a mandatory Federal PSD Class I area. The remainder of Badlands National Park is a PSD Class II area.

sources will not exceed the allowable incremental air quality impacts for NO_2, PM_{10}, or SO_2. Modifications to existing major PSD sources are also subject to PSD regulation if the modification results in a significant net emissions increase of any regulated pollutant. The net emissions increase is determined by adding the modification to the permits issued after a baseline date. In the PRB, the PM_{10} baseline year is 1997; the NO_2 baseline year is 1988.

To date, there are no coal mines within the State of Wyoming that have been subject to PSD review in the permitting process. Existing surface coal mining operations in the PRB, including the Eagle Butte Mine, are not subject to PSD regulations for two reasons: 1) surface coal mines are not on the EPA list of 28 major emitting facilities for PSD regulation; and 2) point-source emissions from individual mines have not exceeded the PSD emissions threshold. A new mine would be classified as a major source and subject to PSD review if potential emissions of any regulated pollutant would equal or exceed 250 tpy. Fugitive emissions are not included in the definition of potential emissions except for certain specified source types [40 CFR 52.21, (b)(1)(iii)]. Mining-related fugitive emissions are exempt from the applicability determination. This NEPA analysis compares potential air quality impacts from mining the Eagle Butte West LBA Tract as applied for or under BLM's preferred tract configuration for Alternative 1 to applicable ambient air quality standards, PSD increments, and AQRVs (such as visibility), but it does not constitute a regulatory PSD analysis; rather, it is strictly for informational purposes.

All sources being permitted within the State of Wyoming must utilize BACT, not just sources subject to PSD review. During the New Source Review permitting process, a BACT analysis is performed for the proposed construction or modification. The BACT process evaluates possible control technologies for the proposed action on the basis of technical feasibility and economic reasonability. Decisions about which technology should be applied are made on a case-by-case basis and are mandated through the permit. See Section 3.4.2.3 for a discussion of BACT measures that have been applied at coal mines.

The NSPS were established by the Clean Air Act and adopted by reference into the WAQSR. The standards, which are for new or modified stationary sources, require the sources to achieve best-demonstrated emission control technology. The NSPS apply to specific processes that are listed in the standards. For surface coal mining in the PRB, this includes certain activities at coal preparation plants. The requirements applicable to these existing units can be found in 40 CFR Part 60, Subpart Y (Standards of Performance for Coal Preparation Facilities).

Major sources of air pollutants must obtain an operating permit from WDEQ/AQD Operating Permit Program (also known as Title V). A "major source" is, generally, a facility that emits over 100 tpy of any criteria pollutant, 25 tpy of combined HAPs or 10 tpy of an individual HAP. The operating permit compiles all applicable

air quality requirements for a facility and specifies compliance assurance in the form of testing, monitoring, reporting, and recordkeeping requirements.

3.4.1.1.1 Surface Coal Mine Regulatory Framework

The WDEQ/AQD administers a permitting program to assist the agency in managing the state's air resources. Under this program, anyone planning to construct, modify, or use a facility capable of emitting designated pollutants into the atmosphere must obtain an air quality permit to construct. Coal mines fall into this category. A new coal mine or a modification to an existing mine must be permitted by WDEQ/AQD under WAQSR Chapter 6, Section 2 and must demonstrate that the proposed mining operations will comply with all applicable aspects of WAQSR. The following summarizes the construction/modification permitting analysis for surface coal mines.

When a company decides to construct a new surface coal mine or proposes a modification to an existing surface coal mine that will cause an increase in pollutant emissions, they must submit an application, which is reviewed by the WDEQ/AQD New Source Review staff and the applicable WDEQ/AQD Field Office. Typically, a company will meet with the WDEQ/AQD prior to submitting an application to determine issues and details that need to be included in the application. A surface coal mining application will include the standard application, BACT measures that will be implemented, an inventory of point and fugitive sources in the area, and modeling analyses.

BACT must be utilized for all sources being permitted within the State of Wyoming. WAQSR Chapter 6, Section 2(b)(v) lists BACT measures to be utilized by (but not limited to) large mining operations. Applicants use these and other BACT measures in the development of their own PM_{10} and NO_2 point and fugitive source inventories (see Section 3.4.2.3 for a discussion of mining BACT measures). During the application review, WDEQ/AQD can also require further control measures through the BACT review process.

For a coal mine PM_{10} modeling analysis, an applicant must put together an emission inventory of PM_{10} from their facility and surrounding sources. For PM_{10}, both point sources and fugitive dust emissions are quantified. The emissions are based on the facility's potential to emit in the highest production year. The applicant also examines the facilities at surrounding coal mines and their previous air quality permits to determine the worst-case emission year for those facilities, based on potential to emit. They then choose two or more years for modeling analyses.

Long-term PM_{10} modeling is conducted for the permit application to demonstrate compliance with the annual PM_{10} standard. Per WDEQ/AQD guidance, the Industrial Source Complex Long-Term Model, Version 3 (ISCLT3) is used for point sources. For fugitive emission sources, the fugitive dust model is used. A PM_{10}

background concentration of 15 µg/m^3 and a NO_x background concentration of 20 µg/m^3 are used, which WDEQ/AQD has chosen as representative of background ambient air quality in the area prior to operation of coal mine sources. Potential emissions corresponding to the maximum production level from the coal mine undergoing permitting and other coal mines in the area are added to this background. The resulting particulate levels are then compared to the average annual PM_{10} standard of 50 µg/m^3 and the average annual NO_x standard of 100 µg/m^3 to determine compliance with the annual AAQS. This constitutes a demonstration of compliance with the "long-term" or annual AAQS.

The background concentrations for PM_{10} and NO_x concentrations chosen by WDEQ/AQD are different than the background PM_{10} and NO_x concentrations shown in Table 3-3. The background values chosen by WDEQ/AQD are representative of background ambient air quality prior to coal mining. The values shown in Table 3-3 are based on recently monitored values in the PRB and include all sources operating at the time the value was measured, including existing coal mine operations located around Gillette. The annual background values shown in Table 3-3 for PM_{10} and NO_x are based on data collected for a recent evaluation of potential cumulative air quality impacts in the PRB conducted by ENSR for Wyoming and Montana (BLM 2006b), which is discussed in Chapter 4.

Short-term PM_{10} modeling is not required by WDEQ/AQD, nor does WDEQ/AQD consider it to be an accurate representation of short-term impacts. Section 234 of the Clean Air Act Amendment of 1990 mandates the Administrator of the EPA to analyze the accuracy of short-term modeling in regard to fugitive particulate emissions from surface coal mines. A June 26, 1996 letter from EPA Region VIII to Wyoming State Representatives states the results of a study where the short-term model failed to meet evaluation criteria and tended to over-predict 24-hr impacts of surface coal mines. A Memorandum of Agreement between EPA Region VIII and the State of Wyoming, dated January 24, 1994, allows WDEQ/AQD to conduct monitoring in lieu of short-term modeling for assessing coal mining-related impacts in the PRB. This regulatory procedure remains in place and in effect. Ambient particulate monitoring is required of each coal mine through conditions of their respective permits. The 1994 Memorandum of Agreement also required WDEQ/AQD to implement "Best Available Work Practice" mitigation measures at any mine where an exceedance of the PM_{10} air quality standard has occurred.

Coal mines in the PRB are also required to quantify NO_2 emissions from their facilities. Dispersion modeling is required to demonstrate compliance with the ambient standard. Potential emissions from diesel powered mining equipment and blasting are modeled. Train locomotive engine emissions are also quantified and included in the NO_2 modeling analysis.

Each application for a permit to construct a new coal mine or modify and existing coal mine is reviewed by WDEQ/AQD to determine compliance with all applicable air quality standards and regulations. This includes review of compliance with emission limitations established by NSPS, review of compliance with ambient standards through modeling analyses, and establishment of control measures to meet BACT requirements. The WDEQ/AQD-proposed permit conditions are placed on public notice for a 30-day review period, after which a final decision on the permit is made.

3.4.1.2 Emission Sources

Air quality conditions in rural areas in the PRB are likely to be very good, as they are characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations. Occasional high concentrations of CO and particulate matter may occur in more urbanized areas (e.g., cities of Gillette, Sheridan, and Buffalo) and around industrial facilities, especially under stable atmospheric conditions that occur during winter.

The major types of emissions that come from surface coal mining activities are in the form of fugitive dust and tailpipe emissions from large mining equipment. Activities such as blasting, excavating, loading and hauling of overburden and coal, and the large areas of disturbed land all produce fugitive dust. Stationary or point sources are associated with coal crushing, storage, and handling facilities. In general, particulate matter (PM_{10}) is the major significant pollutant from coal mine point sources.

Blasting is responsible for another type of emission from surface coal mining. Overburden blasting sometimes produces gaseous, orange-colored clouds that contain NO_2. Exposure to NO_2 may have adverse health effects, as discussed in Section 3.4.3. NO_2 is one of several products resulting from the incomplete combustion of explosives used in the blasting process. Wyoming's ambient air standards for NO_2 are shown in Table 3-3.

Other existing air pollutant emission sources within the region include:

- exhaust emissions (primarily CO and NO_x) from existing natural gas fired compressor engines used in production of natural gas and CBNG; gasoline and diesel vehicle tailpipe emissions of combustion pollutants (VOCs, CO, NO_x, PM_{10}, $PM_{2.5}$, and SO_2);

- dust (particulate matter) generated by vehicle travel on unpaved graded roads, windblown dust from neighboring areas, agricultural activities such as plowing, and paved road sanding during the winter months;

- transport of air pollutants from emission sources located outside the region;
- emissions from railroad locomotives used to haul coal (primarily NO_2 and PM_{10}); and
- SO_2 and NO_x from power plants. The closest coal-fired power plants are the Dave Johnston plant, located about 100 miles south-southwest of the Eagle Butte West LBA Tract, and the Wyodak, Wygen, and Neil Simpson plants, located about 10 miles southeast of the Eagle Butte West LBA Tract.

3.4.2 Particulate Emissions

3.4.2.1 Affected Environment for Particulate Emissions

The federal standard for particulate matter was measured as TSP until 1989. This measurement included all suspendable dust (generally less than 100 microns in diameter). In 1989, EPA changed from a TSP-based standard to a PM_{10}-based standard. PM_{10} is particulate matter with an aerodynamic diameter of 10 microns or less that can potentially penetrate into the lungs and cause health problems. In 1997, EPA set separate standards for fine particles ($PM_{2.5}$), based on their link to serious health problems. In 2006, EPA again revised the air quality standards for particulate matter by tightening the 24-hour fine particle standard from the previous level of 65 $\mu g/m^3$ to 35 $\mu g/m^3$ and revoking the annual PM_{10} standard of 50 $\mu g/m^3$. EPA retained the existing annual $PM_{2.5}$ standard of 15 $\mu g/m^3$ and the 24-hour PM_{10} standard of 150 $\mu g/m^3$. These revisions took effect on December 18, 2006. The current federal ambient air standards are shown in Table 3-3.

Wyoming added PM_{10} based standards to match the federal standards in 1989, but retained the TSP standards as state standards until March 2000. TSP is still monitored in some locations to be used as a surrogate for PM_{10} and as an indication of overall atmospheric levels of particulate matter. Wyoming also adopted a $PM_{2.5}$ standard in March 2000. In view of the December 2006 revisions to the NAAQS for particulate matter, the State of Wyoming will enter into rulemaking to revise the WAAQS for particulate matter so that they remain as stringent as or more stringent than the NAAQS. Wyoming's current ambient air standards are shown in Table 3-3.

3.4.2.1.1 Regional Particulate Emissions

As a result of WDEQ/AQD requirements for the PRB mines to collect air quality data, which is discussed in Section 3.4.2.3, the eastern PRB is one of the most intensely monitored areas in the world for air quality. There are numerous monitors located at and adjacent to mining operations in the PRB, as shown in Figure 3-3. These include six TSP monitors, four $PM_{2.5}$ monitors and 30 PM_{10} monitors. Data for TSP date back to 1980 and data for PM_{10} date back to 1989. Through 2004, nearly 57,000 TSP and 27,000 PM_{10} samples had been collected.

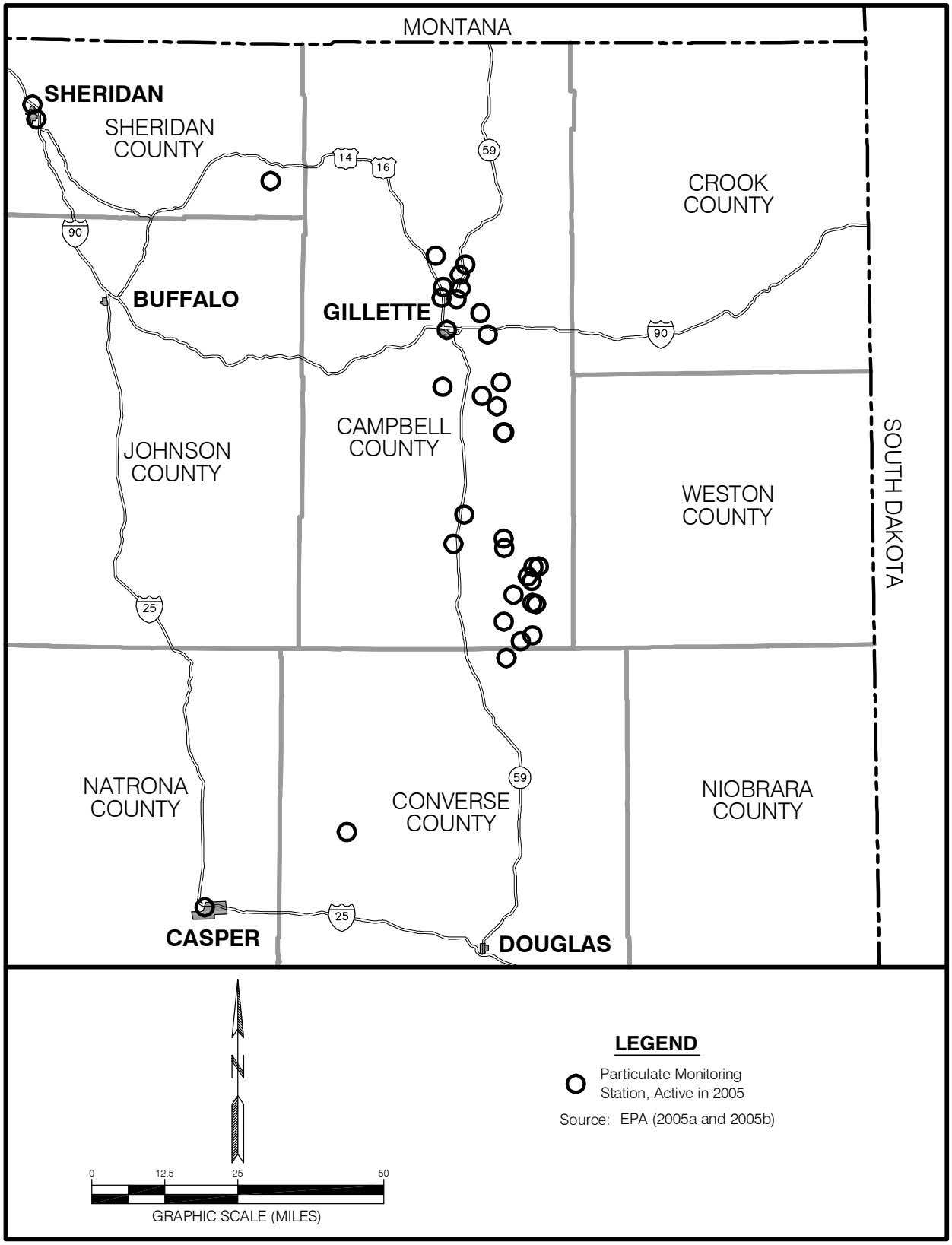


Figure 3-3. Active Particulate Monitoring Stations in Northeastern Wyoming.

Table 3-5 summarizes the annual arithmetic average of these data from 1980 through 2004 of all sites located at and adjacent to mining operations.

As indicated in Table 3-5, the long-term trend in particulate emissions remained relatively flat through 1998. The overall average annual TSP concentration from 1980 through 1998 was 33.1 µg/m^3, with annual averages ranging between 27.8 µg/m^3 and 39.4 µg/m^3. There were increases in 1988 and 1996, which may have been the result of fires in the region during those years. Annual average PM_{10} concentrations from 1989 through 1998 were similarly relatively flat, ranging between 12.9 µg/m^3 and 16.5 µg/m^3, with an overall average of 15.4 µg/m^3.

This time period (1980-1998) was associated with significant growth in the surface coal mining industry. Coal production increased from about 59 mmtpy to over 293 mmtpy (an increase of almost 500 percent), and associated overburden production increased from 105 mmbcy to 669 mmbcy per year (an increase of over 600 percent). From 1990 through 2004, the average annual increase in coal production was 6.5 percent, while annual overburden production increased an average of 13.1 percent over the same time period. The larger annual increase in overburden production is probably due to the fact that the mines are gradually moving into deeper coals as the shallower reserves are mined out.

The relatively flat trend in particulate emissions from 1980 through 1998 is due in large part to the Wyoming Air Quality Program that requires BACT at all permitted facilities. BACT control measures, which include watering and chemical treatment of roads, limiting the amount of area disturbed, temporary revegetation of disturbed areas to reduce wind erosion, and timely final reclamation, are discussed in Section 3.4.2.3.

The average annual TSP concentration increased from 33.9 µg/m^3 in 1998 to 55.3 µg/m^3 in 1999, and remained greater than 50.0 µg/m^3 through 2003. Since 2003 there have been too few remaining TSP monitoring sites to provide a meaningful estimate of the average annual TSP concentration. The average annual PM_{10} concentration increased from 15.9 µg/m^3 in 1998 to 21.6 µg/m^3 in 1999, and has remained equal to or greater than 20 µg/m^3 through 2004, as shown in Table 3-5. The increases in coal production over those six years (an average of 4.6 percent per year and 14.7 mmtpy over the six-year period) and associated overburden production (an average of 10.0 percent per year and 85.9 mmbcy over the six-year period) were not larger than any of the six-year increases during the previous 18 years, but the particulate concentration increase was much larger than in previous years. There were no major fires in the region between 1998 and 2004, but there was an increase in CBNG development in the PRB during that time frame, and northeastern Wyoming has experienced extreme drought conditions as well as a dramatic increase in surface disturbance activities associated with CBNG development since 1999. All of these factors have exacerbated particulate emissions.

Table 3-5. Summary of WDEQ/AQD Reports on Air Quality Monitoring in Wyoming's PRB, 1980-2004.

Year	Coal Produced (mmtpy)	Overburden Moved (mmbcy)	Number of Mines Operating/ Monitoring TSP/ Monitoring PM_{10}[1]	Number of TSP/PM_{10} Monitoring Sites[2]	TSP Average (µg/m³)	PM_{10} Average (µg/m³)
1980	58.7	105.3	10/14/0	34/0	35.5	na[3]
1981	71.0	133.4	11/13/0	35/0	39.4	na
1982	76.1	141.1	11/14/0	40/0	31.2	na
1983	84.9	150.9	13/14/1	41/1	32.6	11.2
1984	105.3	169.5	14/16/1	42/1	33.9	11.1
1985	113.0	203.4	16/17/0	49/0	32.3	na
1986	111.2	165.7	16/17/0	45/0	29.3	na
1987	120.7	174.6	16/17/0	43/0	31.7	na
1988	138.8	209.7	16/17/0	43/0	37.7	na
1989	147.5	215.6	15/17/3	40/3	32.1	15.9
1990	160.7	220.1	17/17/5	47/5	34.3	14.8
1991	171.4	242.3	17/17/5	46/6	32.7	16.5
1992	166.1	296.0	17/17/7	41/7	31.7	15.9
1993	188.8	389.5	17/17/8	40/11	27.8	14.5
1994	213.6	483.9	17/18/8	44/11	31.7	15.5
1995	242.6	512.7	16/18/8	41/12	29.6	12.9
1996	257.0	605.4	17/18/8	41/12	35.4	16.0
1997	259.7	622.0	16/17/10	39/15	33.3	15.9
1998	293.5	669.0	16/17/12	36/17	33.9	15.9
1999	317.1	762.9	15/17/12	36/18	55.3	21.6
2000	322.6	868.9	15/15/12	31/17	56.1	23.4
2001	354.1	927.7	12/11/12	29/29	57.5	27.2
2002	359.7	1,032.1	13/11/13	23/38	56.0	23.3
2003	363.6	1,044.2	13/10/13	16/34	51.9	20.8
2004	381.6	1,184.4	13/5/13	6/36	--[4]	20.0

1 Mines include Buckskin, Rawhide, Eagle Butte, Dry Fork, Fort Union (acquired by Dry Fork), Clovis Point (acquired by Wyodak), Wyodak, Caballo, Belle Ayr, Caballo Rojo, Cordero, Coal Creek, Jacobs Ranch, Black Thunder, North Rochelle, North Antelope, Rochelle, Antelope, and Dave Johnston.

2 Some sites include more than one sampler, so the number of samplers is greater than the number of sites.

3 Not applicable because no monitoring for PM_{10} was done.

4 Data no longer pertinent due to paucity of monitoring sites.

Sources: 1980 through 1996 emissions and production data from April 1997 report prepared by WMA for WDEQ/AQD. 1997 through 2004 emissions data from EPA AirData and WDEQ/AQD databases (EPA 2005a, WDEQ/AQD 2005a). 1997 through 2004 production data from WDEQ/AQD and Wyoming State Inspector of Mines (WDEQ/AQD 2005b and Wyoming Department of Employment 1997-2004).

There were no monitored exceedances of the 24-hour PM_{10} standards anywhere in the PRB through year 2000. From 2001 through 2005, there were 29 monitored exceedances of the 24-hour PM_{10} standard at seven operating mines in the Wyoming PRB. Nineteen of these exceedances occurred in 2001 and 2002, while two, three, and five exceedances occurred in 2003, 2004, and 2005, respectively (Shamley 2006). In early 2007, there were nine exceedances at four mines. Most of the monitored exceedances have occurred in the group of mines located south and east of the town of Wright; however, six exceedances have occurred in the group of mines located north and east of Gillette (Figure 1-1). The Eagle Butte Mine is located in the northern group of mines but none of the monitored exceedances of the 24-hour PM_{10} standards were monitored at the Eagle Butte Mine. The PRB monitoring data show no exceedances of the annual PM_{10} standard to date.

According to WDEQ/AQD, the circumstances associated with the exceedances prior to 2007 have provided adequate reason to believe that high wind events and blowing dust have caused exceedances of the NAAQS that otherwise would not have occurred (WDEQ/AQD 2006a). The 2007 exceedances were also associated with periods of high winds.

In response to the measured exceedances of the 24-hour PM_{10} NAAQS and in anticipation of conditions that would potentially lead to future exceedances, the WDEQ/AQD has collaborated with the Wyoming Mining Association to develop a Natural Events Action Plan for the coal mines of the PRB, based on EPA Natural Event Policy guidance. A report describing the plan, which has been submitted to the EPA for comment and approval, can be accessed on the WDEQ/AQD's website on the Internet (WDEQ/AQD 2006a). If a Natural Events Action Plan is designed and implemented to minimize PM_{10} concentrations, EPA will exercise its discretion, under Section 107(d)(3) of the Clean Air Act, not to redesignate areas as nonattainment, provided that the exeedances are demonstrated to be the result of natural events. Based on EPA's Natural Events Policy, PM_{10} concentrations due to dust raised by unusually high winds will be treated as uncontrollable natural events under the following conditions: 1) the dust originated from non-anthropogenic sources, or 2) the dust originated from anthropogenic sources controlled with BACM.

The WDEQ/AQD Natural Events Action Plan includes a public education plan, a public notification and health advisory program, and a plan to abate or minimize appropriate contributing controllable sources of PM_{10}, which includes three categories of control measures. The three categories of control measures are discussed in Section 3.4.2.3, below. The Natural Events Action Plan currently proposed by WDEQ/AQD only includes measures for control of coal mine sources since it is the ambient monitoring systems around the large surface coal mines that have recorded the exceedances of the 24-hour PM_{10} NAAQS. If it is demonstrated that there are non-coal sources contributing to elevated measurements in an area of concern, WDEQ/AQD may address these additional

sources separately from the proposed Natural Events Action Plan or as a future update of the plan.

3.4.2.1.2 Site Specific Particulate Emissions

For the Eagle Butte Mine air quality monitoring sites, historical particulate matter ambient air quality data generally show the same results as described above for the PRB as a whole. The locations of PM_{10} and TSP particulate emission monitoring samplers at the Eagle Butte Mine are shown on Figure 3-4. The progression of mining operations requires that the location and number of particulate monitors be adjusted in order to provide the best documentation of the ambient air quality. Figure 3-5 presents the average annual TSP and PM_{10} emissions measured at Eagle Butte Mine's particulate monitors from 1996 through 2005. Annual coal and overburden production for the Eagle Butte Mine for these years are also shown on Figure 3-5.

As discussed above, TSP was the federally regulated pollutant until 1989 and was retained as a state regulated pollutant until 2000. PM_{10} became a federal standard in 1989 and was also adopted by the State of Wyoming in 2000. Until recently, TSP measurements have been used as a surrogate for PM_{10} in lieu of having to replace and/or co-locate an existing TSP sampler with a new PM_{10} sampler. As of October 2004, Eagle Butte Mine no longer monitors TSP. In 1996, there were two instances that the 24-hour TSP concentration monitored at the Eagle Butte Mine exceeded the 150 $\mu g/m^3$ standard. In 2001, there were three instances that the 24-hour TSP concentration monitored at the Eagle Butte Mine exceeded 150 $\mu g/m^3$. As a result of these exceedances of the 24-hour TSP standard, WDEQ-AQD required the mine to monitor PM_{10} concentration and TSP measurements could no longer be used as a surrogate for PM_{10} measurements at the site of exceedance. Eagle Butte Mine began monitoring PM_{10} in 1996 and there have been no exceedances of the 24-hour or annual PM_{10} standards.

3.4.2.2 Environmental Consequences Related to Particulate Emissions

Particulates include solid particles and liquid droplets that can be suspended in air. Particulates, especially fine particles, have been linked to numerous respiratory-related illnesses and can adversely affect individuals with pre-existing heart or lung diseases. They are also a major cause of reduced visibility in parts of the United States. While individual particles cannot be seen with the naked eye, collectively they can appear as black soot, dust clouds, or gray hazes.

3.4.2.2.1 Proposed Action and Alternative 1

The Eagle Butte West LBA Tract would be mined as an integral part of the Eagle Butte Mine. FCW projects that average annual coal production would be 25 million tons, with or without the Eagle Butte West LBA Tract. Eagle Butte Mine's

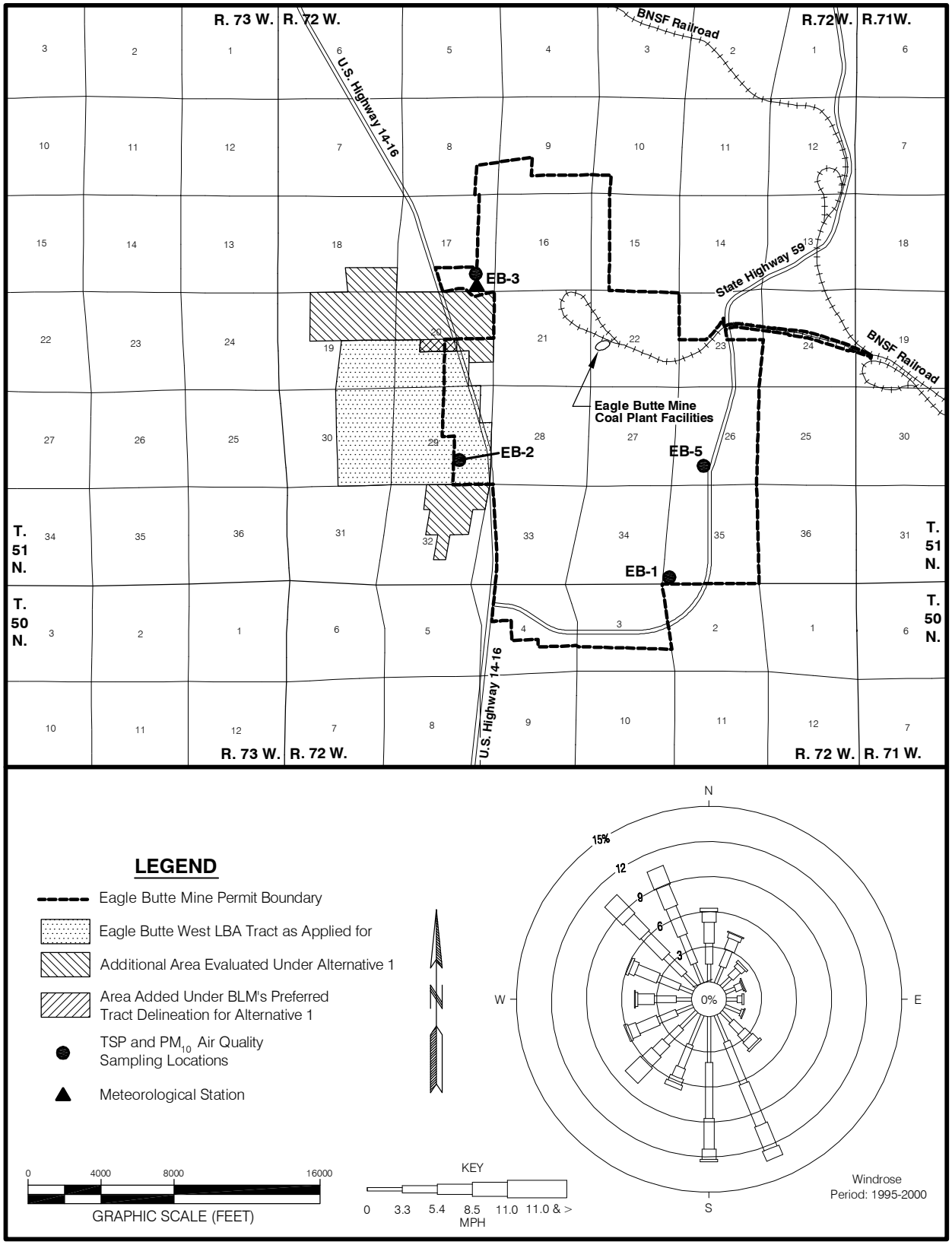


Figure 3-4. Wind Rose, Air Quality, and Meteorological Stations at the Eagle Butte Mine.

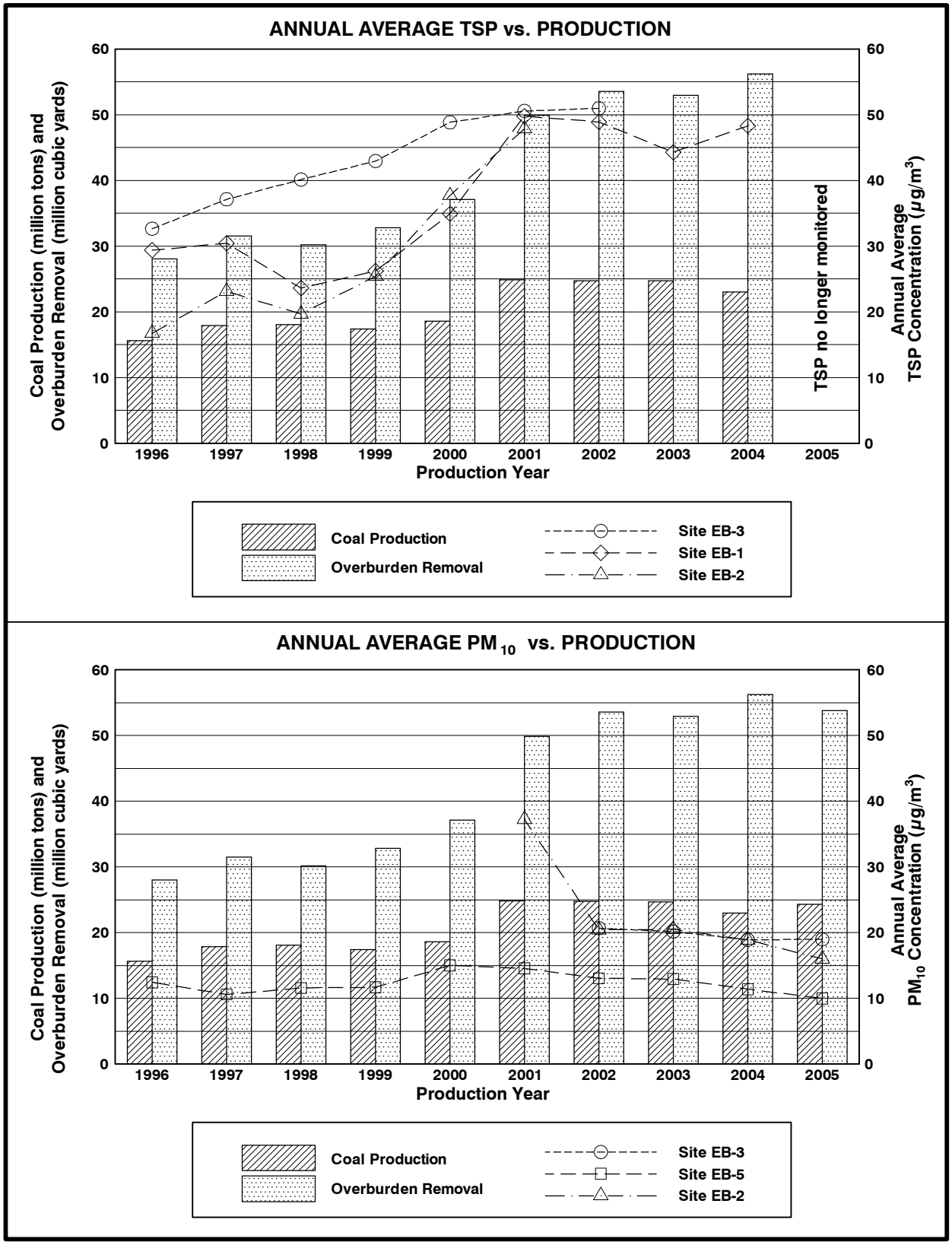


Figure 3-5. Annual Coal Production and Overburden Removal vs. Ambient Particulates for Eagle Butte Mine (1996 through 2005).

currently approved air quality permit from the WDEQ/AQD limits annual coal production to 35 million tons of coal. According to FCW, if they acquire the additional coal in the LBA tract, production would continue at an average rate of 25 mmtpy for about eight years under the Proposed Action or the BLM's preferred tract configuration for Alternative 1. As discussed in Section 3.0, the estimates of recoverable coal, associated disturbance, and mine life shown in Table 3-1 assume that U.S. Highway 14-16 is not moved. As indicated in Table 2-2, approximately 27 million additional tons of coal could be recovered if the highway is moved, which would extend operations at the mine for about one additional year.

Potential particulate emissions related to mining operations at the existing Eagle Butte Mine are described below. Because of the similarities in mining rates and mining operations, the potential impacts of mining the Eagle Butte West LBA Tract have been inferred from the projected impacts of mining the existing coal leases as currently permitted.

WDEQ/AQD issued air quality permit MD-1251 for the Eagle Butte Mine on October 24, 2005. This air quality permit was issued based on an analysis using emission factors, estimation methods, and model selection consistent with WDEQ/AQD policy. This current air quality permit reflects analyses based on a revised coal removal progression and mine plan. The change did not affect the LNCM boundary or the permitted coal production limit of 35 mmtpy. Eagle Butte Mine's air quality permit also approves the construction of a stilling shed at the coal truck dump, which replaces water spray dust control. Shovels, trucks, front-end loaders, and dozers are utilized for the movement of both overburden and coal (FCW 2004a).

Particulate emission inventories for the mining activities at Eagle Butte Mine were prepared for all years in the currently anticipated life of the mine. Two years, 2005 and 2006, were then selected for worst-case dispersion modeling of PM_{10} based on mine plan parameters and emission inventories. The area source, haul road, and point source PM_{10} information for Eagle Butte Mine and other sources in the area were input into the ISCLT3 Model for each worst-case year.

Receptor locations were placed at approximately 500-meter intervals along the ambient air quality (or LNCM) boundary (see Figures 3-6 and 3-7). As discussed in Section 3.4.1.1.1, a PM_{10} concentration of 15 $\mu g/m^3$ was added to all modeled emissions to account for background fugitive dust. Predicted PM_{10} emissions from the neighboring mines (Buckskin, Rawhide, Fort Union, Dry Fork, and Wyodak) were inventoried using those mines' most recent WDEQ/AQD air quality permit applications. Impacts on ambient air from the Eagle Butte Mine and other regional mines vary by year due to annual changes in emission strength, emission density, pit proximity to defined ambient air boundaries, and pit configuration. Emissions for each year are ranked and candidate worst-case years are further evaluated regarding proximity to neighboring mining operations and emissions. The total PM_{10} concentration at each receptor was determined by summing the

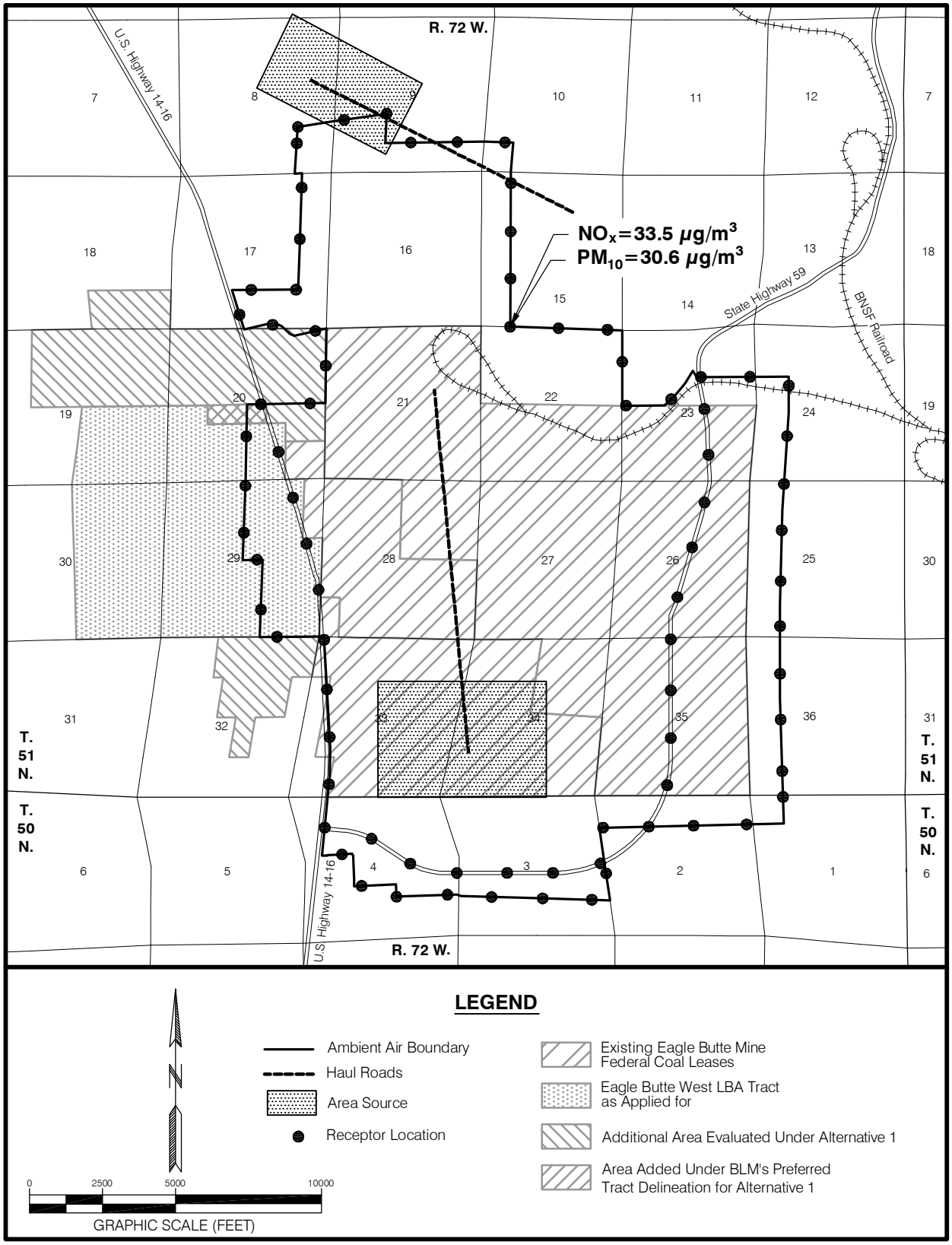


Figure 3-6. Maximum Modeled PM_{10} and NO_X Concentrations at the Eagle Butte Mine Ambient Air Boundary for the Year 2005.

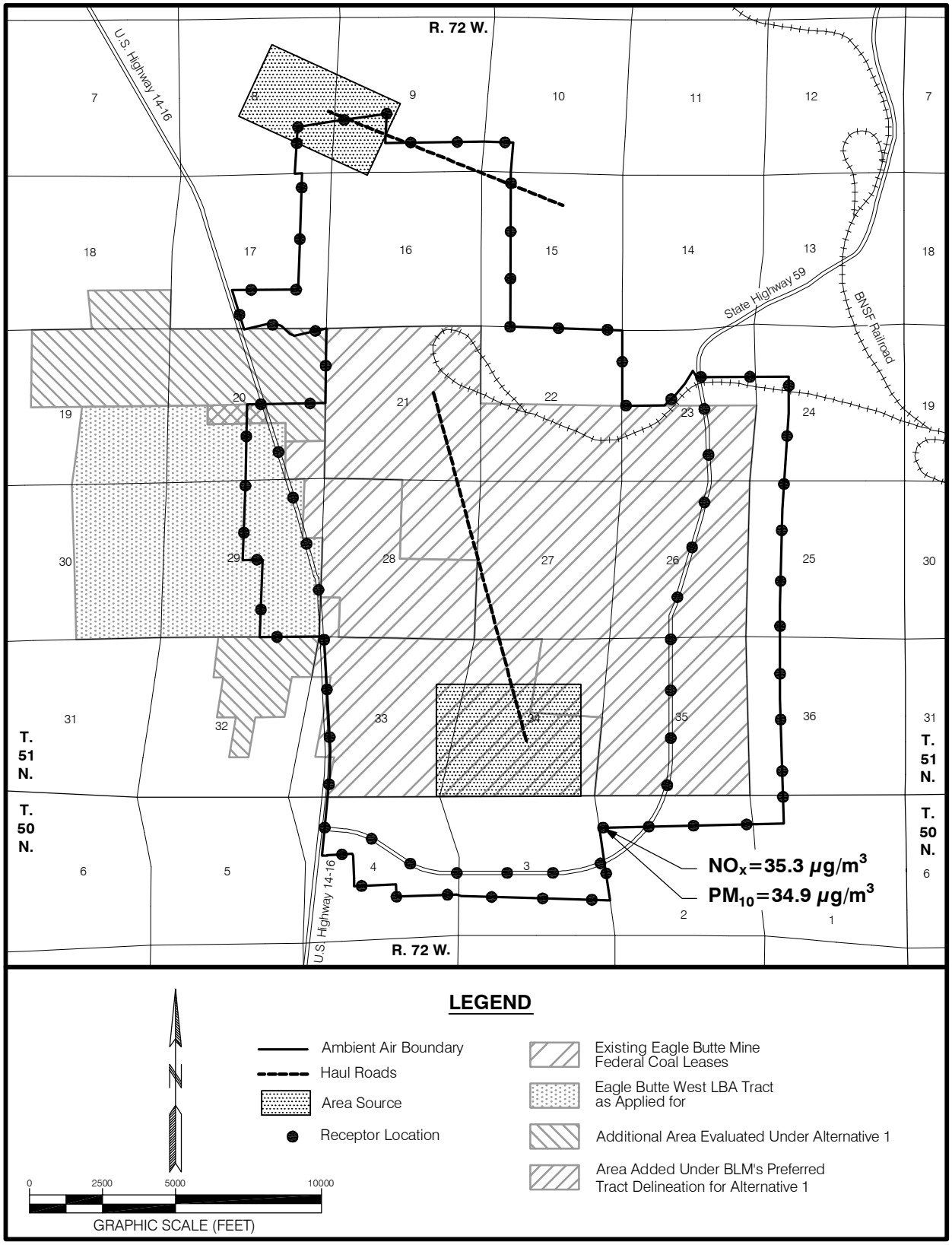


Figure 3-7. Maximum Modeled PM_{10} and NO_X Concentrations at the Eagle Butte Mine Ambient Air Boundary for the Year 2006.

concentration due to each active mine in the general area and adding the estimated pre-mining background concentration of 15 µg/m^3. The resulting particulate levels were then compared to the average annual PM_{10} standard of 50 µg/m^3 to demonstrate compliance with the annual WAAQS.

Long-term modeling indicates the currently projected mine activities will be in compliance with the annual PM_{10} ambient air standard for the life of the Eagle Butte Mine. Based on mine plan parameters and highest emissions inventories, the years 2005 and 2006 were selected as the worst-case years. The dispersion model showed a maximum concentration of 30.59 µg/m^3 in 2005 and 34.88 µg/m^3 in 2006. The modeling assumed that coal production in both years would be at the maximum permitted production level of 35 million tons (FCW 2004a). The locations of the maximum-modeled PM_{10} concentrations for 2005 and 2006 are shown on Figures 3-6 and 3-7, respectively.

As discussed in Section 3.4.1.1, surface coal mines in the Wyoming PRB have not been subject to PSD requirements. Only some fraction of the mine emissions included in the WDEQ/AQD air quality permit analyses consumes increment based on permits in place in the baseline year of 1997. As a result, the concentrations predicted by the WDEQ/AQD air quality permit analyses should not be compared to PSD increments.

The Eagle Butte Mine point source emissions inventory includes all coal preparation and processing facilities (i.e., crushers, material transfer points, silos, and loadouts). All point source parameters for the regional mining operations, which were obtained from WDEQ/AQD files, were also considered in the modeling analysis. As discussed in Section 3.4.1.1, a proposed new point source that has the potential to emit more than 250 tpy of any criteria pollutant (the primary pollutant being particulate matter) must undergo a regulatory PSD increment consumption analysis as well as a BACT review. An inventory of all point sources, controls, and emissions for the MD-1251 air quality permit showed a potential to emit 77.4 tpy; therefore, a PSD increment consumption analysis was not necessary. Because this value is below the 100 tpy major source threshold limit specified in Chapter 6, Section 3 of the WAQSR, Eagle Butte Mine will not be subject to the Title V Operating Permit program (FCW 2004a).

In Wyoming, monitoring results have been used in lieu of short-term (24-hour) modeling for assessing short-term coal mining-related impacts in the PRB. WDEQ has chosen this procedure in accordance with an agreement between EPA and the State of Wyoming, as discussed in Section 3.4.1.1.1. That agreement recognizes that appropriate models do not exist to accurately predict 24-hour impacts. Twenty-four-hour impacts have been estimated from recent monitoring and emission control activities.

There were two instances in 1996 and three instances in 2001 that the 24-hour TSP concentration monitored at the Eagle Butte Mine exceeded 150 µg/m^3, which

was the federal particulate matter standard before 1989. As a result of these monitored TSP concentrations in excess of 150 µg/m^3, WDEQ-AQD required the mine to monitor PM_{10} concentration and did not allow the continued use of TSP measurements as a surrogate for PM_{10} measurements at the site of exceedance. There have been no exceedances of the 24-hour or annual PM_{10} standards at the Eagle Butte Mine. Methods for the control of particulate emissions at the mine are discussed in Section 3.4.2.3. No exceedances of the 24-hour or annual ambient air standards are expected from mining the Eagle Butte West LBA Tract at the proposed mining rate of 25 mmtpy or at the maximum permitted rate of 35 mmtpy.

The estimated average overburden thickness is greater in the LBA tract than within the current leases, but the thickness of the coal in the LBA tract as applied for and in BLM's preferred tract configuration under Alternative 1 is about the same as in the existing mine area (see Table 3-2). If the Eagle Butte Mine acquires and mines the Eagle Butte West LBA Tract, this could result in an increase in fugitive emissions per ton of coal mined from current levels due to the increased volume of overburden that would have to be removed to recover the coal. The increase in fugitive dust emissions could potentially be moderated somewhat if removal of the larger volume of overburden material results in a slower rate of mining advancement through the LBA tract. This would potentially decrease the number of acres disturbed annually and cause haul distances to increase more slowly.

Current mining techniques would be expected to continue for a longer period of time than is shown in the currently approved air quality permit. Shovels and trucks would continue to be utilized for the movement of both overburden materials and coal. Facilities shown in the current air quality permit would not change as a result of proposed mining of the LBA tract. The Eagle Butte Mine does not conduct cast blasting and there are no plans to change blasting procedures or blast sizes associated with the mining of the LBA tract. In addition, current BACT measures for particulates would continue to be employed.

Modeling conducted for the current Eagle Butte Mine permit predicted no exceedances of the annual PM_{10} NAAQS at a 35-mmtpy production rate and there have been no exceedances of the 24-hour and annual PM_{10} NAAQS. If the Eagle Butte Mine acquires and mines the Eagle Butte West LBA Tract, they estimate that average coal production would be approximately 25 mmtpy. Under the Proposed Action and BLM's preferred tract configuration for Alternative 1, mine life would be extended by approximately up to nine years and the overburden thickness would increase during that time period, but fugitive dust emissions should remain in compliance with daily and annual air quality standards.

Public exposure to particulate emissions from surface mining operations is most likely to occur along publicly accessible roads and highways that pass through the area of the mining operations. Occupants of dwellings in the area could also be

affected. There are a number of occupied dwellings, businesses, the Gillette – Campbell County Airport, and a public school (Rawhide Elementary School) in the area of the existing Eagle Butte Mine and the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated under Alternative 1), as shown in Figure 3-8. Roads, highways, and school bus stops in the vicinity of the Eagle Butte Mine and the LBA tract are also shown in Figure 3-8. BLM's study area for the Eagle Butte West LBA Tract, which is shown in Figure 3-8 and discussed in Section 2.2, includes the north half of Section 20, T.51N., R.72W, where the school and several occupied dwellings (Echo Subdivision) are located. However, BLM must consider this coal to be unsuitable for mining, based on SMCRA and the associated regulatory requirements (see Section 2.2). BLM's study area also extends south to include a wedge of land lying between the airport runways. BLM's preferred tract configuration, shown in Figure 3-8, does not include either the federal coal underlying the school and occupied dwellings in Section 20 or the federal coal located between the airport runways.

As discussed above, there have been no exceedances of the 24-hour and annual PM_{10} NAAQS at the Eagle Butte Mine, and modeling conducted for the current Eagle Butte Mine permit predicted no exceedances of the annual PM_{10} NAAQS at a 35-mmtpy production rate. However, several nearby residents who attended the Eagle Butte West LBA scoping meeting, held in Gillette on May 17, 2005, and/or who submitted written scoping comments regarding FCW's proposal to lease the tract indicated that blowing dust from existing operations at the Eagle Butte Mine has affected the air quality in and around their residences, and expressed concern that this problem would continue in the future if the Eagle Butte West LBA Tract is leased and mined. The distance between the federal coal included in the Eagle Butte West LBA Tract (as applied for or under BLM's preferred tract configuration) and the occupied dwellings and the airport would be similar to, but not less than, the distance between the federal coal that has previously been recovered from the existing Eagle Butte Mine leases and the dwellings and airport. The distance between the coal included in the Eagle Butte West LBA Tract (as applied for or under BLM's preferred tract configuration) would be closer to Rawhide Elementary School than the federal coal included in any of the existing Eagle Butte Mine leases.

Another concern expressed during the scoping process was the potential impact of particulate emissions on human health. One written comment suggested that there seems to be a higher than normal incidence of asthma and respiratory problems in the residents living near the mine. According to the EPA, fine particles (2.5 micrometers in diameter and smaller) are small enough to get into the lungs and cause health problems. Scientific studies have linked particle pollution to health problems including decreased lung function, aggravated asthma, development of chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung diseases. People with heart or lung diseases, children, and older adults are most likely to be affected by particle pollution exposure (EPA 2007a). EPA considered these studies in

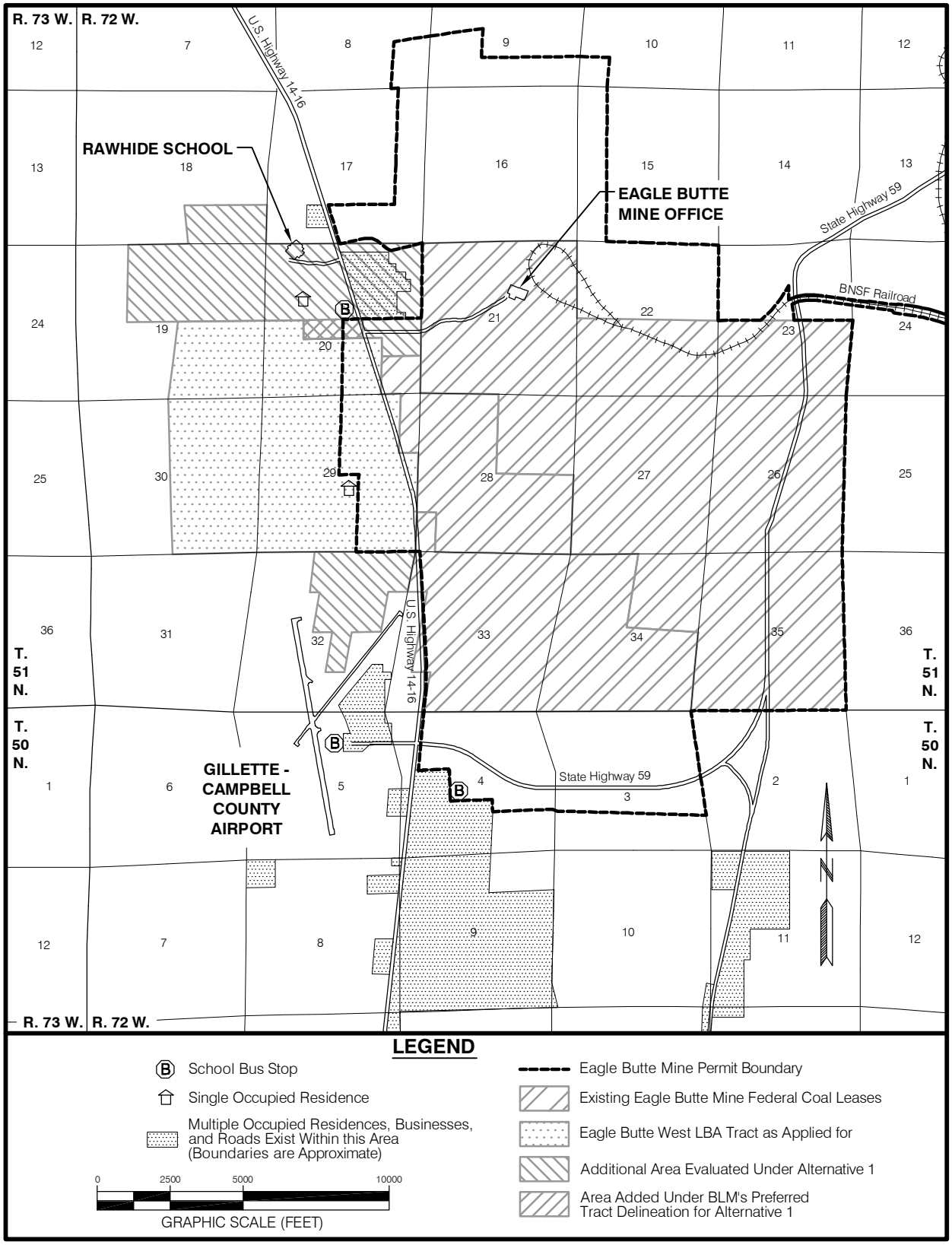


Figure 3-8. Residences, School Bus Stops, Public Roads, and other Publicly Accessible Facilities Within and Adjacent to the Eagle Butte West LBA Tract.

revising the air quality standards for particle pollution in 2006. The revisions to the standards are discussed above in Section 3.4.2.1. References to the studies linking particle pollution to health problems that EPA reviewed in revising the particulate matter standards and the results of those studies can be found in the Related Documents Section of EPA's Particulate Matter Standards website at http://www.epa.gov/air/particlepollution/standards.html.

3.4.2.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and the Eagle Butte Mine would continue to operate as currently permitted for approximately 13.6 more years. A discussion of the currently permitted mining operations and potential impacts related to PM_{10} emissions is included in Section 3.4.2.2.1. Impacts related to mining operations at the Eagle Butte Mine would continue on the existing mine area as permitted, but mining operations would not be extended onto those portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.4.2.3 Regulatory Compliance, Mitigation, and Monitoring for Particulate Emissions

Control of particulate emissions at all PRB coal mines is accomplished with a variety of measures. The WDEQ/AQD permits for all of the surface coal mines in the PRB require the following dust control measures, which are considered to be BACT measures:

1. No mines are allowed to have out-of-pit open coal stockpiles. All coal removed from the mine pits must be stored in totally enclosed coal silos or barns.
2. Unless specifically exempted, all coal mine main access roads must be paved.
3. As use and condition warrant, the minor access roads at coal mines which are unpaved must be watered or treated with dust suppressants.
4. All coal conveyor transfer points must be shrouded or otherwise enclosed to direct coal fines from one belt to the next.
5. The transfer point and crushers within coal processing plants must be equipped with control devices and measures specified in individual permits. These control devices and measures may include, but are not limited to, the use of dust collection baghouses, cyclones, scrubbers, fog systems, and controlled flow transfer chutes.
6. All out-of-pit conveyors must be hooded or contained in a conveyor gallery.

7. All out-of-pit coal dump hoppers must be fitted with a dust control stilling shed, water sprays, or a baghouse dust collector.
8. Active longer-term coal haul roads must be treated with dust control chemicals and/or water.
9. Active short-term mine haul roads that must be continuously relocated are maintained and watered while in use.
10. All haul roads must be regularly maintained to reduce the amount of dust re-entrained by haulage equipment (WDEQ/AQD 2006a).

Additional site-specific requirements related to mine-specific layout and mining practices may be included in individual mine permits. When the Eagle Butte Mine's air quality permit was first issued, the BACT on emissions from the mine's point sources included covered conveyors, telescoping loadout chutes, enclosed storage devices (silos), and water spray dust controls at all coal transfer points. In 2005, WDEQ/AQD issued air quality permit MD-1251 to modify operations at the Eagle Butte Mine with the addition of a PEC dust control system (stilling shed) at the coal truck dump that replaced the existing water spray dust controls.

Fugitive emissions are also controlled with a variety of other measures that the WDEQ/AQD considers BACT. Mines often apply dust suppressants to adjoining county roads. Haul truck speed limits are imposed to further help to reduce fugitive emissions from roads. Material drop heights for shovels and draglines (bucket to truck bed or backfill) are limited to the minimum necessary to conduct the mining operations. Timely permanent and temporary revegetation of disturbed areas is utilized to minimize wind erosion. All of these control measures are employed at the Eagle Butte Mine.

The Natural Events Action Plan discussed in Section 3.4.2.1.1 identifies two categories of control measures designed to prevent exceedances during high wind events in addition to the BACT measures discussed above (WDEQ/AQD 2006a). One of these categories, BACM, is an additional list of control measures that the mines can implement continuously so that they are in place before a high wind event occurs. These measures are not current requirements in all of the mines' air quality permits. They primarily address the principal mine-controlled sources of fugitive dust, which are large contiguous disturbed areas. These measures include:

1. Stabilizing topsoiled areas as soon as practicable following topsoil replacement.
2. Ripping, windrowing, mulching, temporarily seeding or chemically treating areas greater than 300 contiguous acres in size that have been stripped of topsoil but will not be mined in the near future.
3. Ripping, windrowing, temporarily seeding or chemically treating graded backfill areas greater than 300 contiguous acres in size.
4. Ripping, mulching, temporarily seeding or chemically treating long-term out-of-pit overburden and topsoil stockpiles that have been graded.

5. Applying non-vegetative barriers such as gravel or other large-diameter particles to erodible surfaces to reduce surface erosion where appropriate.
6. Cleaning, treating, and maintaining pads in front of truck dumps to prevent accumulations of spilled materials from getting pulverized.
7. Scheduling topsoil removal, backfill grading, and topsoil replacements concurrently to minimize open areas when possible.
8. Requiring contractors to apply water and/or chemical dust suppressants in their haulage areas.

The second category of control measures discussed in the Natural Events Action Plan includes measures that are not currently required by all of the individual mines' air quality permits but are actions that can be taken during a high wind event, depending on site-specific conditions (WDEQ/AQD 2006a). These include:

1. The mine operator will consider relevant information, including NWS forecasts and local meteorological information, to confirm that a high wind event is to occur.
2. The mine operator will visually determine areas of mining activity that are generating excessive visible dust and direct water trucks to those areas.
3. The mine operator should direct overburden operations to the shortest haul distance available during a high wind event.
4. The mine operator will evaluate the practicality of dumping the overburden as low as possible.
5. Mine employees will inspect for and extinguish coal fires.
6. The mine operator will evaluate shutting down scoria crushing operations that appear to be generating excess dust.
7. The mine operator will evaluate shutting down road maintenance activities that are generating dust.
8. The mine operator will evaluate ordering contractors to increase watering, reduce operating equipment or shut down haulage.
9. The mine operator will evaluate the need to shut down and/or reduce earthmoving activities as the mine schedule and conditions will allow.

WDEQ/AQD may require implementation of these control steps and continual evaluation of activity plans when exceedances are monitored at surface coal mines. Some of these measures have been formally implemented at the Black Thunder, North Rochelle, and Jacobs Ranch mines through the establishment of a formal, site-specific mitigative response plan at each of those mines. A mitigative response plan will be developed by any mine that records an exceedance or violation of the NAAQS downwind of its mining operations.

Other operational control measures that WDEQ/AQD may require at specific mines when exceedances occur include, but are not limited to, site-specific watering of inactive areas and problem areas; relocation of overburden truck-dumping operations; and deferring blasting. The mines are experimenting with dust control treatments, including magnesium chloride, surfactants, and

petroleum-based products. In addition, WDEQ/AQD may require additional monitoring, action levels based on continuous monitoring, expedited reporting of monitored exceedances, detailed reporting of contributing factors (e.g., meteorological conditions), and continual evaluation of activity plans when exceedances are monitored at surface coal mines.

The WDEQ/AQD is continually reviewing the data and considering regulatory options, such as increasing the frequency of monitoring. Where elevated emissions have occurred, continuous PM_{10} monitors, or TEOMs, are installed, which allows monitoring of emissions on a real-time basis (WDEQ/AQD 2006a). Other regulatory options may include enforcement actions such as Notices of Violation resulting in a consent decree and/or modified permit conditions. WDEQ/AQD is also coordinating with EPA to develop additional monitoring requirements in CBNG development areas, high PM_{10} mitigation action plans in permits, and additional mitigation measures under the SIP.

Additional measures that have been instituted as mine permit requirements at the Eagle Butte Mine to facilitate control of or diminish both NO_x emissions and public exposure to flyrock from blasting operations also act to limit dust impacts to the nearby businesses, residents, and the public school, as well as highways (refer to Section 3.4.3.3). For example, the following condition is included in the WDEQ/LQD Mine Permit No. 428-T5:

> The mine will block traffic on U.S. Highway 14-16 and State Highway 59 for all overburden blasts that occur within 1,100 ft of the highway ROW, and traffic control points are periodically moved as mining locations change.

If the Eagle Butte West LBA Tract is leased to the applicant, permit conditions designed to control or limit public exposure to NO_2 and flyrock would be expected to be included within specified distances of potentially affected businesses, dwellings, and the school, as well as the highway when mining operations on the new lease are conducted. According the WDEQ/LQD, if the Eagle Butte West LBA Tract is leased, permit conditions designed to control or limit public exposure to NO_2 and flyrock from blasting operations would be no less stringent than the permit conditions for the existing Eagle Butte Mine (Emme 2007).

Continuous monitors have not been required at the Eagle Butte Mine. After the monitors recorded 24-hour TSP concentrations in excess of 150 $\mu g/m^3$ in 1996 and 2001, WDEQ/AQD required the mine to monitor PM_{10} concentration and to discontinue using TSP measurements as a surrogate for PM_{10} measurements at the site that recorded the exceedance. Eagle Butte Mine's air quality permit (FCW 2004a) includes an analysis that demonstrates compliance with the 24-hour PM_{10} standard that focuses of historical monitoring data and continuing employment of BACT on mine-wide emissions and concludes that the 24-hour PM_{10} WAAQS would be protected through the LOM.

The eastern side of the PRB has one of the most extensive networks of monitoring sites for PM_{10} in the nation. As discussed in Section 3.4.2.1, the monitoring sites include six TSP monitors, four $PM_{2.5}$ monitors, and 30 PM_{10} monitors, including TEOMs. Most of these monitoring sites are funded and operated by the coal mines (Figure 3-3). WDEQ/AQD requires the collection of information documenting the quality of the air resource at each of the PRB mines. Each mine monitored air quality for a 24-hour period every six days at multiple monitoring sites through the end of 2001. All PM_{10} monitors located at the active mines are now required by WDEQ/AQD to sample air quality for a 24-hour period every three days beginning in 2002.

There are also monitors in Sheridan, Gillette, Arvada, and Wright, Wyoming. WDEQ/AQD uses monitoring stations located throughout the state to anticipate issues related to air quality. These monitoring stations are located to measure ambient air quality; they are not located to measure impacts from a specific source. Monitors located to measure impacts from a specific source may also be used for trends. The extensive air quality monitoring network currently in use enables the WDEQ to manage the air resource using monitoring data rather than modeled predictions. WDEQ uses the monitoring data to pro-actively arrest or reverse trends towards air quality problems. When WDEQ became aware that particulate readings in the PRB were increasing due to increased CBNG activity and exacerbated by prolonged drought, the WDEQ approached the counties, coal mines, and CBNG industry. A coalition involving the Campbell County Board of Commissioners, coal companies, and regional CBNG and oil producers have made substantial efforts towards minimizing dust from graded roads. Measures taken have ranged from the implementation of speed limits to paving of heavily traveled roads. The coalition has utilized chemical treatments to control dust as well as closing roads where appropriate or necessary and rebuilding existing roads to higher specifications. The coalition requested money from the Wyoming State Legislature to fund acquisition of Rotomill (ground up asphalt) to be mixed with gravel for use in treating some of the roads in the PRB. The Rotomill/gravel mixture has been demonstrated to be effective in reducing dust; the life of the mixture on treated roads is estimated to be from five to six years (Bott 2006).

Monitoring is also used to measure compliance. When monitoring shows that any standard has been violated, the WDEQ can take a range of enforcement actions to remedy the situation. Where a standard is exceeded specific to an operation, the enforcement action is specific to the facility. For many facilities, neither the cause nor the solution is simple. The agency normally uses a negotiated settlement in those instances.

3.4.3 Emissions of Nitrogen Oxides (NO_x)

3.4.3.1 Affected Environment for NO_x Emissions

Gases that contain nitrogen and oxygen in varying amounts are referred to as nitrogen oxides, or NO_x. One type of NO_x is nitrogen dioxide (NO_2), a reddish brown gas that is heavier than air and has a pungent odor. Gaseous NO_2 is highly reactive and combines with water to form nitric acid and nitric oxide.

Nitrogen oxides form when fuel is burned at high temperatures. They can be formed naturally or by human activities. The primary manmade sources are motor vehicles, electric utilities, and other fuel-burning sources. According to EPA, motor vehicles produce about 55 percent of the manmade NO_x emissions, utilities and industrial/commercial/residential activities each produce about 22 percent of the manmade NO_x emissions, and other sources account for the remaining one percent of the manmade emissions (EPA 2007b). The primary direct source of emissions of nitrogen oxides during coal mining operations is tailpipe emissions from large mining equipment and other vehicle traffic inside the mine permit area.

Blasting that is done to remove the material overlying the coal (the overburden) can result in emissions of several products, including NO_2, as a result of the incomplete combustion of nitrogen-based explosives used in the blasting process. When this occurs, gaseous, orange-colored clouds may be formed and they can drift or be blown off mine permit areas.

3.4.3.1.1 Regional NO_x Emissions

Annual mean NO_2 concentrations have been periodically measured in the PRB since 1975, as discussed in Section 3.4.3.3. The annual mean NO_2 concentrations recorded by those monitoring efforts have all been well below the 100 $\mu g/m^3$ standard. The highest annual mean concentration recorded to date was 22 $\mu g/m^3$ at two separate sites between March 1996 and April 1997.

NO_2 is a product of incomplete combustion at sources such as gasoline- and diesel-burning engines or from mine blasting activities. Incomplete combustion during blasting may be caused by wet conditions in the overburden, incompetent or fractured geological formations, deformation of bore holes, and blasting agent factors. Generally, blasting-related NO_x emissions are more prevalent at operations that use the blasting technique referred to as cast blasting (Chancellor 2003). Cast blasting refers to a type of direct blasting in which the blast is designed to cast the overburden from on top of the coal into the previously mined area. The Eagle Butte Mine has never conducted cast blasting and does not have plans to begin using that blasting procedure in the future.

In the mid-to late-1990s, OSM received complaints from several citizens about blasting clouds from several mines in the PRB, including the Eagle Butte Mine. EPA expressed concerns that NO_2 levels in some of those blasting clouds may have been sufficiently high at times to cause human health effects. In response to those concerns, several studies have been conducted, the mines have modified their blasting techniques, and the WDEQ has imposed blasting restrictions on several mines. More information about these studies and restrictions is presented in the following discussion.

3.4.3.1.2 Site Specific NO_x Emissions

Sources of NO_x emissions at the Eagle Butte Mine include the tailpipe emissions from the mining equipment and the emissions from the trains used to haul the coal from the mine. NO_x point sources at the mine include stationary engines and natural-gas fired heaters.

Prior to 2001, WDEQ received reports of public exposure to blasting clouds from blasts at the Eagle Butte Mine from residents in the area of the mine, including a report of health problems potentially caused by blasting clouds outside of the Eagle Butte Mine permit area from one person (Emme 2007). Nearby residents brought concerns about blasting practices at the Eagle Butte Mine to the EQC several times, which resulted in the inclusion of conditions regulating blasting operations in the mine's WDEQ/LQD mine permit. Control measures to limit public exposure to NO_2 from blasting are in place and being implemented at the Eagle Butte Mine. These control measures are defined, in part, by conditions in the WDEQ/LQD Mine Permit No. 428-T5 and the provisions of the Wyoming EQC ruling of June 26, 2003. Since these control measures were implemented, WDEQ/LQD has received one report of an orange-tinged blasting cloud at the mine, but no visible NO_x fumes left the mine permit area during that incident (Emme 2007). Specific blasting control measures that are used to control NO_x at the Eagle Butte Mine are discussed in more detail in Section 3.4.3.3.

3.4.3.2 Environmental Consequences Related to NO_x Emissions

There are various compounds and derivatives in the family of nitrogen oxides, including NO_2, nitric acid, nitrous oxide, nitrates, and nitric oxide, which may cause a wide variety of health and environmental impacts. According to EPA, the main causes of concern with respect to NO_x are:

- it is one of the main ingredients involved in the formation of ground level ozone, which can trigger serious respiratory problems;
- it reacts to form nitrate particles, acid aerosols, as well as NO_2, which also cause respiratory problems;
- it contributes to the formation of acid rain;
- it contributes to nutrient overload that deteriorates water quality;
- it contributes to atmospheric particles that cause visibility impairment, most noticeably in national parks;

- it reacts to form toxic chemicals;
- one member of the NO_x family, nitrous oxide or N_2O, is a greenhouse gas that contributes to global warming; and
- it can be transported over long distances (EPA 2007c).

Potential health risks associated with inhalation of ground level ozone and NO_x-related particles include acute respiratory problems, aggravated asthma, decreases in lung capacity in some healthy adults, inflammation of lung tissue, respiratory-related hospital admissions and emergency room visits, and increased susceptibility to respiratory illnesses, including bronchitis and pneumonia (EPA 2007d).

Although there is no NAAQS that regulates short-term NO_2 levels, there is concern about the potential health risk associated with short-term exposure to NO_2 from blasting emissions. NIOSH, OSHA, and EPA have identified the following short-term exposure criteria for NO_2:

- NIOSH's recommended Immediately Dangerous to Life and Health level is 20.0 ppm (37,600 $\mu g/m^3$);

- EPA's Significant Harm Level, a one-hour average, is 2.0 ppm (3,760 $\mu g/m^3$);

- OSHA's Short-Term Exposure Limit, a 15-minute time-weighted average, which was developed for workers, is 5.0 ppm (9,400 $\mu g/m^3$, which must not be exceeded during any part of the workday, as measured instantaneously);

- NIOSH's recommendation for workers is a limit of 1.0 ppm (1,880 $\mu g/m^3$) based on a 15-minute exposure that should not be exceeded at any time during the workday; and

- EPA recommends that concentrations not exceed 0.5 ppm (940 $\mu g/m^3$) for a 10-minute exposure to protect sensitive members of the public (EPA 2003).

A study conducted by Dr. Edward Faeder for the Black Thunder Mine (Figure 1-1) recommended a limit of 5.0 ppm (9,400 $\mu g/m^3$) for a 10-minute exposure.

According to EPA "...the exact concentrations at which NO_2 will cause various health effects cannot be predicted with complete accuracy because the effects are a function of air concentration and time of exposure, and precise measurements have not been made in association with human toxicity. The information that is available from human exposures also suggests that there is some variation in individual response" (EPA 2001a).

The WMA conducted a study beginning in August 1999 and completed in April 2000, with participation from the WDEQ/LQD and WDEQ/AQD, because of the

concern with the health risk that could be potentially associated with short-term exposure to NO_x. The study involved collection of 15-minute average NO_2 concentrations in areas that are near PRB coal mining operations and that would be accessible to the public. It was designed to help evaluate potential exposure of the public to NO_2 emissions resulting from blasting activity at surface coal mines. Six monitor locations were selected "...based on their proximity to mining activity and accessibility to the public. Roads adjacent to mining activity were felt to be areas where the public exposure would most likely occur. Locations were also chosen based on dominant wind direction, and to represent areas having the greatest chance of being impacted by several mining operations..." (WMA 2000).

A brief summary of the findings follows:

- Approximately 95 percent of the valid data points were readings of 0 ppm (0 $\mu g/m^3$) NO_2.

- The maximum 15-minute average valid values observed for each of the six monitors ranged from 0 to 1.65 ppm (0 - 3,102 $\mu g/m^3$) NO_2.

- Where readings greater than 0 ppm did occur, there was a strong correlation between NO_2 readings and temperatures. This correlation indicates that the NO_2 readings may have been inflated due to temperature considerations.

The Black Thunder Mine also conducted a study designed to provide information on safe setback distances for blasting activities at that mine (TBCC 2002). Monitors for that report were located close to blasts in order to collect data for a modeling project; they were located within the mine permit boundary in areas that are not and would not be accessible to the public during mining operations and these areas are also cleared of employees during blasting activities. The measured NO_x levels ranged from non-detectable to 21.4 ppm. The highest value was measured 361 ft from the blast.

There are no state or federal rules that require the public or employees to stay back a certain distance from mine blasting operations in order to limit their exposure to NO_2. An administrative ruling by the Wyoming EQC, which is discussed in Section 3.4.3.3, approved a setback of blasting operations from the southern boundary of the Eagle Butte Mine when prevailing winds are blowing toward the mine's downwind neighbors.

3.4.3.2.1 Proposed Action and Alternative 1

The Eagle Butte West LBA Tract would be mined as an integral part of the Eagle Butte Mine. FCW anticipates that the average annual coal production would be about 25 million tons, with or without the Eagle Butte West LBA Tract. Eagle Butte Mine's currently approved air quality permit from the WDEQ/AQD allows up

to 35 million tons of coal to be mined per year. According to FCW, if the mine acquires the additional coal in the LBA tract, production at the Eagle Butte Mine would continue at an average rate of 25 mmtpy for up to nine additional years under the Proposed Action or the BLM's preferred tract configuration for Alternative 1.

Potential NO_x emissions related to mining operations at the existing Eagle Butte Mine are described below. Because of the similarities in mining rates and mining operations, the potential impacts of mining the Eagle Butte West LBA Tract have been inferred from the projected impacts of mining the existing coal leases as currently permitted.

The WDEQ/AQD has determined that an assessment of annual NO_x impacts must be included as part of an air quality permitting analysis for new surface coal mines and existing mine plans revisions. As discussed in Section 3.4.2.2, WDEQ/AQD issued air quality permit MD-1251 for the Eagle Butte Mine on October 24, 2005, and the mine was required to conduct NO_2 dispersion modeling in their permit. Emission rates were determined for the same worst-case years used in the PM_{10} modeling. The amount of NO_x emissions from blasting is related to the amount of ANFO utilized. NO_x emission rates for 2005 and 2006 are expected to be 872 tpy and 871 tpy, respectively. NO_x modeling closely followed many of the same procedures used in the PM_{10} analysis. Emissions were apportioned in a similar manner and the same meteorological data set was used. Emissions from neighboring mines and other types of regional sources were also determined and considered for 2005 and 2006. Pursuant to WDEQ/AQD requirements, emissions from all stationary engines and natural-gas fired heaters, which are considered to be NO_x point sources at the mine, were considered in the inventory. The regional background NO_x annual concentration used was 20 $\mu g/m^3$. Additional mobile sources were added to describe the railroad locomotives and large mining equipment on the Eagle Butte Mine site. Long-term modeling indicated the currently projected mine activities will be in compliance with the annual NO_x AAQS for the life of the Eagle Butte Mine. For year 2005, the maximum modeled annual NO_x concentration was 33.5 $\mu g/m^3$ and for year 2006, the maximum modeled annual NO_x concentration was 35.3 $\mu g/m^3$ (FCW 2004a). Coal production in both years was assumed to be the maximum permitted production level of 35 million tons. The locations of the maximum-modeled NO_x concentrations for 2005 and 2006 are shown on Figures 3-6 and 3-7, respectively. The potential NO_x impacts from mining the Eagle Butte West LBA Tract have been inferred to be similar to the currently permitted impacts of mining the existing coal leases at the Eagle Butte Mine because of the similarities in mining rates and mining operations.

The average overburden thickness is greater in the LBA tract than within the current leases, but the thickness of the coal is about the same as in the existing mine area (Table 3-2). The Eagle Butte Mine has never used cast blasting techniques to remove overburden. If the Eagle Butte Mine acquires and mines the

Eagle Butte West LBA Tract, there are no plans to change blasting procedures or blast sizes associated with the mining of the LBA tract. However, if the average annual rate of production is maintained, there would potentially be an increase in the frequency of blasting in order to remove the additional volume of overburden overlying the coal.

One cause of incomplete combustion and formation of NO_2 in the blasting clouds is downhole moisture. Roughly 30 years of surface mining and CBNG development has drawn down the water level in the coal in the general analysis area; however, there are discontinuous sand bodies in the overburden which are generally saturated. The presence of these saturated sand bodies may create conditions that are more favorable to the formation of NO_2 when blasting is conducted; however, as discussed in Section 3.4.3.3, surface coal mine operators have developed various techniques to avoid formation of NO_2 in the blasting clouds. These measures include the use of plastic liners within the shot holes, which reduces or eliminates the exposure of the blasting agents to moisture. The Eagle Butte Mine has utilized plastic liners in shot holes in the past and may need to extend that practice to mining operations on the Eagle Butte West LBA Tract in order to avoid public exposure to blasting clouds during mining operations.

Public exposure to emissions caused by surface mining operations is most likely to affect travelers on publicly accessible roads and highways that pass through and near the area of the mining operations and occupants of dwellings near the area of mining operations. As discussed in Section 3.4.2.2.1, there are a number of occupied dwellings, businesses, the Gillette – Campbell County Airport, and a public school (Rawhide Elementary School) in the area of the existing Eagle Butte Mine and the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1), as shown in Figure 3-8. Roads, highways, and school bus stops in the vicinity of the Eagle Butte Mine and the LBA tract are also shown in Figure 3-8. BLM's study area for the Eagle Butte West LBA Tract, which is shown in Figure 3-8 and discussed in Section 2.2, includes the north half of Section 20, T.51N., R.72W, where the school and several occupied dwellings (Echo Subdivision) are located. However, BLM must consider this coal to be unsuitable for mining, based on SMCRA and the associated regulatory requirements (see Section 2.2). BLM's study area also extends south to include a wedge of land lying between the airport runways. BLM's preferred tract configuration, shown in Figure 3-8, does not include either the federal coal underlying the school and occupied dwellings in Section 20 or the federal coal located between the airport runways.

The distance between the federal coal included in the Eagle Butte West LBA Tract (as applied for or under BLM's preferred tract configuration) and the occupied dwellings and the airport would be similar to, but not less than, the distance between the federal coal that has previously been recovered from the existing Eagle Butte Mine leases and the dwellings and airport. The distance between the coal included in the Eagle Butte West LBA Tract (as applied for or under BLM's

preferred tract configuration) would be closer to Rawhide Elementary School than the federal coal included in any of the existing Eagle Butte Mine leases.

As discussed in Section 3.4.3.1.2, WDEQ received reports of public exposure to blasting clouds from blasting operations at the Eagle Butte Mine prior to 2001 from residents in the area of the mine (Emme 2007). Subsequently, control measures to limit both emissions and public exposure to NO_2 from blasting were included in the mining permit for the Eagle Butte Mine. Since these control measures were implemented, WDEQ/LQD has received one report of an orange-tinged blasting cloud at the mine, but no visible NO_x fumes were reported leaving the mine permit area during that incident (Emme 2007).

Specific blasting control measures that are used to control NO_x are discussed in more detail in Section 3.4.3.3. If the Eagle Butte Mine acquires the Eagle Butte West LBA Tract, they will have to amend their current permit to include the new lease before mining activities can proceed into the new lease area. According to WDEQ, permit conditions designed to control or limit public exposure to NO_2 and flyrock from blasting operations would be no less stringent for mining operations on the Eagle Butte West LBA Tract than the permit conditions that are in place for blasting operations on the existing Eagle Butte Mine leases (Emme 2007).

If Eagle Butte Mine acquires the Eagle Butte West LBA Tract, current mining techniques for removing coal and overburden would be expected to continue for a longer period of time than is shown in the currently approved air quality permit. Modeling for the current Eagle Butte Mine permit projected no exceedances of the annual NO_x AAQS at a 35-mmtpy production. Therefore, air quality impacts that would result from mining the Eagle Butte West LBA Tract by the applicant at an estimated average annual coal production rate of 25 mmt should also be within annual AAQS limits.

3.4.3.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and the Eagle Butte Mine would continue to operate as currently permitted. A discussion of the currently permitted mining operations and potential impacts related to NO_x emissions is included in Section 3.4.3.2.1. Impacts related to mining operations at the Eagle Butte Mine would continue on the existing mine area as permitted, but mining operations would not be extended onto those portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.4.3.3 Regulatory Compliance, Mitigation, and Monitoring for NO_x Emissions

Several of the surface coal mines in the PRB have undertaken voluntary blasting restrictions to avoid NO_x impact to the public. Voluntary measures that have been instituted, particularly when large blasts are planned include:

- telephone notification of neighbors (both private parties and other mining operations) in the general area of the mine prior to large blasts;
- monitoring of weather and atmospheric conditions prior to the decision to detonate a large blast;
- minimizing blast size to the extent possible;
- posting of signs on major public roads that enter the general mine area and on all locked gates accessing the active mine area;
- closing public roads that enter the general mine area, depending on wind conditions and blast location with respect to the road; and
- providing post-blast notification to neighbors of potential exposure to the blasting cloud.

After WDEQ received reports of public exposure to NO_2 from blasting operations at some of the PRB mines prior to 2001, measures to prevent future such incidences were instituted at those mines when large overburden blasts are planned. WDEQ has required several mines, including Antelope, North Antelope/Rochelle, Black Thunder, Belle Ayr, Eagle Butte, and Wyodak (Figure 1-1), to stop traffic on public roads during blasting due to concerns with fly rock and the "startle factor". Other measures that have been instituted as mine permit requirements include:

- notification of neighbors and workers in the general area of the mine prior to a blast;
- blast detonation between 12:00 p.m. and 3:00 p.m. whenever possible to avoid temperature inversions and minimize inconvenience to neighbors;
- monitoring of weather and atmospheric conditions prior to the decision to detonate a blast;
- posting of signs on major public roads that enter the general mine area and on all locked gates accessing the active mine area;
- closing public roads when appropriate to protect the public; and

- establishment of safe setback distances for blasting operations from the mine boundary.

Two mines in the Wyoming PRB, Black Thunder and Eagle Butte, currently have blasting restrictions in their mine permits to address NO_x. Measures to control or limit both emissions and public exposure to NO_2 from blasting presently being implemented at the Eagle Butte Mine are defined, in part, by conditions that have been included in the WDEQ/LQD Mine Permit No. 428-T5. These conditions include such procedures as:

- blasting of overburden within certain specified mine areas will not occur when the wind is blowing from the blast site toward Rawhide Village to the north;

- the mine will block traffic on U.S. Highway 14-16 and State Highway 59 for all overburden blasts that occur within 1,100 ft of the highway ROW, and traffic control points are periodically moved as mining locations change;

- a monitoring plan for NO_x will be implemented for blasts that require traffic control as wind conditions warrant, and NO_x monitoring will occur at the traffic control point that is downwind from the blast on Highway 14-16 when traffic is stopped; and

- the mine will use specific blasting methods (low-NO_x techniques) that have been shown to reduce emissions within specified areas of the mine, including a 1,100 ft corridor for public highways.

On June 26, 2003, the Wyoming EQC issued a Final Order that addresses procedures and notification protocols related to providing protections from overburden blasting within the Eagle Butte Mine area. The conditions state that the following procedures will be used when overburden blasting occurs within 2,500 feet of the residences and businesses located south and west of the mine:

- blast size will be limited to 50,000 pounds;

- blasting will be conducted using the low-NO_x blasting techniques that have been shown to reduce emissions within a 1,100 ft corridor for public highways;

- no blasting will be conducted when the prevailing winds are blowing toward the residences or businesses to the south and west of the mine site;

- if wind conditions prevent the Eagle Butte Mine from blasting for more than one consecutive day, then the mine can conduct blasting on the second and subsequent days regardless of wind conditions, if the mine notifies DEQ when blasting must be conducted to avoid “sleeping holes” and if

notifications are made to residences and businesses south and west who request such notification. "Sleeping holes" refers to the practice of loading holes but not setting off the blast until the next day, which can increase emissions of NO_x.

This order also placed limits of the size of the blasting that can be conducted within the Eagle Butte Mine Southwest Extension area (the area that was included in the Eagle Butte LBA Tract, which was leased to the mine in 1995) and restricts blasting in the Southwest Extension area under certain atmospheric conditions.

Mine operators in the eastern PRB have also been working with blasting agent manufacturers to reduce NO_x emissions. Efforts to eliminate NO_x production have included use of different blasting agents, different blends of blasting agents, different additives, different initiation systems and sequencing, borehole liners, and smaller cast blasts. Operators have tried adding substances like microspheres and rice hulls, using different blends of ANFO and slurries and gels, using electronic detonation systems that can vary shot timing, different shot hole patterns, and using plastic liners within the shot holes. No one single procedure or variation has proven consistently successful due to the numerous factors that are believed to contribute to the production of NO_2. The most successful control measure has been reducing the size of the cast blasting shots (Doug Emme 2003, Rick Chancellor 2003). The low-NO_x emission blasting techniques described above coupled with reduced blast size have almost eliminated NO_x production at the Eagle Butte Mine. The Eagle Butte Mine has never used cast blasting techniques and does not propose to use that procedure in the future. The North Antelope Rochelle Mine (Figure 1-1) has had success in eliminating NO_x in over 75 percent of their cast blasting through the use of borehole liners and changing their blasting agent blends (Rick Chancellor 2003).

NO_2 was monitored from 1975 through 1983 in Gillette and from March 1996 through April 1997 at four locations in the PRB. Table 3-6 summarizes the results of that monitoring.

Due to public concerns about emissions of nitrogen dioxides as a result of blasting and a general concern of the WDEQ about levels of nitrogen dioxides due to development of all types in the eastern PRB, the coal mining industry instituted a monitoring network in cooperation with WDEQ/AQD to gather data on NO_2 beginning in 2001. Industry funded and operated the network for approximately three years. The 2001 through 2005 data from this regional network are summarized in Table 3-7.

The WDEQ now funds and operates the NO_2 monitoring network along the east side of the basin. Ownership of the monitoring equipment was transferred to WDEQ by the mines and the mines have given ongoing access to the monitoring sites and provide electrical power for the instrumentation.

Table 3-6. Annual Ambient NO_2 Concentration Data.

Site	Gillette, WY	Black Thunder Mine	Belle Ayr Mine	Bill, WY
Year	Percent of Standard[1]	Percent of Standard[1]	Percent of Standard[1]	Percent of Standard[1]
1975	6*			
1976	4*			1*
1977	4*			5*
1978	11*			
1979	11			
1980	12			
1981	14			
1982	11			
1983[2]	17			
1996[3]	16	16	22	22

[1] Based on arithmetic averaging of data.
[2] Monitoring discontinued December 1983, reactivated March 1996 to April 1997.
[3] Arithmetic average – actual sampling ran from March 1996 to April 1997.
* Inadequate number of samples for a valid annual average.
Source: (McVehil-Monnett 1997)

Table 3-7. 2001 Through 2005 Annual Mean NO_2 Concentration Data.

Site Address	2001 (µg/m³)	2002 (µg/m³)	2003 (µg/m³)	2004 (µg/m³)	2005 (µg/m³)
Thunder Basin National Grassland	6*	5	6	4	4
Campbell County	--	--	13	8	8
Tracy Ranch	--	--	--	8	--
Black Thunder Mine	5**	6	--	--	--
Belle Ayr Mine, Site Ba-4	14	14	13	13	13
Antelope Mine, Site 3	7	6	8	8	9

* Data for May through December 2001. Monitor was not operational until May 2, 2001.
** Data for the third quarter is questionable and therefore is not used in the determination of the annual mean for the site.
Sources: EPA AirData and WDEQ/AQD databases (EPA 2006d, WDEQ/AQD 2006b).

As represented by Table 3-7, NO_2 monitoring data are available from four currently active sites in the PRB. With respect to the Eagle Butte West LBA Tract, the Thunder Basin National Grassland Site is approximately 30 miles north-northeast; the Campbell County Site is approximately 18 miles south-southwest; the Belle Ayr Mine Site is approximately 20 miles south-southeast; and the Antelope Mine Site is approximately 60 miles south. These monitoring stations

are maintained by WDEQ/AQD and respective mines. The WDEQ/AQD is relying on the on-going monitoring data and emission inventories in air quality permit applications to demonstrate compliance with the annual NO_2 ambient air standard (Table 3-3).

3.4.4 Visibility

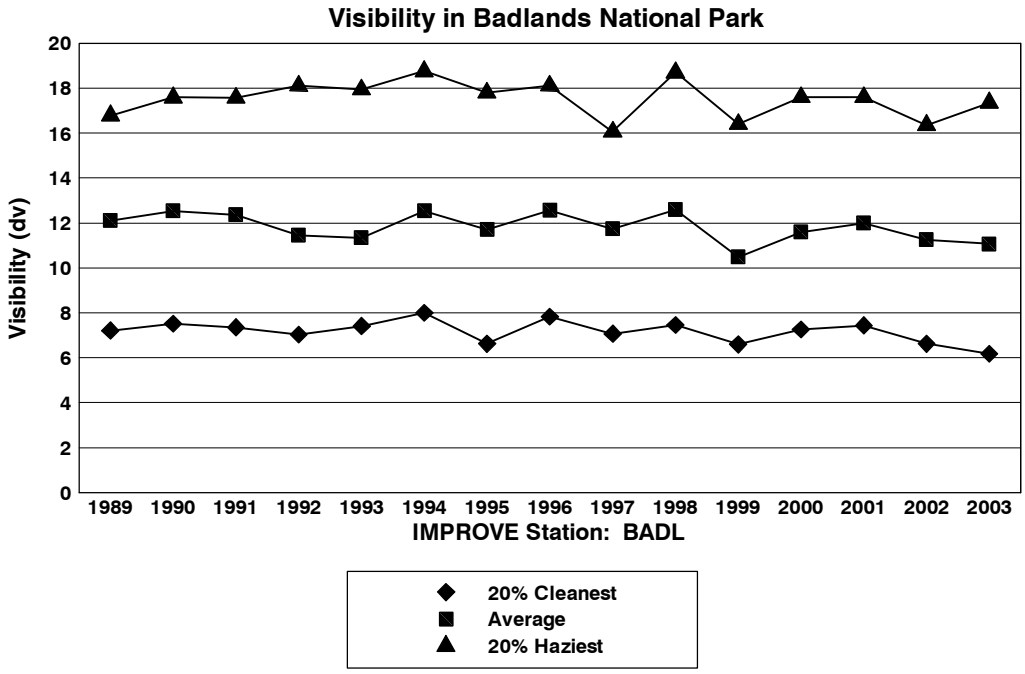
Visibility refers to the clarity with which scenic vistas and landscape features are perceived at great distances. Visibility can be defined as the distance one can see and the ability to perceive color, contrast, and detail. Fine particulate matter ($PM_{2.5}$) is the main cause of visibility impairment. Visual range, one of several ways to express visibility, is the furthest distance a person can see a landscape feature. Without the effects of human-caused air pollution, a natural visual range is estimated to be about 140 miles in the western U.S. and 90 miles in the eastern U.S. (EPA 2001b).

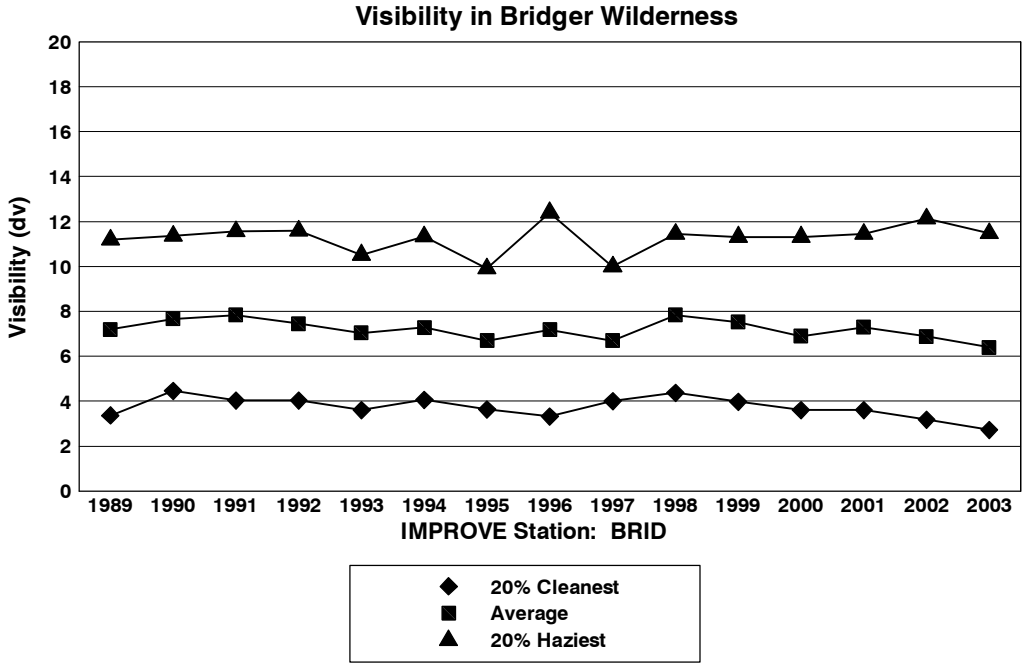
Visibility is also expressed in terms of deciview (dv). The dv index was developed as a linear perceived visual change (Pitchford and Malm 1994), and is the unit of measure used in the EPA's Regional Haze Rule to achieve the National Visibility Goal. The National Visibility Goal was established as part of the Clean Air Act in order to prevent any future, and remedy any existing, impairment of visibility in mandatory Federal Class I areas that result from manmade air pollution. The deciview index is a scale related to visual perception that has a value near zero for a pristine atmosphere. A change in visibility of 1.0 dv represents a "just noticeable change" by an average person under most circumstances. Increasing dv values represent proportionately larger perceived visibility impairment.

3.4.4.1 Affected Environment for Visibility

An AQRV is a resource identified by a federal land manager that may be adversely affected by a change in air quality. Visibility is a potentially affected resource. The potential air pollutant effects on visibility are applied to PSD Class I and Class II areas. The land management agency with jurisdiction for the Class I area sets an LAC or LOC for each AQRV. The AQRVs reflect the land management agency's policy and are not legally enforceable standards. Table 3-4 shows the distances from 31 PSD Class I and Class II areas in the vicinity of the PRB to the Eagle Butte West LBA Tract general analysis area.

The Regional Haze Rule calls for improved visibility on the most-impaired days and no additional impairment on the least-impaired days. EPA participates in the IMPROVE visibility monitoring program as part of its visibility protection program. The IMPROVE monitoring sites were established to be representative of all Class I areas. Figure 3-9 shows annual averages for the 20 percent best, average, and worst visibility days at Badlands and Bridger Wilderness Areas from 1989 through 2003. During that time frame, Badlands National Park has statistically shown improved visibility on the least impaired days and no change in visibility on the





Source: IMPROVE (2005)

Figure 3-9. Visibility in the Badlands and Bridger Wilderness Area.

average and most-impaired days. Bridger Wilderness has shown no statistically significant change in visibility on the least, average, or most impaired days (IMPROVE 2005).

The *Wyoming State Implementation Plan for Class I Visibility Protection* states: "Wyoming's long term strategy will focus on the prevention of any future visibility impairment in Class I areas that can be attributed to a source or small group of sources as the Federal Land Managers have not identified any current impairment in the State's Class I areas due to such sources" (WDEQ/AQD 2005c). WDEQ/AQD prepared the *2003 Review Report on Wyoming's Long Term Strategy for Visibility Protection in Class I Areas*, as required by WAQSR, which calls for AQD to review and revise, if appropriate, the Long Term Strategy every three years. The 2003 Review Report is available on the WDEQ/AQD website at http://deq.state.wy.us/aqd/visibility.asp.

3.4.4.2 Environmental Consequences for Visibility

3.4.4.2.1 Proposed Action and Alternative 1

The impacts to visibility from mining the Eagle Butte West LBA Tract have been inferred from the currently permitted impacts of mining the existing coal leases at the Eagle Butte Mine. The Eagle Butte West LBA Tract would be mined as part of the Eagle Butte Mine. FCW anticipates that the average annual coal production would remain at about 25 million tons, with or without the Eagle Butte West LBA Tract. Eagle Butte Mine's currently approved air quality permit from the WDEQ/AQD allows up to 35 million tons of coal to be mined per year. According to FCW, if the mine acquires the additional coal in the LBA tract, production at the Eagle Butte Mine would continue at an average rate of 25 mmtpy for approximately up to nine additional years under the Proposed Action or the BLM's preferred tract configuration for Alternative 1.

Mining operations using the current Eagle Butte mining techniques for blasting, coal removal, and coal hauling, etc. would be expected to continue for a longer period of time than was considered in the currently approved air quality permit. Material movement would continue to utilize shovels and trucks in overburden and coal. Facilities shown in the current air quality permit would not change as a result of proposed mining of the LBA tract. There are no plans to change blasting procedures or blast sizes associated with the mining of the LBA tract; however, the blasting processes and required mitigation measures would be reviewed when the mining permit is amended to include the new lease area. The blasting plan would be reviewed and modified to incorporate the BACT protection measures that are required at that time.

Surface coal mines are not considered to be major emitting facilities in accordance with Chapter 6, Section 4 of WDEQ/AQD Rules and Regulations. Therefore, the

State of Wyoming does not require mines to evaluate their impacts on Class I areas; however, BLM considers such issues during leasing.

3.4.4.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and the Eagle Butte Mine would continue to operate as currently permitted for about 13.6 more years. Coal removal would not occur on the LBA tract. Impacts to visibility related to mining operations at the existing Eagle Butte Mine would not occur as a result of mining those portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.4.4.3 Regulatory Compliance, Mitigation and Monitoring for Visibility Impacts

As discussed above, fine particulate matter ($PM_{2.5}$) is the main cause of visibility impairment. Mitigation measures being used to limit emissions of particulate matter are discussed in Section 3.4.2.3.

Visibility monitoring within the State of Wyoming consists of both the WDEQ/AQD sponsored Wyoming Visibility Monitoring Network and the IMPROVE program. WDEQ has sited two visibility monitoring stations in the PRB. One of these sites (the Thunder Basin National Grasslands site) is 32 miles north of Gillette and includes a nephelometer, a transmissometer, an IMPROVE aerosol sampler, instruments to measure meteorological parameters (temperature, RH, wind speed, wind direction), a digital camera, instruments to measure ozone and instruments to measure oxides of nitrogen (NO, NO_2, NO_x). The second visibility monitoring station (the Cloud Peak Wilderness Area site) is located 14 miles west of Buffalo and includes a nephelometer, a transmissometer, an IMPROVE aerosol sampler, instruments to measure meteorological parameters, and a digital camera.

These sites are being utilized to characterize the extent, frequency of occurrence, and magnitude of visual air quality impacts. The IMPROVE Steering Committee approved the incorporation of the Thunder Basin and Cloud Peak sites into the IMPROVE network in June 2002. Although these stations are not located in areas classified as Class I areas, the collected data will be comparable to monitoring data available from the state's Class I areas. This information can help scientists determine the types and concentrations of air pollutants and their direction of travel in order to project visibility impacts to Class I areas. The Wyoming Visibility Monitoring Network was recently supplemented with the development of a website (http://www.wyvisnet.com/all.html) to allow public access to real-time monitored visibility and air quality conditions (WDEQ/AQD 2005d).

3.4.5 Acidification of Lakes

Atmospheric deposition of pollutants (acid rain) causes acidification of lakes and streams. According to EPA, sulfur dioxide and NO_x, primarily derived from the burning of fossil fuels, are the primary causes of acid rain. Most lakes and streams have a pH between 6 and 8. Some lakes are more easily affected by, and therefore more sensitive to, acid rain than others. The response of lakes to acid rain is described in terms of changes to acid-neutralizing capacity, or ANC. The lake is the sensitive resource and ANC is the indicator. ANC is a measure of buffering capacity, measured in microequivalents per liter (μeq/L), which indicates the lake's capacity to resist acidification from acid rain. Lakes and streams become more acidic (i.e., the pH value of the water in the lake goes down) when the water itself and its surrounding soil cannot buffer the acid rain enough to neutralize it. The more sensitive lakes are generally located in watersheds whose soils have a limited ability to neutralize acidic compounds (a lower buffering capacity). In areas where buffering capacity is low, acid rain also releases aluminum from soils into lakes and streams; aluminum is highly toxic to many species of aquatic organisms.

Several regions in the U.S. were identified in a national surface water survey as containing many of the surface waters sensitive to acidification. They include the Adirondacks and Catskill Mountains in New York State, the mid-Appalachian highlands along the east coast, the upper Midwest, and mountainous areas of the western U.S.

Scientists predict that the decrease in SO_2 emissions required by the Acid Rain Program will significantly reduce acidification due to atmospheric sulfur. Without the reductions in SO_2 emissions, the proportions of acidic aquatic ecosystems would remain high or dramatically worsen (EPA 2005c). The USDA-FS has been monitoring air quality in the Wind River Mountain Range in Wyoming since 1984 and is seeing a general trend of decreasing sulfates. Nitrates, on the other hand, have been increasing globally.

3.4.5.1 Affected Environment

AQRVs, including the potential air pollutant effects on the acidification of lakes and streams, are applied to PSD Class I and Class II areas. The land management agency with jurisdiction for the Class I area sets an LAC or LOC for each AQRV. The AQRVs reflect the land management agency's policy and are not legally enforceable standards.

Table 3-8 shows the existing ANC monitored in some mountain lakes and their distance from the Eagle Butte West LBA Tract general analysis area.

Table 3-8. Existing Acid Neutralizing Capacity in Sensitive Lakes.

Wilderness Area	Lake	Background ANC (μeq/L)	Distance from General Analysis Area (miles)
Bridger	Black Joe	69.0	250
	Deep	61.0	240
	Hobbs	68.0	255
	Upper Frozen	5.8[1]	260
Cloud Peak	Emerald	55.3	110
	Florence	32.7	100
Fitzpatrick	Ross	61.4	250
Popo Agie	Lower Saddlebag	55.5	240

[1] The background ANC is based on only six samples taken between 1997 and 2001.
Source: Argonne (2002)

3.4.5.2 Environmental Consequences

3.4.5.2.1 Proposed Action and Alternative 1

The Eagle Butte West LBA Tract would be mined as part of the Eagle Butte Mine; therefore, the impacts to air quality from mining the Eagle Butte West LBA Tract have been inferred from the impacts at the currently permitted mining operation. FCW anticipates that average annual coal production would remain at about 25 mmt, with or without acquisition of the Eagle Butte West LBA Tract. Impacts to air quality that would result in lake acidification related to mining the tract as applied for or BLM's preferred tract configuration under Alternative 1 would be similar to the impacts under the No Action Alternative, but they would be extended by up to nine additional years. This would mean that mining operations using current Eagle Butte mining techniques for blasting, coal removal, and coal hauling, etc. would be continue for a longer period of time than was considered in the currently approved air quality permit.

3.4.5.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and the Eagle Butte Mine would continue to operate as currently permitted for about 13.6 more years. Coal removal would not occur on the LBA tract. Lake acidification impacts related to mining operations at the existing Eagle Butte Mine would not be extended onto those portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.4.5.3 Regulatory Compliance, Mitigation, and Monitoring

Mitigation and monitoring for coal mine emissions, including the emissions that contribute to the acidification of lakes, are discussed in Sections 3.4.2.3, 3.4.2.4., 3.4.3.3, and 3.4.3.4. Other air quality monitoring programs that are in place in the PRB include WARMS monitoring of sulfur and nitrogen concentrations near Buffalo, Sheridan, and Newcastle, and NADP monitoring of precipitation chemistry in Newcastle.

3.4.6 Residual Impacts to Air Quality

No residual impacts to air quality would occur following mining and reclamation.

3.5 Water Resources

3.5.1 Groundwater

3.5.1.1 Affected Environment

The Eagle Butte West LBA Tract overlies three geologic water-bearing strata that have been directly affected by existing mining activities and would be directly affected by mining the LBA tract. In descending order, these units are the recent alluvium, the Wasatch Formation overburden, and the mineable coal seams in the Tongue River Member of the Fort Union Formation, which are referred to as the Roland and Smith by the Eagle Butte Mine. The underlying, subcoal Fort Union Formation and the Fox Hills Sandstone are utilized for municipal, industrial, and domestic water supply by the city of Gillette, residential subdivisions, Eagle Butte Mine, and other nearby coal mines, but these units are not physically disturbed by mining activities. Both regional and site-specific baseline hydrogeologic environments within and around the Eagle Butte Mine are extensively characterized in the WDEQ/LQD mining and reclamation permit (FCW 2005a), which also provides groundwater monitoring data. Figure 3-2 presents the hydrostratigraphic units underlying the general analysis area.

3.5.1.1.1 Recent Alluvium

Within the Eagle Butte West LBA Tract, alluvial (unconsolidated, stream-laid) deposits primarily occupy the Little Rawhide Creek valley and the lower-most portion of a tributary, Prong Draw, where it joins the main stem of Little Rawhide Creek. The Little Rawhide Creek alluvium overlies the Wasatch Formation bedrock and the lithologies are very similar at the contact. The thickness of alluvial deposits varies from less than one ft to 22 ft, and is typically around 15 ft. The lithologic composition of Little Rawhide Creek alluvium varies with respect to the lithology of the underlying Wasatch Formation bedrock. The lithology of the alluvium is such that it appears to be Wasatch Formation that has been reworked by fluvial processes. Certain finite reaches of Little Rawhide Creek alluvial

deposits are nearly impermeable and do not readily transmit groundwater due to their clayey nature. These reaches generally overlie bedrock strata comprised of shales, claystones, and siltstones. Conversely, certain finite reaches of the alluvial deposits readily transmit groundwater due to their sandy nature and these deposits generally overlie bedrock strata comprised of sands and sandstones (FCW 2005a).

Data from Eagle Butte Mine's Little Rawhide Creek alluvial monitor wells indicate that alluvial groundwater flow is down-valley. Recharge to the alluvium comes primarily from the underlying bedrock aquifer and precipitation and streamflow infiltration, depending upon the season and the extent of alluvial saturation. Groundwater elevations fluctuate seasonally, increasing in the spring in response to snowmelt and precipitation runoff, and then decreasing throughout the remainder of the year (FCW 2005a).

Aquifer pump testing within the current Eagle Butte Mine permit area downstream/downgradient of the Eagle Butte West LBA Tract indicates that the Little Rawhide Creek alluvium has a very low hydraulic conductivity and, therefore, cannot be described as an aquifer in that area. Aquifer tests conducted within and upgradient of the LBA tract indicate that the Little Rawhide Creek alluvium has a low hydraulic conductivity, ranging from 0.4 ft/day to 7.2 ft/day, with a mean value of 4.4 ft/day, which is representative of fine sands and silt and clay (FCW 2005a).

Very little alluvium is present along Prong Draw, with the majority of the valley fill consisting of buried, ancestral playa deposits that are overlain by a thin deposit of fine-grained eolian materials. The playa deposits, which are buried beneath a blanket of eolian materials, contain significant amounts of displacive gypsum, indicative of an evaporative depositional environment. Groundwater was found to occur within these deposits at a depth between seven and 18 ft below ground level. Aquifer tests were conducted to determine the hydraulic conductivity of these deposits and found to be very low, ranging from 0.02 ft/day to 0.18 ft/day. Given the dominance of clay, the very low permeability, and the limited areal extent of the unconsolidated valley fill deposits associated with Prong Draw; these deposits are not considered to be an aquifer.

Little Rawhide Creek alluvial groundwater quality varies greatly. TDS concentrations range from around 2,000 mg/L to 20,000 mg\L. The alluvial water type is generally a magnesium/sodium-sulfate or a magnesium/calcium-sulfate. The sodium adsorption ratio (SAR) values range from 0.94 to 5.48, and have a mean value of 3.29. In general, the groundwater in the saturated Little Rawhide Creek alluvium is poor quality and unsuitable for domestic consumption or irrigation, and it is considered marginal to unsuitable for livestock use. These poor water quality characteristics are indicative of limited groundwater circulation due to the low permeability of the fine-grained alluvial deposits (FCW 2005a).

The shallow groundwater that occurs beneath Prong Draw is also of poor quality. In the upper reaches of the drainage, the TDS concentration is over 3,000 mg/L and is a calcium-sulfate type water, which seems to reflect the gypsum-rich valley fill materials. In the lower reaches of the drainage, the groundwater quality has characteristics of CBNG-produced, sodium-bicarbonate type water.

The low hydraulic conductivities, limited areal extent of saturation, and poor water quality indicate that the alluvium does not exhibit aquifer characteristics adequate for agricultural or domestic use. There is currently no known use of alluvial groundwater in or near the Eagle Butte West LBA Tract. Within the Eagle Butte West LBA Tract, Little Rawhide Creek and its alluvial aquifer have not been disturbed or impacted by surface coal mining activities at the adjacent Eagle Butte Mine to date.

3.5.1.1.2 Wasatch Formation

Within the PRB, the Wasatch Formation (the strata lying above the mineable coal seams, also called the overburden) generally consists of interbedded sands, silts, and clays with occasional discontinuous deposits of coal and carbonaceous material. This description basically holds true for the area within and around the Eagle Butte West LBA Tract. The Wasatch strata range in cohesion from unconsolidated (i.e., loose sands and silts) to lithified (sandstones, siltstones, shales, and coal stringers). Any of the deposits may be water bearing, although the sands and sandstones possess a greater potential for groundwater yield. These sands and sandstones are generally discontinuous and separated laterally and vertically by the finer-grained siltstone and shale deposits. The discontinuous nature of the deposits produces considerable variability in groundwater elevations both laterally and vertically. The hydraulic connection between sandstone lenses is tenuous due to intervening shale aquitards; thus, groundwater movement through the Wasatch Formation overburden is limited. Because the water-bearing units within the Wasatch Formation are not continuous, the Wasatch is not considered to be a regional aquifer. However, Wasatch sandstones do provide limited amounts of groundwater for livestock and domestic uses on a local scale, provided the water quality is suitable.

Another geologic unit that may be considered a part of the Wasatch Formation is scoria, also called clinker or burn. It consists of sediments that were baked, fused, and melted in place when the underlying coal burned spontaneously. These burned sediments collapsed into the void left by the burned coal. Scoria can be a very permeable aquifer and can extend laterally for miles in the eastern PRB. The occurrence of scoria is site specific, typically occurring in areas where coal seams crop out at the surface. The hydrologic function of scoria is to provide infiltration of precipitation and recharge to laterally contiguous overburden and coal beds. Scoria outcrop areas occur within the northern portion of the Eagle Butte Mine's current permit area. Scoria does not occur on the LBA tract as applied for or on the BLM's preferred tract configuration under Alternative 1.

Small, localized deposits do occur in the extreme northwest corner of the additional area evaluated by BLM under Alternative 1, in Sections 18 and 19, T.51N., R.72W.

Recharge to the Wasatch Formation in the PRB is predominately from the infiltration of precipitation and lateral movement of water from adjacent scoria bodies. Regionally, groundwater is discharged from the Wasatch Formation by evaporation and transpiration, pumping wells, vertical leakage into the underlying coal seams, drainage into mine excavations, and seepage into the overlying alluvium along stream courses. Overburden in the vicinity of the Eagle Butte West LBA Tract is recharged naturally by precipitation infiltration into exposed sand and sandstone bedrock outcrop areas and infiltration of surface water runoff beneath drainages. Additional, artificial recharge occurs where reservoirs have been constructed for ranching operations and for storage of CBNG discharge water. Locally, groundwater flow in the Wasatch Formation is generally from the west and south toward the north where the water discharges into the Little Rawhide Creek alluvial groundwater system (FCW 2005a). Overburden sand bodies within the Wasatch Formation were the most influential groundwater aquifers in the Eagle Butte Mine area prior to mining in that they provided the most regionally extensive recharge areas for the underlying coal seams and discharged water to Little Rawhide Creek (FCW 2005a).

For the Wasatch Formation as a whole in the PRB, the discontinuous nature of the water bearing units results in low overall hydraulic conductivity and low groundwater flow rates. Martin et al. (1988) reported that hydraulic conductivities within the Wasatch range from 10^{-4} ft/day to 10^{2} ft/day, and the mean value, based on 203 tests, was 0.2 ft/day. The mean hydraulic conductivity from 70 aquifer tests using wells completed in sandstone in the Wasatch overburden was 0.35 ft/day, while that from 63 aquifer tests using wells completed in siltstone and claystone in the Wasatch was 0.007 ft/day (Rehm et al. 1980).

The Wasatch Formation overburden sand bodies appear to be relatively extensive within the general analysis area. Thick sand layers were encountered in the Wasatch Formation overburden during exploration drilling conducted in 2002 and 2004 by the Eagle Butte Mine in the general analysis area (refer to Section 3.3). These discontinuous sand bodies are generally saturated. Five overburden monitoring wells (numbers 345398OW, 344403OW, 350395OW, 357398OW, and 357402OW) were completed in the saturated overburden sands at that time, the locations of which are shown in Figure 3-10. A geologic cross section that illustrates the areal extent and continuity of the overburden sand layers in the general analysis area is depicted in Figure 3-11. During drilling, the open-hole, airlift water production from these five monitoring wells ranged from 25 gpm to 225 gpm (as illustrated in Figure 3-11). The overburden sand bodies are in contact with the overlying Little Rawhide Creek alluvial deposits, although it does not appear that the saturated overburden sand bodies are in hydraulic communication with the mineable coal zones (referred to as the Roland and Smith

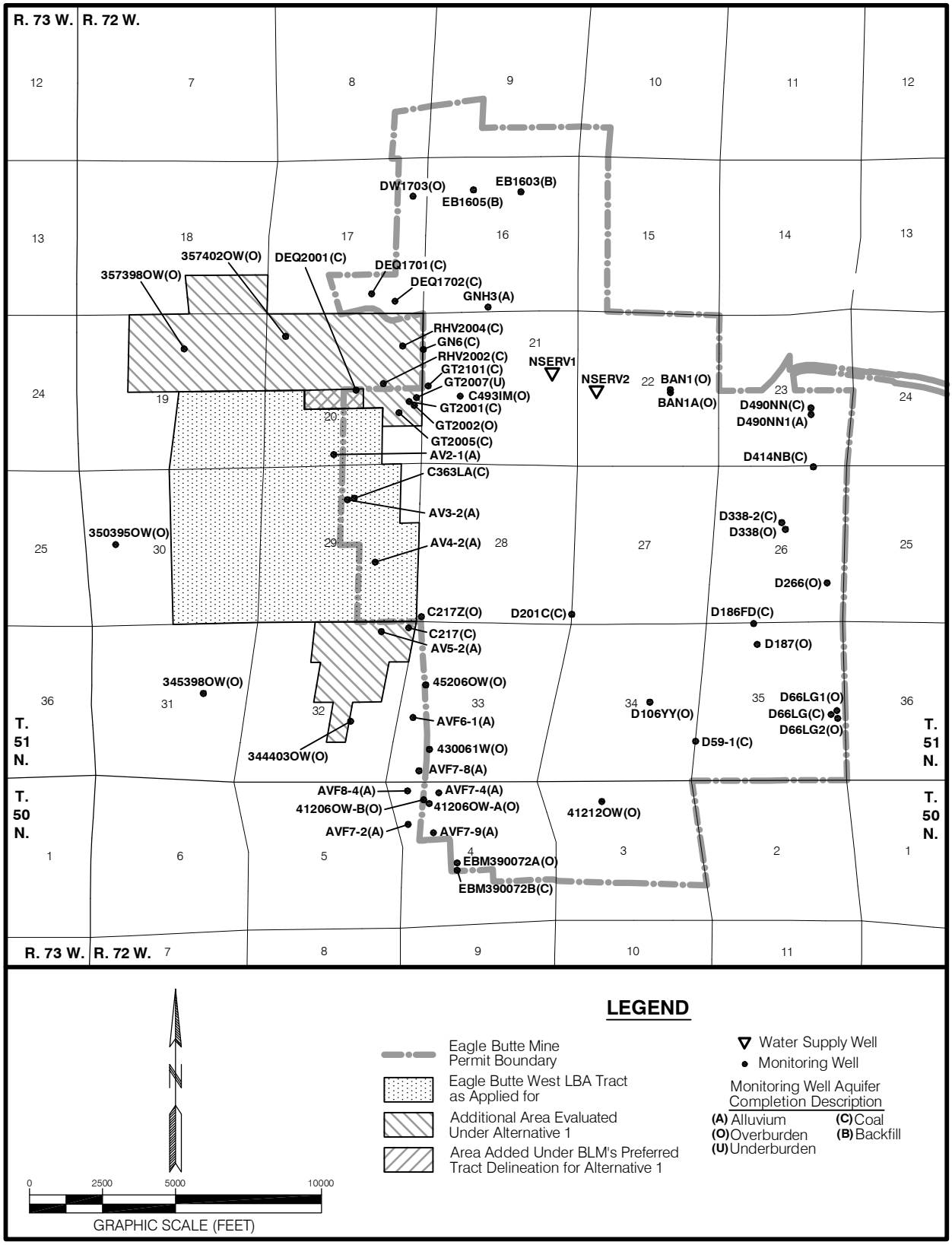


Figure 3-10. Locations of Currently Active Groundwater Monitoring and Water Supply Wells at the Eagle Butte Mine.

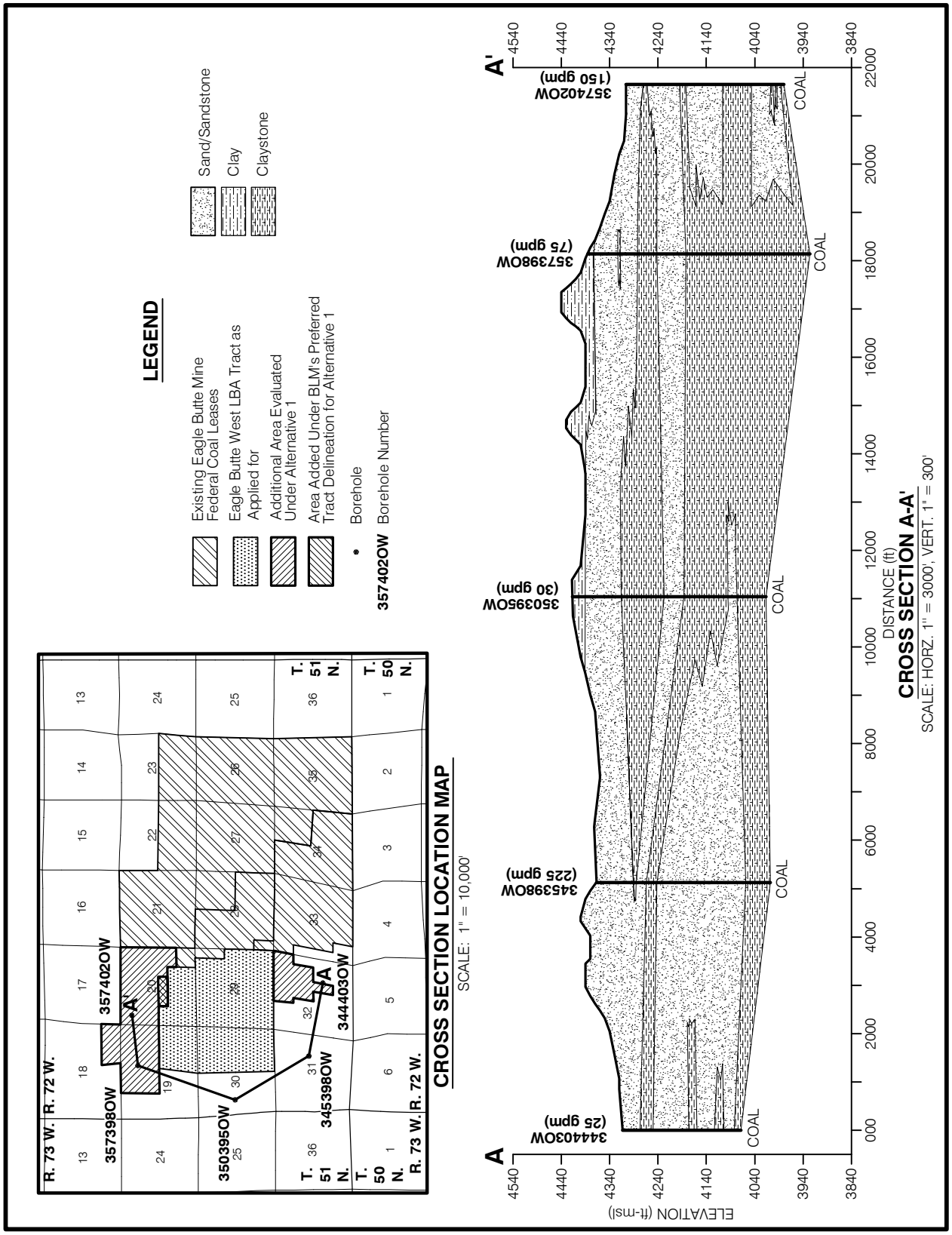


Figure 3-11. Geologic Cross Section of the Wasatch Formation Overburden in the Area of the Eagle Butte West LBA Tract.

coal beds by FCW), but rather, are perched above a shale/claystone layer that overlies the coal, effectively separating the two aquifers in the general analysis area.

Aquifer pumping tests were conducted in 1980, 1986, and 1998 to help determine the aquifer characteristics of the overburden sands in the Eagle Butte Mine area. The test results indicate that the hydraulic characteristics of the Wasatch sands are highly variable. Hydraulic conductivity values range from approximately 0.02 ft/day to 3.3 ft/day and storage coefficients indicate the sands are predominately unconfined aquifers (FCW 2005a). In 2005, aquifer pumping tests were conducted on the five overburden monitoring wells that were recently installed in the general analysis area (Figure 3-10). Like the lithology of the overburden in the LBA tract, the hydraulic characteristics of the saturated sands are areally inconsistent. The hydraulic conductivity values ranged from approximately 0.1 ft/day to 100 ft/day.

The overburden aquifer's saturated thickness is also highly variable, ranging from just a few feet in Eagle Butte Mine's current permit area to over 200 ft in the western portion of the Eagle Butte West LBA Tract. Due to the discontinuous nature of the deposits, premine overburden groundwater flow in the vicinity of the Eagle Butte Mine generally followed the topography, which was basically to the north. Groundwater discharge would then occur wherever saturated overburden sands were in hydraulic communication with the overlying Little Rawhide Creek alluvial deposits. Groundwater movement in the overburden has since been affected locally by the mining operations in the area. Current monitoring well data indicate that overburden groundwater in the Eagle Butte Mine area still flows from south to north and discharges into the mine's open pits and the Little Rawhide Creek alluvial system (FCW 2005b and Hydro-Engineering 2006). Groundwater levels measured in 2005 in the five recently installed overburden monitoring wells located immediately north, west, and south of the proposed lease area (Figures 3-10 and 3-11) varied from about 25 ft to 120 ft below land surface.

The quality of groundwater in the Wasatch Formation aquifer in the Eagle Butte Mine area is somewhat variable (FCW 2005a). Baseline groundwater samples were collected in 2004 and 2005 from the five recently installed overburden monitoring wells. The water quality at all five sites is characterized as a calcium-sulfate type and the average TDS concentrations range from 1,390 mg/L (at well 357398OW) to 4,121 mg/L (at well 344404OW). The median TDS for the Wasatch Formation for the group of mines north of Gillette, as calculated by WDEQ/LQD based on 752 samples, is 2,326 mg/L (Ogle et al. 2006). Groundwater from all five overburden monitoring wells in the general analysis area meets only WDEQ/Water Quality Division's (WQD's) Class III use suitability classification (suitable for livestock and wildlife use) due to excessive concentrations of TDS, sulfate, and/or iron. The groundwater quality observed in the overburden sand aquifer in the Eagle Butte West LBA Tract area is typical of that observed in the overburden throughout the existing Eagle Butte Mine area.

3.5.1.1.3 Roland-Smith/Wyodak-Anderson Coal

The Tongue River Member of the Fort Union Formation contains the mineable coal zones; the coal beds are often separated by partings into two or more units. As discussed in Section 3.3.1.1, the mineable coal zones are variously referred to as the Anderson and Canyon, Wyodak-Anderson, and Wyodak coal beds in the eastern PRB. At the Eagle Butte Mine they are referred to as the Roland and Smith coal beds or coal seams. In the Eagle Butte Mine area, the Roland Coal seam ranges from zero to 70 ft thick, with an average thickness of 40 ft. The Smith Coal seam in places reaches thicknesses of over 100 ft, with an average thickness of 70 ft.

The Roland and Smith seams are generally present within the Eagle Butte West LBA Tract; however, the Roland seam is not present in all areas. The total coal thickness ranges from 33.4 ft to 133.1 ft, with overburden thickness ranging from 182.9 to 459.2 ft. in the proposed lease area. The parting (dark brown to black carbonaceous clay and clayey coal) between the Roland and Smith seams ranges from one ft to 13 ft thick, where both seams are present. In general, exploration drill holes in the Eagle Butte West LBA Tract as applied for and in the BLM's preferred tract configuration under Alternative 1 had a total of more than 100 ft of coal present. A general description of the coal seam aquifer is presented as follows.

The Fort Union coal seams are considered regional aquifers because they are water bearing and laterally continuous throughout large areas. Historically, the Fort Union coal seams have been a source of groundwater for domestic and livestock uses in the eastern PRB. However, due to the one to three degree west-northwest dip of the coal beds, the coal generally becomes too deep to be an economical source of water within a couple of miles west of the PRB surface coal mines, including Eagle Butte Mine.

Hydraulic conductivity within the coal seams is highly variable and reflective of the amount of fracturing the coal has undergone, as unfractured coal is virtually impermeable. Field tests indicate that the coal has a low to moderate transmissivity with a range of roughly three orders of magnitude, with localized zones of moderately high transmissivity due to increased fracturing. The yield of groundwater to wells and mine pits is smallest where the permeability of the coal is derived primarily from localized unloading fractures. The highest permeability is imparted to the coal by tectonic fractures. Due to their pronounced surface expression, these tectonic fractures are often referred to as "lineaments". Coal permeability along lineaments can be increased by orders of magnitude over that in the coal fractured by unloading only. Hydraulic conductivity values, using a mean saturated thickness of 100 ft, range from 0.1 to 9.0 ft/day in the Eagle Butte Mine area (FCW 2005a).

Under premining conditions, water in the coal was confined in places within the Eagle Butte Mine permit area and unconfined in others, depending upon whether or not an aquiclude (a claystone/shale stratigraphic layer) was present to separate the coal from the overlying Wasatch Formation sand lenses.

Recharge to the coal occurs principally by infiltration in the clinker outcrop areas along the eastern flank of the Powder River structural basin. Secondary vertical recharge from the overburden also occurs. Prior to mining in the Eagle Butte Mine area, groundwater in the areally continuous coal seams flowed down dip to the northwest, with local variations caused by hydrologically significant lithologic features, including a "no-coal zone" and a paleo-erosional cut-out within the overlying Wasatch Formation. The no-coal zone, which is in the northern portion of the existing Eagle Butte Mine permit area (in Sections 16 and 21, T.51N., R.72W.), is an area where the coal has been replaced with a dominantly claystone/shale material of very low permeability that acts as a groundwater dam. Groundwater in the coal seams flowed around and over the feature, thus causing groundwater to discharge upward into the Little Rawhide Creek alluvial aquifer system. The Wasatch cut-out feature is basically where a sand paleo-channel was deposited directly over the coal, permitting direct hydraulic communication between the coal and overburden aquifers and the Little Rawhide Creek alluvium. These local variations play a significant part in the groundwater and surface water regimes for Little Rawhide Creek in the Eagle Butte Mine area. Except for the limited areas where the coal's premining potentiometric surface indicated recharge upward to Little Rawhide Creek, the movement of groundwater in the Fort Union Formation coal zone and the Wasatch Formation overburden was primarily down dip (FCW 2005a).

Site-specific water-level data collected from monitoring wells by Eagle Butte Mine and other Gillette area coal mining companies and presented in the GAGMO 20-year report (Hydro-Engineering 2001) indicate that the groundwater flow directions in the mineable coal zones (Roland-Smith/Wyodak-Anderson) have been greatly influenced by surface mine dewatering and groundwater discharge associated with CBNG development. Groundwater level declines observed near active mining areas prior to 1994 were likely due to mine dewatering alone and the direction of groundwater flow as toward the mine excavations. By year 2000, groundwater level decline rates had dramatically increased because drawdown caused by widespread CBNG development west of the mines was overlapping with drawdowns caused by mining operations. The extent of drawdown in the coal west of the mines that is attributable to mine dewatering can no longer be defined due to much greater drawdown in the coal caused by CBNG development (Hydro-Engineering 2001). The coal seam water level contours presented in the GAGMO 2005 Annual Report (Hydro-Engineering 2006) depict the groundwater flow direction in the Eagle Butte Mine area to be entirely west-northwest, away from the open pits. Roughly 30 years of surface mining and CBNG development has resulted in complete dewatering of the coal seams in localized areas, particularly near the mines' open pits and where the coal seams are structurally highest.

Groundwater samples collected from monitoring wells within and around the existing Eagle Butte Mine permit area (Figure 3-10) indicate that the TDS concentrations in the coal seam water is generally lower than the TDS concentrations in the alluvial or overburden groundwater. The composition of groundwater in the coal is fairly uniform and there are no seasonal or long-term trends. The predominant cation is sodium, while the predominant anion is bicarbonate. Those wells located closer to the coal-scoria contact have much higher sulfate concentrations. In the general analysis area, TDS concentrations range 874 mg/L to 3,316 mg/L, and average approximately 1,700 mg/L. This compares to a median TDS of 1,412 mg/L calculated by WDEQ/LQD for the group of mines north of Gillette, based on 1,598 samples collected from the coal aquifer (Ogle et al. 2006). The average and mean values are calculated differently and are not directly comparable, with the average value more likely to be influenced by a few high values. Coal groundwater is typically only suitable for livestock and wildlife watering purposes because certain constituent concentrations commonly exceed many suitability criteria for domestic uses, and the water may have a high salinity and sodium hazard, which makes it unsuitable for agricultural uses.

3.5.1.1.4 Subcoal Fort Union Formation

As discussed in Section 3.3.1.1, the Fort Union Formation is divided into three members: the Tongue River Member, the Lebo Member, and the Tullock Member. The mineable coal seams occur within the Tongue River Member. The subcoal Fort Union Formation consists primarily of lithified sands and shales, and is divided into three hydrogeologic units: the upper Tongue River aquifer, the Lebo confining layer, and the Tullock aquifer (Law 1976). Of the three units, the Tullock is the most prolific in terms of groundwater yield.

Mining does not directly disturb the hydrogeologic units below the mineable coal, but many PRB mines use them for industrial water supply wells. In a few cases, there have been drawdowns in the subcoal aquifer due to leakage into mine pits, dewatering, and CBNG development (BLM 2001a).

Transmissivities are generally higher in the deeper Tullock aquifer than in the shallower Tongue River aquifer. The average transmissivity for the Tullock, as reported by OSM (1984), is 290 ft^2/day. Many mines in the PRB have water-supply wells completed in this interval (Martin et al. 1988), which is also utilized for municipal, industrial, and domestic water supply by the City of Gillette and residential subdivisions.

Data from drilling water supply wells at Eagle Butte Mine indicate that the subcoal Fort Union Formation is rather impermeable above a depth of about 670 ft below ground level. The Eagle Butte Mine uses two wells completed in the Tullock aquifer (NSERV1 and NSERV2) at depths of 900 to 1,000 ft for its water supply (Figure 3-10).

The water quality of the subcoal Fort Union Formation is generally suitable for domestic use and may be suitable for irrigation, depending upon TDS concentrations and site-specific SAR values. TDS concentrations measured in various subcoal Fort Union Formation water supply wells in the eastern PRB range from 230 mg/L to 520 mg/L. Well NSERV1 is sampled periodically and the water quality meets WDEQ/AQD Class I standards (WDEQ 2005); it is a sodium bicarbonate type with TDS concentrations of approximately 280 mg/L and a pH of 8.0 (FCW 2004b and 2005b).

3.5.1.2 Environmental Consequences

3.5.1.2.1 Proposed Action and Alternative 1

Surface coal mining impacts the quantity of the groundwater resource in two ways: 1) the coal aquifer and any aquifers present in the overburden are removed from the mined areas during and replaced with unconsolidated backfill after the coal is removed, and 2) water levels in the coal and overburden aquifers adjacent to the mine pits are depressed as a result of seepage into and dewatering from the open excavations in the area of coal and overburden removal.

If the Eagle Butte West LBA Tract is leased under the Proposed Action or the BLM's preferred tract configuration for Alternative 1, the area of coal removal and reclamation would increase, which would result in an increase in the area of mining-related impacts to groundwater quantity. Currently approved mining will remove the Wasatch Formation overburden, Fort Union Formation interburden (where present), and coal on the existing leases at the Eagle Butte Mine and replace these stratified units with backfill material composed of an unlayered mixture of the shale, siltstone, and sand that makes up the existing Wasatch Formation overburden and Fort Union Formation interburden (where present). The existing leases currently include approximately 5,524 acres. Mining the LBA tract as a maintenance lease would extend the area of overburden and coal removal by about 2,395 acres under the Proposed Action up to about 2,415 acres under BLM's preferred tract configuration for Alternative 1.

If the Eagle Butte West LBA Tract is leased and mined, the coal and overburden aquifers within the tract would be completely dewatered and removed and the area of drawdown caused by coal and overburden removal would be extended further to the west of the active mine area. In general, the extent that drawdowns would propagate away from the mine pits would be a function of the water-bearing properties of the aquifer materials. In materials with high transmissivity and low storativity, drawdowns would extend further from the pit face than in materials with lower transmissivity and higher storage capacity. While there would be variations in hydrologic properties, the time the pits are open, the distance from mining and the dewatering that has already occurred as a result of previous mining and CBNG development, the area subject to lower water levels would increase roughly in proportion to the increase in area affected by mining.

In general, due to the variable lithologic makeup of the Wasatch Formation overburden (discontinuous sandstone and sand lenses in a matrix of siltstone and shale), drawdowns in the overburden are variable and do not extend great distances from the active mine pits. Overburden water levels are currently being monitored by Eagle Butte Mine at 18 monitoring wells (Figure 3-10). Historical data do not indicate that mine dewatering has necessarily caused water levels in the overburden to be depressed in direct proportion to distance and direction from the active pits or to the time since mine dewatering began. The maximum drawdown observed is approximately 60 ft at a single well located about 500 ft from an active pit. Drawdown measured at all of the other active overburden monitoring wells ranges from about 32 ft to two ft, and none of these wells are located more than 4,000 ft from an open pit (Hydro-Engineering 2006, FCW 2005b).

In 1998, Eagle Butte Mine used the numerical groundwater flow model MODFLOW to predict the extent of the life-of-mine drawdowns in the local overburden aquifer system attributable to mining the existing leases (WWC 1998). The results of the groundwater modeling are reported in Appendix 4.6-3, Section 4.6 of the Eagle Butte Mine Permit 428-T5 (FCW 2005a). Based on the 1998 modeling, the predicted five ft drawdown contour in the overburden aquifer over the life of the Eagle Butte Mine extends approximately two miles south and two miles west of the current mine permit boundary. The five ft drawdown contour in the Wasatch overburden sand aquifer over the life of the Eagle Butte Mine if the Eagle Butte West LBA Tract is leased and mined is therefore predicted to extend a radius of approximately two miles beyond the areas of overburden removal. This extrapolation serves as a general approximation of the potential impacts, based on previous experience, but it does not take into account variations in hydrologic properties, the time the pits are open, and the dewatering that has occurred as a result of previous mining. More precise predictions of the extent of drawdowns would be required in order to amend the Eagle Butte West LBA Tract into the WDEQ/LQD permit area, if the Eagle Butte Mine acquires the Eagle Butte West LBA Tract.

Water level drawdowns propagate farther and in a more consistent manner in the coal seam aquifers than in the overburden due to the regional continuity and higher transmissivity of the coal seams. Drawdowns in the coal aquifers are primarily a function of distance from the pit, although geologic and hydrologic barriers and boundaries such as crop lines, fracture zones, and recharge sources can also influence drawdowns. Drawdowns within the coal from 1980 to 1990 in the Eagle Butte Mine area were fairly rapid and inversely proportional to the distances between the monitoring wells and the active pit. By 1995, the rate of drawdown had declined and drawdown was probably being caused by both mine pit dewatering and CBNG production. The extent of coal-mining related drawdown in the coal (the five ft drawdown contour) in 1995 was approximately two miles west and from one to 2.5 miles south of Eagle Butte Mine's active pit. At that time, a maximum of approximately 160 ft of drawdown had occurred

adjacent to the mine's active pit (Hydro-Engineering 1996). Since 1995, BLM and state monitoring wells located at varying distances west of the mines' groundwater monitoring networks have recorded an increased rate of drawdown in the coal as a result of CBNG production. By year 2000, the five ft drawdown contour extended approximately four to five miles south of the Eagle Butte Mine and could no longer be defined to the west due to the much larger drawdown caused by CBNG development (Hydro-Engineering 2001). In 2000, monitoring wells located immediately adjacent to the active pit had recorded around 180 ft of drawdown; however, drawdowns extrapolated by Hydro-Engineering (2001) using BLM and state monitoring well data exceeded 200 ft at a distance of over four miles west of the mine pit. As of 2004, minimal additional drawdown had occurred immediately adjacent the advancing pit, although an additional 100 ft of drawdown had occurred in the vicinity of the Eagle Butte West LBA Tract (Hydro-Engineering 2004). As of 2005, dewatering by existing mining and CBNG development activities in the area of the Eagle Butte Mine had nearly completely drained groundwater from the coal seams, particularly near the open mine pits and where the coal seams are structurally highest (Hydro-Engineering 2006). The direction of groundwater flow within the LBA tract is now to the west-northwest rather than toward the Eagle Butte Mine's open pits to the east. Groundwater level monitoring data are included in the annual progress reports that Eagle Butte Mine submits to the WDEQ/LQD, as well as in the GAGMO annual reports.

In 1991, the numerical flow model MODFLOW was used to predict the extent of water level drawdown in the Roland and Smith coal aquifers attributable to mining the existing leases at the Eagle Butte Mine. The results of the groundwater modeling are reported in Section 3.5, Appendix 3.5-10, of the Eagle Butte Mine 428-T5 Permit (FCW 2005a). In 1995, the Eagle Butte Mine acquired the Eagle Butte LBA Tract, which is called the Southwest Extension Amendment Area in the Eagle Butte Mine permit document. In 1998, the coal aquifer drawdown estimates were updated in order to address the impacts of mining the Eagle Butte LBA Tract in the WDEQ/LQD mine permit. The 1998 predictions were extrapolated by extending the life-of-mine five ft drawdown contour to the west and south by the dimensions of the Eagle Butte LBA Tract. (The coal seams are not areally continuous east and north of the mine.) This method of prediction was approved by the WDEQ/LQD in light of the extensive drawdowns associated with offsite CBNG development. It would have been difficult or impossible to verify a new model predicting impacts due to surface coal mining only and track its predictions against measured drawdowns (FCW 2005a).

The predicted extent of coal-mining related drawdown (five ft contour) in the Roland and Smith coal seams over the life of the Eagle Butte Mine if the Eagle Butte West LBA Tract is mined is shown on Figure 3-12. The life-of-mine drawdown shown in this figure extends the predicted 1998 life-of-mine five ft drawdown contour westward by the dimensions of the Eagle Butte West LBA Tract. This extrapolation serves as a general approximation of the potential impacts, based on previous experience, but it does not take variations in

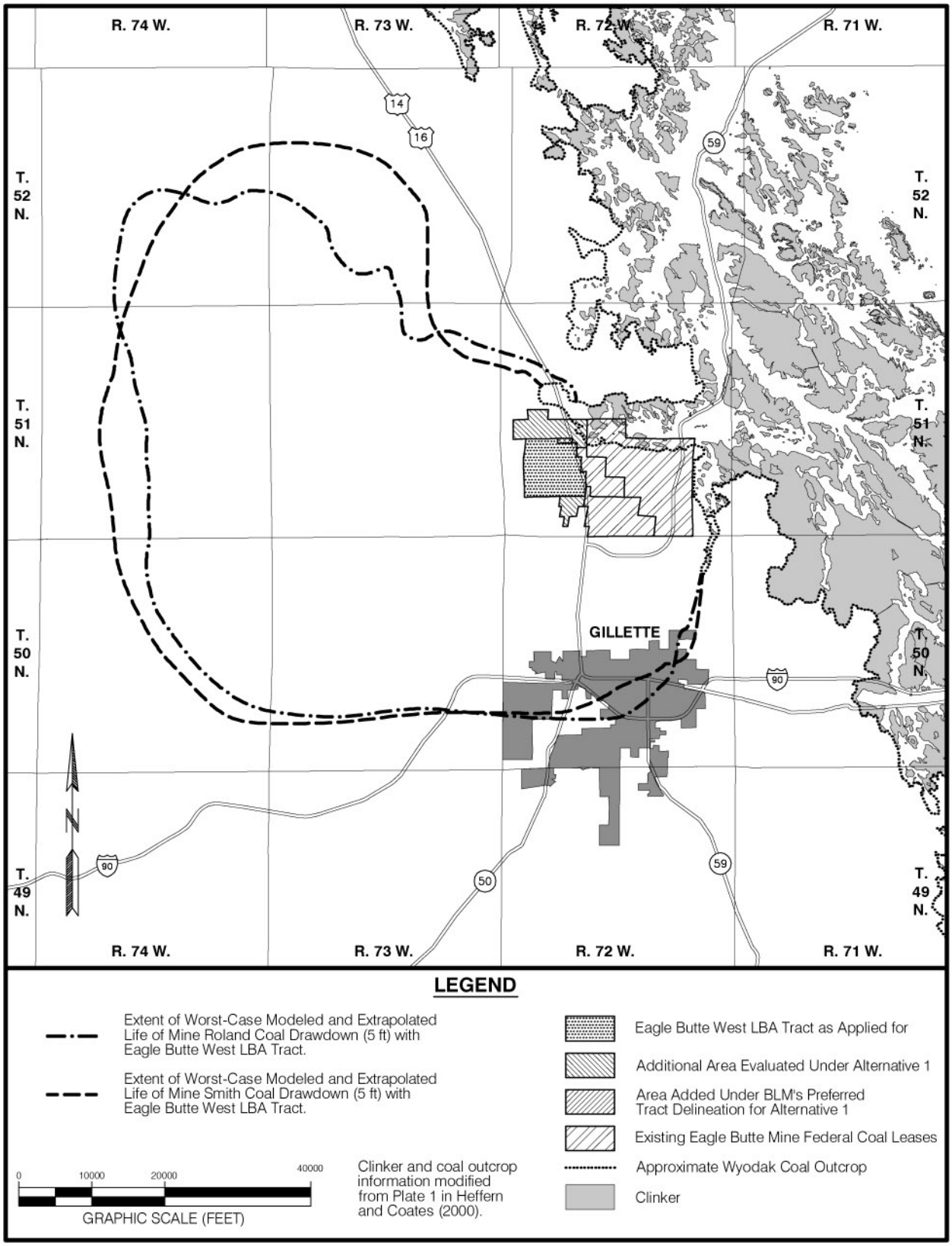


Figure 3-12. Life of Mine Drawdown Map, Resulting from Currently Approved Mining With Addition of the Eagle Butte West LBA Tract.

hydrologic properties, the time the pits are open, the distance from mining and dewatering that has occurred as a result of previous mining and CBNG development into account. More precise predictions of the extent of drawdowns may be required in order to amend the Eagle Butte West LBA Tract into the WDEQ/LQD permit area, if the Eagle Butte Mine acquires the Eagle Butte West LBA Tract.

The subcoal aquifers (i.e., Tullock Member of the Fort Union Formation and Lance Formation-Fox Hills Sandstone) are not removed or disturbed by mining, so they are not directly impacted by coal mining activity. The Eagle Butte Mine has two water supply wells completed in the Tullock aquifer below the Roland and Smith coal seams. If the Eagle Butte West LBA Tract is leased by the applicant, water would be produced from these wells for a longer period of time, but FCW would not require additional sub-coal wells to mine the LBA tract.

As noted above, the existing layers of sediment and rock in the area of coal removal would be replaced by generally homogeneous, unconsolidated backfill material, which would recover as a single hydrostratigraphic unit. The backfill unit created in the LBA tract area would be in hydraulic communication with the undisturbed coal, overburden, and adjacent mine backfill aquifer system. Premining recharge areas, described in Section 3.5.1.1, would not be disturbed by mining. Surface infiltration recharge rates for the backfill materials should be equivalent to or somewhat greater than infiltration recharge through undisturbed overburden, due primarily to the generally flatter topography resulting in less surface runoff.

The hydraulic properties of the backfill aquifer, based on the results of aquifer testing at mines in the PRB, are quite variable although they are generally equal to or greater than the undisturbed overburden and coal aquifers (Van Voast et al. 1978 and Rahn 1976). To date, not all of the backfilled materials have reached an adequate saturated thickness to be aquifer tested at the Eagle Butte Mine, but two backfill monitoring wells (EB1603 and EB1605) were tested in 2000. The backfill at these two well locations (Figure 3-10) is approximately 180 ft and 190 ft thick and the saturated thickness at that time was approximately 78 ft and 90 ft, respectively. Hydraulic conductivity values were determined to be 1.1 ft/day and 2.1 ft/day (FCW 2005a), which is comparable to the hydraulic conductivity values for the undisturbed overburden and coal seams within the Eagle Butte Mine area. These data provide an indication that the backfill would readily resaturate as postmining potentiometric elevations recover in the surrounding undisturbed aquifers, and that wells completed in the backfill (including in the Eagle Butte West LBA Tract) would be capable of supplying sufficient yields to wells constructed for livestock watering uses.

Mining and reclamation also impacts groundwater quality; the TDS concentration in the water resaturating the backfill is generally higher than the TDS concentration in groundwater from the coal seam aquifer prior to mining. This is

due to the exposure of fresh mineral surfaces to groundwater that moves through the backfill. Research conducted by Van Voast and Reiten (1988), who analyzed data from the Decker and Colstrip Mine areas in Montana, indicates that upon initial saturation, mine backfill is generally high in TDS concentration and contains soluble salts of calcium, magnesium and sodium sulfates. As the backfill is resaturated, the soluble salts are leached by groundwater inflow and TDS concentrations tend to decrease with time, indicating that the long term groundwater quality in mined and off-site lands would not be compromised (Van Voast and Reiten 1988). Using data compiled from 10 surface coal mines in the eastern PRB, Martin et al. (1988) concluded that backfill groundwater quality improves markedly after the backfill is leached with one pore volume of water. Clark (1995) conducted a study to determine if the decreases predicted by laboratory studies actually occur onsite. In the area of the West Decker Mine near Decker, Montana, his study found that dissolved solids concentrations increased when water from an upgradient coal aquifer flowed into a backfill aquifer, and apparently decreased along an inferred path from a backfill aquifer to a downgradient coal aquifer.

Groundwater quality within the backfill at the Eagle Butte West LBA Tract would be expected to be similar to groundwater quality measured in existing wells completed in the backfill at the Eagle Butte Mine. To date, two wells (EB1603 and EB1605) have been installed to monitor water levels and water quality in the backfill at the Eagle Butte Mine. Water quality in these two backfill monitoring wells have been and continue to be sampled on a quarterly schedule. TDS concentrations in samples collected from well EB1603, from 2000 through 2004, have ranged from 4,281 to 4,822 mg/L, with a geometric mean of 4,497 mg/L. TDS concentrations in samples collected from well EB1605, from 2000 through 2004, have ranged from 5,286 to 6,072 mg/L, with a geometric mean of 5,804 mg/L (Hydro-Engineering 2006). WDEQ/LQD calculated a median TDS concentration of 5,016 mg/L for the backfill aquifer in the northern group of mines, which includes the Eagle Butte Mine and adjacent mines (Figure 1-1), based on 429 samples (Ogle et al. 2006). The average and mean values are calculated differently and are not directly comparable, with the average value more likely to be influenced by a few high values.

TDS concentrations observed to date in samples from these two Eagle Butte Mine backfill monitoring wells are generally higher than those from the undisturbed Roland and Smith coal seams or Wasatch Formation overburden. However, water quality samples from most of the mine's alluvial monitoring wells and at least two overburden monitoring wells have higher TDS concentrations (FCW 2004b and 2005b). Postmining groundwater quality would be expected to improve after one pore volume of water moves through the backfill. In general, the mine backfill groundwater TDS can be expected to range from 3,000 to 6,000 mg/L, similar to the Wasatch Formation aquifer, and meet Wyoming Class III standards for use as stock water.

Changes to the premining hydraulic characteristics of the alluvial aquifer and the quality of alluvial groundwater are expected to be minor after final reclamation, because Eagle Butte Mine would be required to maintain the essential hydrologic functions of Little Rawhide Creek and its alluvial groundwater system (as is currently required for the already-approved mining operations affecting Little Rawhide Creek). See additional discussion in Section 3.5.1.3.

As discussed in Chapter 2, the Proposed Action and Alternative 1 assume that this LBA tract would be leased as a maintenance tract to an existing mine. As discussed above, there have been drawdowns in the coal and overlying aquifers as a result of the existing approved mining and the existing CBNG development in the vicinity of the LBA tract. As of May 2006, the level of groundwater in the Roland and Smith coal beds in the general analysis area had already been lowered to near the base of the coal as a result of dewatering by existing mining and CBNG development activities in the area. The potential overlapping impacts of the existing mining activities with other proposed activities are discussed in Chapter 4.

3.5.1.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal would not occur on the Eagle Butte West LBA Tract. Impacts to groundwater resources related to existing approved mining and CBNG development, described above, would continue as permitted on the existing Eagle Butte Mine leases. Mining operations would not be extended onto portions of the Eagle Butte West LBA Tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.5.1.3 Regulatory Compliance, Mitigation and Monitoring

In order to obtain a mining and reclamation permit, the Eagle Butte Mine was required to evaluate regional and site-specific baseline hydrogeologic environments within and around the mine and use a groundwater flow model to predict the extent of water level drawdown in the Wasatch Formation overburden and Roland and Smith coal aquifers that would occur as a result of mining the existing leases at the Eagle Butte Mine. Results of these studies are included in the WDEQ/LQD mine permit (FCW 2005a). If the Eagle Butte West LBA Tract is leased and mined, the permit for the Eagle Butte Mine would have to be amended to include the tract, and these studies would be revised accordingly.

As discussed in Section 3.5.3.3, SMCRA and Wyoming State Statutes require mine operators to provide the owner of a water right whose water source is interrupted,

discontinued, or diminished by mining with water of equivalent quantity and quality.

The surface coal mines, including Eagle Butte Mine, are required to monitor water levels and water quality in the overburden, coal, interburden, underburden, and backfill. Groundwater monitoring wells installed by Eagle Butte Mine within and around the current permit area have been used to evaluate groundwater conditions since 1974. A total of 139 wells have historically been installed for monitoring purposes at the Eagle Butte Mine. Most monitor wells were installed between 1975 and 1992 and used for long-term monitoring purposes before either being removed by mining operations or discontinued. Wells for which monitoring has been discontinued are still in place and may be reincorporated into the monitoring network in the future. Additional wells have been installed as mining has progressed. Currently, there are 56 wells in and surrounding the mine permit area that are actively being monitored by FCW: 12 in the alluvium, 22 in the overburden, 19 in the coal, two in the mine backfill, and one in the aquifer below the coal. The locations of these monitoring wells are shown on Figure 3-10.

The Eagle Butte Mine's WDEQ/LQD mine permit requires the mine to maintain the essential hydrologic functions of Little Rawhide Creek and its alluvial groundwater system that were identified prior to mining. In order to meet this requirement, the stream-laid alluvial materials are salvaged and stockpiled during mining and would be replaced upon final reclamation. This requirement would be extended to include mining operations on the Eagle Butte West LBA Tract, if it is leased.

As stated in Sections 3.5.1.1.1 and 3.5.1.1.2, overburden sand bodies within the Wasatch Formation provide recharge for the Little Rawhide Creek alluvial groundwater system, which in turn contributes to Little Rawhide Creek streamflow. In order to maintain the hydrologic balance between the overburden sand aquifers and Little Rawhide Creek, and to restore the essential hydrologic functions of the Little Rawhide Creek AVF, WDEQ/LQD determined that discharge from the overburden aquifers to the alluvium must be reestablished after mining (FCW 2005). Eagle Butte Mine therefore committed, as part of their existing permit, to reconstructing a sand body aquifer during reclamation to replace a hydrologically significant overburden sand aquifer removed during mining. The majority of the general backfill is siltstones and shales, but sand within the overburden was selectively used for the reconstructed sand body, which is therefore expected to exhibit aquifer characteristics similar to the premining sand body. Eagle Butte Mine also committed to replacing the alluvial deposits along Little Rawhide Creek that were in contact with the overburden sand aquifer prior to mining in order to maintain the premining hydrologic balance and support the postmining land uses (FCW 2005a). Eagle Butte Mine's current hydrologic restoration plan includes a reconstructed sand body aquifer that will be in hydraulic communication with a saturated, undisturbed sand body along the western limit of mining and an infiltration pond within the reconstructed Little

Rawhide Creek stream channel. If the Eagle Butte West LBA Tract is acquired by the Eagle Butte Mine and the proposed lease area is amended into the WDEQ/LQD permit area, more extensive reconstruction of hydrologically significant overburden sand body aquifers and the Little Rawhide Creek alluvial aquifer may be required in order to maintain the premining hydrologic balance and support the postmining land uses.

3.5.2 Surface Water

3.5.2.1 Affected Environment

The existing Eagle Butte Mine permit area and the Eagle Butte West LBA Tract are located within the Little Rawhide Creek and Dry Fork Little Powder River watersheds. The majority of the mine's permit area lies within the Little Rawhide Creek drainage basin and only the extreme eastern portion of the permit area is drained by the Dry Fork Little Powder River. Little Rawhide Creek and its tributary, Prong Draw, drain the general analysis area for the Eagle Butte West LBA Tract. Little Rawhide Creek flows from south to north and empties into Rawhide Creek about three miles north of the LBA tract. Rawhide Creek is a tributary to the Little Powder River, which joins the Powder River near Broadus, Montana. Surface water features in the Eagle Butte West LBA Tract and the surrounding areas prior to all mining disturbance are displayed in Figure 3-13.

The main channel of Little Rawhide Creek is within the eastern portion of the Eagle Butte West LBA Tract, which is inside the current Eagle Butte Mine permit area (Figure 3-13). Little Rawhide Creek is currently diverted from its natural channel by Diversion No. 6 to facilitate mining within the current Eagle Butte Mine permit area. Little Rawhide Creek Diversion No. 6 was constructed in 1981. The diversion channel begins inside the LBA tract area, immediately downstream of the Highway 14-16 crossing in the NW¼SE¼ of Section 20, T.51N., R.72W., then runs to the northeast until it empties into a reservoir located in the Rawhide Mine permit area. Little Rawhide Creek Diversion No. 6 is shown in Figure 3-13. Other surface runoff control structures (e.g., reservoirs and diversion channels) have been constructed on Little Rawhide Creek's ephemeral tributaries within the current Eagle Butte Mine permit area.

Gently rolling topography characterizes the drainage basin of Little Rawhide Creek within and upstream of the LBA tract. Near the headwaters, the stream channel elevation is about 4,500 ft. The channel elevation is about 4,300 ft where it enters the LBA tract, about 4,260 ft where the Little Rawhide Creek Diversion No. 6 begins, and approximately 4,100 ft at the confluence with Rawhide Creek. The channel slope, or gradient, from the headwaters to the diversion is approximately 23 ft per mile (0.004 ft/ft), and from there to the mouth of the stream the channel gradient is about 15 ft per mile (0.003 ft/ft). Little Rawhide Creek has a total drainage area of approximately 34.1 square miles. At the upstream end of the

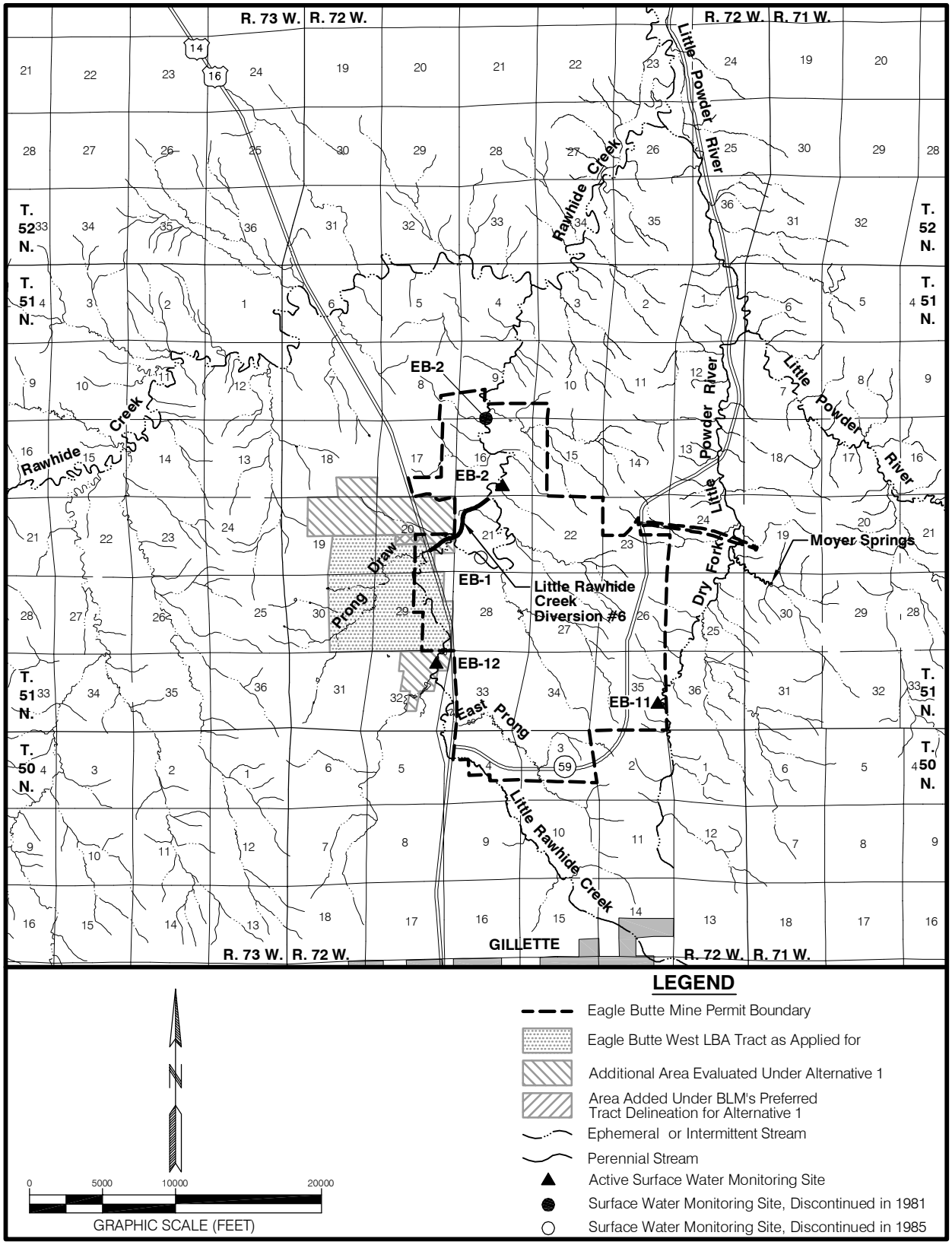


Figure 3-13. Surface Water Features Within and Adjacent to the Eagle Butte West LBA Tract.

diversion, approximately where the stream leaves the LBA tract, the drainage area is about 21.2 square miles.

Prong Draw flows diagonally across the LBA tract from southwest to northeast and joins with the main channel of Little Rawhide Creek near the eastern boundary of the LBA tract (Figure 3-13). The average channel gradient through the LBA tract is 0.006 ft/ft, with a total drop of about 85 ft. Prong Draw drains about 59 percent of the Eagle Butte West LBA Tract and has a total drainage area of approximately 3.4 square miles. No natural topographic depressions, internally drained areas, or playas exist within the general analysis area. No springs occur within the general analysis area.

Seven reservoirs used for livestock watering and storage of groundwater discharged from CBNG wells are currently located on the BLM study area for the LBA tract (the tract as applied for and the additional area evaluated under Alternative 1). Two of these reservoirs are located on Little Rawhide Creek and the other five are located on Prong Draw and its tributaries.

The Little Rawhide Creek valley includes areas underlain by both alluvium and colluvium and exhibits a winding course. It is bounded on its sides by slope wash, fan deposits, and bedrock outcrops. There is evidence of abandoned meander scars within the valley, which range in width from 250 ft to 1,350 ft. In the general analysis area, numerous man-made modifications (e.g., impoundments and diversion dikes) have been constructed along the main channel and tributaries to Little Rawhide Creek. The width and depth of the channel varies considerably, primarily due to the effects of these channel modifications. The stream alternately forms pools and constrictions along its length. The pools average about 50 ft in length and the constricted “riffle” areas average about 200 ft in length. The pools are important with respect to the interaction between surface water and groundwater and for use by livestock and wildlife in dry months. Upstream from the impoundments and diversions, the channel is as much as 20 ft wide and filled with soft silts and clays high in organic matter that obscure the natural channel geometry. In areas well upstream of the channel modifications the channel is normally about two to six ft wide and about 1.5 ft deep and is often partially or totally covered with cattails or grasses. Numerous impoundments have also been constructed along the Prong Draw channel, most of which are associated with the storage of groundwater discharged by CBNG development.

Eagle Butte Mine established a surface water monitoring network in 1974 to assess the pre- and during-mining surface water quantity and quality characteristics of Little Rawhide Creek. Continuously recording discharge gaging stations, sites EB-1 and EB-2, were established in March 1974. Site EB-1 was deactivated in 1985 and site EB-12 was established south of the Eagle Butte Mine permit boundary to replace EB-1. Site EB-2 was moved to its current location in

1990 to accommodate Rawhide Mine advances. The locations of these surface water monitoring sites are depicted on Figure 3-13.

Flow in the stream is influenced by the in-channel impoundments; however, the storage capacity of those impoundments is relatively small. Streamflow hydrographs recorded at gaging stations EB-1 and EB-2 indicate that Little Rawhide Creek streamflow during baseline conditions (pre-1977) was characterized by wide fluctuations on a seasonal and annual basis. Due to the short duration, high intensity nature of summer storms in this area, flow events were typically of short duration and sharply peaked. Flow typically occurred rapidly in response to large storm events, and then tapered off to no flow within a few days. The larger storms produced enough runoff to fill the channel impoundments and recharged the alluvium along Little Rawhide Creek, resulting in a prolonged period of flow due to alluvial groundwater seepage.

Before mining and CBNG development activities commenced in this part of the PRB, streamflow above (upstream of) a point roughly in the center of Section 29, T.51N., R.72W. was more ephemeral in nature, generally occurring only in direct response to precipitation and snowmelt runoff events. However, downstream of that point, stream baseflow was sustained by groundwater discharging from underlying bedrock and alluvial aquifers, thus making the stream more intermittent in nature. The annual discharge volumes of Little Rawhide Creek recorded at site EB-12 (upstream site) over the 21-year period of record (1985-2005) is 148 ac-ft. The annual discharge volumes of Little Rawhide Creek recorded at site EB-2 (downstream site) over the 32-year period of record (1974-2005) is 403 ac-ft.

Prior to the relatively recent effects from the surface discharge of groundwater associated with CBNG development and drought conditions in northeastern Wyoming (Curtis 2004), streamflow in Little Rawhide Creek was of short duration and exhibited temporal patterns similar to precipitation events. Under current conditions, discharges from CBNG development in the Little Rawhide Creek drainage basin have altered the frequency and duration of streamflow events in the main stream and most of its tributaries. Annual streamflow at site EB-2 from 2001 through 2005 is 28.6 ac-ft; only 9.6 percent of the 32-year mean. Annual precipitation amounts have been considerably below normal since the spring of 2000 (Curtis 2004), which has resulted in below normal streamflows. In 2004, Eagle Butte Mine's meteorological monitoring station recorded only 8.1 inches of precipitation, which is 47 percent of the annual average. Concurrently, streamflow recorded at site EB-12 has been considerably higher than at site EB-2 six of the last seven years, which is the reverse of baseline/natural conditions. The mean annual discharge at site EB-12 from 2001 through 2005 is 101 ac-ft; 68 percent of the 21-year mean. This anomalous streamflow condition is attributable to the augmentation from CBNG groundwater discharge outfalls that are located relatively near site EB-12. In addition, streamflow between these two gaging stations is being lost by discharge to the alluvium and underlying overburden

aquifers. Shallow impoundments along the stream channel that are located immediately upstream and downstream of site EB-12 presently hold water year-round, although water does not flow continuously within the channel downstream. Streamflow recorded at these two gaging sites from October 2000 through August 2005 indicate that flow occurred at site EB-12 on approximately 67 percent of the days that the site was operational, compared to approximately 32 percent of the days that site EB-2 was operational.

Eagle Butte Mine has not monitored the streamflow of Prong Draw; however, surface runoff flood estimates for the drainage were computed and are included in the mine permit (FCW 2005a).

Little Rawhide Creek is listed in the WDEQ/WQD Surface Water Classification List as a Class 3B stream that is not protected for drinking water or as a fishery, but is protected for other aquatic life, recreation, wildlife, agriculture, industry, and scenic value. All other ephemeral streams draining the existing Eagle Butte Mine permit area and LBA general analysis area are categorized as Class 4 streams (where it has been determined that aquatic life uses are not attainable) (WDEQ/WQD 2005).

Eagle Butte Mine has monitored the water quality of Little Rawhide Creek in the vicinity of the mine since 1972. Eagle Butte Mine, in compliance with WDEQ/LQD permit requirements, currently collects quarterly water quality samples from Little Rawhide Creek at sites EB-2 and EB-12 (Figure 3-13) and includes the analyses in the mine's annual reports. Based on these historical water quality analyses, water from Little Rawhide Creek varies temporally, but is generally not suitable for domestic or agricultural uses. An improvement in quality is generally noted in the spring, which can be attributed to the flushing and dilution effect from snowmelt and rainfall runoff. Water from Little Rawhide Creek is usually unsuitable for domestic or irrigation uses due to excessive concentrations of TDS and sulfate, but suitable for livestock and wildlife use. The TSS concentration is typically less than 30 mg/L, which is relatively low for an ephemeral/intermittent stream, but may be due to low-flow conditions at the time of sampling and the numerous impoundments along the stream channel upstream of the monitoring stations that act to trap suspended solids. High TSS concentrations can be expected from floods caused by large thunderstorms.

Prior to 1982, water quality samples collected downstream of the Eagle Butte West LBA Tract at Sites EB-1 and EB-2 had TDS concentrations that averaged around 6,000 mg/L and the predominant ions were calcium, magnesium, and sulfate. The average TDS concentration of all water samples collected in recent years (between 1999 and 2005) decreased to approximately 3,300 mg/L and the sodium and bicarbonate ion concentrations, in general, increased relative to the calcium, magnesium, and sulfate ion concentrations. This shift in water quality may be attributed to the fact that water sampled at site EB-2 is a blend of natural surface flow, treated mine discharge water, and CBNG discharge water.

Water quality samples were collected monthly at station EB-12 in 1985 when that monitoring station was first established. During that year, the water was consistently a magnesium-sulfate type and the TDS concentration ranged from 4,650 to 8,330 mg/L. The TDS concentration of all water samples collected at this location in recent years (between 1999 and 2005) has ranged from 1,505 to 12,724 mg/L and averaged 2,930 mg/L. Not only does the TDS concentration vary seasonally and with flow, the chemical composition of the water has been relatively inconsistent over this period of time. For example, the predominant anions are sulfate or bicarbonate, the former being the predominant anion of most samples; however, the concentration of bicarbonate relative to sulfate has generally increased over time. The predominant cations were typically magnesium or sodium, with the ionic concentration of sodium increasing over time. The surface discharge of coal seam groundwater, which is rich in sodium and bicarbonate, from CBNG development in the area is apparently affecting the stream's natural water quality.

Because of the lack of regular natural streamflow in Prong Draw, water quality data are not available. Surface water samples were collected from a similar tributary, East Prong Little Rawhide Creek, as part of Eagle Butte Mine's Southwest Extension permit amendment application, and it is likely that the surface water quality in Prong Draw would be similar to that in this tributary of Little Rawhide Creek. The natural surface flow in East Prong is magnesium-sulfate type water, with TDS concentrations ranging from under 100 mg/L to approximately 600 mg/L. The lower TDS value reflects water quality during major runoff events, which would be of suitable chemical quality for irrigation.

3.5.2.2 Environmental Consequences

3.5.2.2.1 Proposed Action and Alternative 1

Changes in surface runoff characteristics and sediment discharges would occur during mining of the LBA tract as a result of the destruction and reconstruction of drainage channels as mining progresses and the use of sediment control structures to manage discharges of surface water from the mine permit area. Erosion rates could be high on the disturbed areas because of vegetation removal. However, both state and federal regulations require treatment of surface runoff from mined lands to meet effluent standards. Generally, the surface runoff sediment is deposited in ponds or other sediment control devices inside the permit area before the surface runoff water is allowed to leave the permit area.

Since the LBA tract would be mined as an extension of the existing mine under the Proposed Action or Alternative 1, there would not be a large increase in the size of the area that is disturbed and not reclaimed at any given time as a result of leasing the tract. The presence of disturbed areas creates a potential that sediment produced by large storms (i.e., greater than the 10-year, 24-hour storm) could potentially adversely impact areas downstream of the mining operation.

This potential for adverse downstream impacts would be extended if the LBA tract were leased.

Following reclamation, the loss of soil structure would act to increase runoff rates. However, the general decrease in average slope in reclaimed areas, as discussed in Section 3.2.2, would tend to counteract the potential for an increase in runoff. Soil structure would gradually reform over time, and vegetation (after successful reclamation) would provide erosion protection from raindrop impact, retard surface flows, and control runoff at approximately premining levels.

There may periodically be substantial streamflow in Little Rawhide Creek within the Eagle Butte West LBA Tract. Sections of Little Rawhide Creek and East Prong Little Rawhide Creek are currently diverted within the existing Eagle Butte Mine permit area. During mining of the LBA tract, hydrologic control would likely consist of building another diversion channel for the main stream around the open pit area. Because most of the LBA tract is drained by Prong Draw, an ephemeral tributary of Little Rawhide Creek, runoff within the tract would not be expected to be substantial. In addition to diverting Little Rawhide Creek, hydrologic control during mining would most likely consist of allowing surface runoff to accrue to the mine pit where it would be treated and discharged according to the standards of the WDEQ/WQD. A need for large flood control reservoirs is not anticipated for the LBA tract.

The impacts described above would be similar for both the Proposed Action and the BLM's preferred tract configuration under Alternative 1, and they are similar to the expected impacts for the currently permitted mining operation.

3.5.2.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected; coal removal and associated disturbance of Little Rawhide Creek and Prong Draw would not occur on the Eagle Butte West LBA Tract. The impacts to surface water resources described above would continue on the existing mine permit area as a result of currently approved mining and CBNG development. Impacts related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.5.2.3 Regulatory Compliance, Mitigation and Monitoring

In accordance with SMCRA and Wyoming State Statutes, the Little Rawhide Creek stream channel would be restored after surface mining operations are completed

on the Eagle Butte West LBA Tract. Surface water flow, quality, and sediment discharge would approximate premining conditions. The drainages that intersect the permit area would be reclaimed to exhibit channel geometry characteristics similar to the premining characteristics. The Little Rawhide Creek stream channel would be restored in approximately the same location as the natural channel and its hydrologic functions, including the alluvial groundwater-surface water interaction would be restored. (See additional discussion in Section 3.5.1.3.)

Other WDEQ/LQD permit requirements for the existing Eagle Butte Mine include constructing sediment control structures to manage discharges of surface water from the mine permit area; treatment of all surface runoff from mined lands as necessary to meet effluent standards; and restoration of stock ponds and in-channel impoundments disturbed during mining. These requirements would be extended to include the Eagle Butte West LBA Tract when the mine permit is amended to include the tract.

Monitoring requirements for the existing Eagle Butte Mine include a monitoring program to assure that sediment ponds would always have adequate space reserved for sediment accumulation, collection of streamflow and water quality data from Little Rawhide Creek at sites EB-2 and EB-12 on a quarterly basis, and compliance with EPA's NPDES permits. These requirements would be extended to include the Eagle Butte West LBA Tract when the mine permit is amended to include the tract.

3.5.3 Water Rights

3.5.3.1 Affected Environment

The Wyoming SEO administers water rights in Wyoming. Water rights are granted for both groundwater and surface water appropriations. Prior to development of water resources associated with energy development, water appropriations (either groundwater or surface water) in the PRB were typically for livestock use. Currently, mining companies and CBNG development companies hold the majority of the water rights in the general analysis area.

Records of the SEO have been searched for groundwater rights within a three-mile radius of the BLM study area for Eagle Butte West LBA Tract (the tract as applied for under the Proposed Action and the additional area evaluated by BLM under Alternative 1). This information is required for WDEQ permitting. A summary of the most recent search is provided below. A more detailed listing of the non-coal mine related groundwater rights within a three-mile radius of the LBA tract is presented in the supplementary information document for this EIS, which is available on request.

For the Eagle Butte West LBA Tract, SEO data indicate that, as of October 2004, there were 1,312 permitted water wells within three miles of the tract, of which,

300 were owned by coal mining companies. The other 1,012 non-coal mine related, permitted water wells, which include 788 wells permitted for uses related to CBNG development and 224 wells permitted for non-coal and non-CBM uses, are permitted for the following uses:

- 393 stock and CBNG
- 296 CBNG only
- 69 monitoring
- 63 miscellaneous, stock, and CBNG
- 52 miscellaneous
- 41 stock only
- 39 domestic only
- 24 miscellaneous and CBNG
- 14 domestic and stock
- 5 stock, CBNG, and reservoir supply
- 3 industrial
- 2 CBNG and reservoir supply
- 2 industrial and miscellaneous
- 2 stock, miscellaneous, dewatering, and CBNG
- 1 irrigation and domestic
- 1 miscellaneous and dewatering
- 1 miscellaneous, dewatering, stock, wildlife, and CBNG
- 1 miscellaneous and domestic
- 1 stock, CBNG, and monitoring
- 1 stock and miscellaneous
- 1 stock, miscellaneous, monitoring, and CBNG

SEO records have been searched for surface water rights within a three-mile radius of the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated under Alternative 1). Like the groundwater rights, this information is also required for WDEQ permitting. A summary of the most recent search is provided below. A more detailed listing of the non-coal mine related surface water rights is presented in the supplementary information document for this EIS.

For the Eagle Butte West LBA Tract, SEO records indicate that as of October 2004, there were 16 non-coal mine related, permitted surface water rights within the search area. These surface water rights were permitted for the following uses:

- 8 miscellaneous
- 7 stock
- 1 miscellaneous and industrial

3.5.3.2 Environmental Consequences

3.5.3.2.1 Proposed Action and Alternative 1

As discussed above, Wyoming SEO records indicated that a total of 1,312 permitted water wells were located within three miles of the Eagle Butte West LBA Tract in October 2004. As discussed above, 300 of these wells are owned by coal mining companies and are used for groundwater monitoring and water supply. The majority of the remaining 1,012 non-coal mine related wells are permitted for multiple uses. Approximately 78 percent are permitted either for CBNG development only or for CBNG development and other uses; 58 percent are permitted either for livestock use only or for livestock and other uses; 15 percent are permitted either for miscellaneous only or for miscellaneous and other uses; seven percent are either permitted for monitoring only or for monitoring and other uses; and five percent are either permitted for domestic only or for domestic and other uses.

Private water supply wells in this area have been impacted by past surface coal mining as well as CBNG development and it is likely that some of the privately permitted water wells listed in Section 3.5.3.1 would be impacted (either directly by removal of the well or indirectly by water level drawdown) by future approved mining operations occurring on existing coal leases at the Eagle Butte or adjacent mines or on the Eagle Butte West LBA Tract.

None of the 224 wells permitted for non-coal and non-CBNG uses listed in Section 3.5.3.1 that are located within the expanded five-ft drawdown contour associated with mining the Eagle Butte West LBA Tract (Figure 3-12) have completion depths that indicate they produce water from the Roland or Smith coal seams. It is therefore unlikely that any additional private water wells completed in either the Roland or Smith coal seams would be affected if the LBA tract is leased and mined.

Due to the areally discontinuous nature and varied hydraulic properties of the water-bearing units within the Wasatch Formation overburden, the extent and degree of water level drawdowns in the overburden would be variable. There may be private water supply wells completed in the local overburden aquifer that would be affected if the tract is leased and mined. If the Eagle Butte Mine acquires the LBA tract, the mine's WDEQ/LQD permit would be amended to include the Eagle Butte West LBA Tract and the extent of the life-of-mine drawdowns in the local overburden aquifer system attributable to mining the proposed lease area would be evaluated.

3.5.3.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal would not occur on the Eagle Butte West LBA Tract.

The impacts to water rights associated with existing approved mining and CBNG development would continue to occur.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.5.3.3 Regulatory Compliance, Mitigation and Monitoring

SMCRA and Wyoming regulations require surface coal mine operators to provide the owner of a water right whose water source is interrupted, discontinued, or diminished by mining with water of equivalent quantity and quality. This required mitigation is considered to be part of the Proposed Action and Alternative 1. The most probable source of replacement water would be one of the aquifers underlying the coal. For example, the subcoal Fort Union Formation aquifers are not removed or disturbed by coal mining and would therefore be a potential source of replacement water.

If the Eagle Butte West LBA Tract is leased, the mine operator would be required to update the list of potentially impacted private water supply wells and predict impacts to those wells within the five-ft drawdown contour as part of the permitting process. The operator would be required to commit to replacing those water supplies that are determined to be affected by mining with water of equivalent quality and quantity.

3.5.4 Residual Impacts

The area of coal and overburden removal and replacement of overburden and associated groundwater drawdowns would be increased under the Proposed Action or BLM's preferred tract configuration for Alternative 1 compared with the area of coal and overburden removal and overburden replacement and associated groundwater drawdowns for the existing Eagle Butte Mine. The postmining backfill may take in excess of 100 years to reach equilibrium water levels and water quality. Less time would be required near the mining boundaries. Monitoring data from wells completed in existing backfilled areas in the PRB suggest that there would be an adequate quantity of water in the backfill to replace current use, which is for livestock. Water quality in the backfill would generally be expected to meet the Wyoming Class III standards for use as stock water, which was the primary pre-mining use of water from the coal seams.

The area of overburden sand body aquifer and Little Rawhide Creek alluvial aquifer removal and reconstruction would be increased under the Proposed Action and BLM's preferred tract configuration for Alternative 1, compared with the area of overburden sand body and alluvial aquifer removal and replacement for the existing Eagle Butte Mine. The time required to reconstruct and resaturate the post-mining aquifers in order to restore the essential hydrologic functions of Little

Rawhide Creek and its alluvial aquifer system would be increased, but no residual impacts would occur.

3.6 Alluvial Valley Floors

3.6.1 Affected Environment

Prior to leasing and mining, AVFs must be identified because, under SMCRA, mining on AVFs is prohibited unless the affected AVF is undeveloped rangeland that is not significant to farming or if the affected AVF is of such small acreage that it would have a negligible impact on a farm's agricultural production. These restrictions also apply to AVFs that are downstream of the area of disturbance but might be affected by disruptions in streamflow. AVFs that are determined not to be significant to agriculture can be disturbed during mining but must be restored as part of the reclamation process.

WDEQ regulations define AVFs as unconsolidated stream-laid deposits where water availability is sufficient for subirrigation or flood irrigation agricultural activities. Guidelines established by OSM and WDEQ/LQD for the identification of AVFs require detailed studies of geomorphology, soils, hydrology, vegetation, and land use. These studies are used to identify 1) the presence of unconsolidated stream-laid deposits, 2) the possibility for artificial flood irrigation, 3) past and/or present flood irrigation, and 4) apparent subirrigated areas and the possibility for natural flood irrigation. Areas that are identified as AVFs following these studies are evaluated for their significance to farming by WDEQ/LQD.

The reach of Little Rawhide Creek within and adjacent to the existing Eagle Butte Mine permit area has been investigated for the presence of AVFs. These AVF studies were conducted as part of the WDEQ/LQD mine permitting process for the purpose of recovering coal in the mine's existing leases. As a result of these studies, Little Rawhide Creek and a small portion of Prong Draw at its confluence with Little Rawhide Creek were declared an AVF non-significant to farming by the WDEQ/LQD (FCW 2005a). Little Rawhide Creek and its alluvial valley lie within the eastern portion of the Eagle Butte West LBA Tract, which is inside Eagle Butte Mine's existing permit area. Therefore, the entire reach of Little Rawhide Creek within the BLM study area for the LBA tract (the tract as applied for and the additional area evaluated under Alternative 1) has been declared an AVF non-significant to farming by the WDEQ/LQD. Approximately 83 acres of declared AVF lie within the Eagle Butte West LBA Tract as applied for, and an additional 45 acres of declared AVF lie within the additional area evaluated by BLM under Alternative 1. Approximately 84 acres of declared AVF lie within the Eagle Butte West LBA Tract under BLM's preferred tract configuration.

Eagle Butte Mine conducted AVF investigations on the undeclared portion of Prong Draw within and adjacent to the LBA tract in the summer of 2004. These studies included identifying and mapping stream-laid deposits, assessing the

extent of subirrigation, evaluating alluvial groundwater availability and quality, evaluating natural and artificial flood irrigation, and identifying the stream's essential hydrologic functions. These studies concluded that the AVF characteristics of Prong Draw are negligible and it does not meet the regulatory definition of an AVF because the stream-laid deposits are very limited in areal extent and support little or no natural subirrigation or flood irrigation activities, and the quality of groundwater that occurs in the alluvial deposits is unsuitable for agricultural use. Surface water quantity is insufficient to support agricultural activities, further supporting the contention that the portion of Prong Draw within the LBA tract is not an AVF. Formal declarations of the presence or absence of an AVF, its significance to agriculture, and the appropriate perimeter (areal extent) would be made by the WDEQ/LQD as part of the mine permitting process if the LBA tract is leased and proposed for mining.

3.6.2 Environmental Consequences

3.6.2.1 Proposed Action and Alternative 1

If either the Eagle Butte West LBA Tract as applied for or BLM's preferred tract configuration under Alternative 1 is mined by the applicant as an extension of existing operations, the mining operations would affect between 83 and 84 acres of declared AVF along Little Rawhide Creek. Mining activity would not be restricted in the AVF areas because the WDEQ/LQD has declared them not to be significant to farming. Portions of Little Rawhide Creek upstream and downstream of the LBA tract have been affected by previous mining operations at the Eagle Butte Mine.

As indicated above, the WDEQ/LQD has not made a formal AVF declaration for Prong Draw or evaluated its significance to agriculture. However, it is unlikely that mining activity would be precluded by the presence of an AVF significant to farming in those areas due to the absence of irrigated agricultural development.

No direct, indirect, or cumulative impacts are anticipated to off-site AVFs through mining of the Eagle Butte West LBA Tract. Streamflows in drainages within the Eagle Butte West LBA Tract would be diverted around the active mining areas in temporary diversion channels, captured in flood control reservoirs above the pit, or allowed to flow into the mine pit and routed through settling ponds. If flood control impoundments and/or settling ponds are used, it would be necessary to evacuate them following major runoff events to provide storage volume for the next flood. Consequently, disruptions to streamflows that might supply downstream AVFs are expected to be negligible. Groundwater and surface runoff intercepted by the mine pits would be routed through settling ponds to meet state and federal quality criteria, and the pond discharges would likely increase the frequency and amount of flow in these streams, thereby increasing surface water supplies to downstream AVFs.

3.6.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal and associated impacts to the Little Rawhide Creek AVF would not occur on the Eagle Butte West LBA Tract. The impacts to the Little Rawhide Creek AVF associated with existing approved mining operations would continue to occur. Impacts related to mining operations at the Eagle Butte Mine would not be extended onto those portions of the Little Rawhide Creek AVF within the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.6.3 Regulatory Compliance, Mitigation and Monitoring

As discussed above, AVFs must be identified because SMCRA generally does not allow impacts to AVFs that are determined to be significant to agriculture. AVFs that are determined not to be significant to agriculture or that were permitted to be affected prior to the effective date of SMCRA can be disturbed during mining but must be restored as part of the reclamation process. The determination of significance to agriculture is made by WDEQ/LQD, and it is based on specific calculations related to the production of crops or forage on the AVF and the size of the existing agricultural operations on the land of which the AVF is a part. For any designated AVF, regardless of its significance to agriculture, it must be demonstrated that the essential hydrologic functions of the valley will be protected. Downstream AVFs must also be protected during mining. These measures are required by regulation and are therefore considered to be part of the Proposed Action and Alternative 1 for the Eagle Butte West LBA Tract.

As stated in Section 3.5.1.2, WDEQ/LQD has determined that, in order to restore the essential hydrologic functions of Little Rawhide Creek and its AVF, discharge from the Wasatch Formation overburden sand aquifer to the alluvial aquifer must be reestablished after mining. Eagle Butte Mine's current hydrologic restoration plan includes a reconstructed sand body aquifer that is in hydraulic communication with a saturated, undisturbed sand body along the western limit of mining and an infiltration pond within the reconstructed Little Rawhide Creek stream channel. The current reclamation plan was designed to maintain the premining acreage of subirrigated vegetation along Little Rawhide Creek that has been or will be disturbed by mining. If the Eagle Butte West LBA Tract is acquired by the Eagle Butte Mine, the newly-leased area would be amended into the WDEQ/LQD permit area. More extensive reconstruction of hydrologically significant overburden sand body aquifers and the Little Rawhide Creek alluvial aquifer may be required in order to maintain the premining hydrologic balance,

restore the essential hydrologic functions of Little Rawhide Creek and its AVF, and support the postmining land uses.

3.6.4 Residual Impacts

No residual impacts to AVFs would occur following mining.

3.7 Wetlands

3.7.1 Affected Environment

Waters of the U.S. is a collective term for all areas subject to regulation by the COE under Section 404 of the CWA. Waters of the U.S. include special aquatic sites, wetlands, and jurisdictional wetlands. Special aquatic sites are large or small geographic areas that possess special ecological characteristics of productivity, habitat, wildlife protection or other important and easily disrupted ecological values (40 CFR 230.3). Wetlands are a type of special aquatic site that includes "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" [33 CFR 328.3(a)(7)(b)].

There are effectively three categories of wetlands:

- Jurisdictional wetlands, which are defined as those wetlands which are within the extent of COE regulatory review. They must contain three components: hydric soils, a dominance of hydrophytic plants, and wetland hydrology. Navigable, non-isolated wetlands and other Waters of the U.S. are considered jurisdictional by the COE.

- Non-jurisdictional wetlands, which are non-navigable, isolated intrastate wetlands (e.g., playas) and other Waters of the U.S. These wetlands are not considered to be jurisdictional as a result of Supreme Court rulings [*Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers*, January 9, 2001 and consolidated cases *Rapano v. United States* and *Carabell v. United States* (known as the "Rapanos" decision), June 19, 2006].

- Functional wetlands, which are areas that contain only one of the three criteria listed under jurisdictional wetlands. The USFWS used this categorization in producing the NWI maps. These maps were produced using aerial photo interpretation, with limited field verification.

Several types of wetland systems are present within the general analysis area. These wetland systems are limited in size; however, the vegetation in these

environments is highly productive and diverse, and provides habitat for many wildlife species. Further, the systems as a whole play important roles in controlling floodwaters, recharging groundwater, and filtering pollutants (Niering 1985).

A preliminary wetlands inventory, based on USFWS NWI mapping and vegetation mapping in the field, was conducted in 2004. The wetland analysis area includes the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional lands evaluated by BLM under Alternative 1) and a ¼-mile disturbance buffer around the tract sufficient to mine and reclaim the tract as a part of the existing Eagle Butte Mine operation (approximately 4,172 acres). A formal wetland delineation has been confirmed by the COE for the portion of the wetland analysis area (947.94 acres) that is within the current Eagle Butte Mine permit area. A formal jurisdictional wetland survey for the portion of the Eagle Butte West LBA Tract that is outside of the current Eagle Butte Mine permit area has not yet been completed.

Current field conditions may not be representative of the field conditions in the future. Wetland areas previously mapped by the USFWS NWI have been recently altered due to CBNG-related water production within and upstream of the wetland analysis area. The NWI maps were consulted prior to the initiation of the preliminary wetlands field survey; however, the boundaries of the existing potential jurisdictional wetlands vary to a greater or lesser extent from the boundaries shown on the NWI maps. Due to the ephemeral nature of CBNG dewatering activities, the boundaries, and therefore wetland areas, are likewise ephemeral. A formal jurisdictional wetland delineation survey would be conducted and submitted to the COE for verification as part of the mining and reclamation permit process, if the tract is leased.

Wetlands occur in a variety of forms within the wetland analysis area. Palustrine wetlands, defined by their close association with emergent herbaceous marshes, swales, and wet meadows, support a variety of lush plant life and occur sporadically along drainages and a few small closed depressions. These areas are supported by the saturated soils along the water courses of Little Rawhide Creek and its tributaries that are adequately supplied with surface runoff, discharged CBNG waters, and groundwater discharged from Wasatch Formation sand body aquifers (Section 3.5.1.1.2). The identified potential jurisdictional wetlands within the wetland analysis area, as identified by NWI mapping, include Riverine-Emergent Marsh and Riverine-Wet Meadow.

Within the entire wetland analysis area, the preliminary inventory identified a total of approximately 50.38 acres of Waters of the U.S., including a total of 49.85 acres of jurisdictional Waters of the U.S. Approximately 37.53 of those acres are jurisdictional wetlands that occur along the watercourses of Little Rawhide Creek and its tributaries. The 12.32 acres of jurisdictional other Waters of the U.S. that did not qualify as jurisdictional wetlands consist primarily of the open water that

is held within the linear upland drainage channels and in-channel impoundments and intermittent pools. The non-jurisdictional Waters of the U.S. contained in the wetland analysis area (approximately 0.53 acre) consists of small, isolated depressions where CBNG discharge water has ponded.

3.7.2 Environmental Consequences

3.7.2.1 Proposed Action and Alternative 1

Based on USFWS NWI mapping and vegetation mapping in the field that was completed in 2004, a maximum of approximately 37.5 acres of jurisdictional wetlands would be disturbed if the entire BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1) is leased and subsequently mined.

If the Eagle Butte West LBA Tract is leased, a formal wetland inventory would be conducted as part of the mining and reclamation permit process, thus verifying the areas of jurisdictional and non-jurisdictional wetlands, as well as the other Waters of the U.S. A formal wetland delineation has been confirmed by COE for that portion of the wetland analysis area for the proposed LBA tract that lies within Eagle Butte Mine's current permit area, but a formal wetlands inventory covering the entire LBA tract has not yet been submitted to COE for verification. This wetland inventory would be submitted to COE for verification as part of the mining and reclamation permit process. In Wyoming, once the delineation is verified by the COE, it would be made a part of the mine permit document. The reclamation plan would then be revised to incorporate replacement of at least equal types and number of jurisdictional wetlands.

Non-jurisdictional wetlands would be restored as required by the authorized federal or state agency or private surface owner as specified in the mining and reclamation permit, which would have to be approved by WDEQ/LQD before mining operations could be conducted on the Eagle Butte West LBA Tract, if it is leased.

During the period of time after mining and before replacement of wetlands, all wetland functions would be lost. The replaced wetlands may not duplicate the exact function and landscape features of the premine wetlands, but replacement plans would be evaluated by COE and replacement would be in accordance with the requirements of Section 404 of the CWA as determined by COE.

As a result of court directives, playas are no longer identified as jurisdictional Waters of the U.S. under Section 404 of the CWA. These non-jurisdictional wetland features, having significant biological and hydrological features, are not present within the preliminary wetland analysis area.

3.7.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal would not occur on the Eagle Butte West LBA Tract. The impacts to wetlands on the existing Eagle Butte Mine leases would occur as currently permitted. Impacts to wetlands related to mining operations at the Eagle Butte Mine would not occur on those portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.7.3 Regulatory Compliance, Mitigation and Monitoring

The presence of jurisdictional wetlands on a mine property does not preclude mining. A wetland delineation must be completed according to approved procedures (COE 1987) and submitted to the COE for verification as to the amounts and types of jurisdictional wetlands present. There are special required permitting procedures to assure that after mining there will be no net loss of wetlands. COE requires replacement of all impacted jurisdictional wetlands in accordance with Section 404 of the CWA.

Section 404 does not cover non-jurisdictional or functional wetlands; however, Executive Order 11990 requires that all federal agencies protect all wetlands. Mitigation for impacts to non-jurisdictional wetlands located on the tract will be specified during the permitting process as required by the authorized state or federal agency (which may include Wyoming DEQ, the Office of Surface Mining and Reclamation, or the Federal Surface Managing agency, if any federal surface is included in the tract) or the private surface owner. The surface on the Eagle Butte West LBA Tract as applied for and under BLM's preferred tract configuration for Alternative 1 is privately owned. WDEQ/LQD allows and sometimes requires mitigation of non-jurisdictional wetlands affected by mining, depending on the values associated with the wetland features. If any playas with hydrologic significance are located within the tract that is leased, WDEQ/LQD would also require their replacement.

Reclaimed wetlands are monitored using the same procedures used to identify pre-mining jurisdictional wetlands.

3.7.4 Residual Impacts

Replaced wetlands (jurisdictional or functional) may not duplicate the exact function and landscape features of the premining wetland, but all wetland replacement plans would be approved by COE, which has special required

permitting procedures to assure that there will be no net loss of wetlands after mining.

3.8 Soils

3.8.1 Affected Environment

Numerous baseline soil surveys associated with surface mining operations and oil field development have been conducted in the eastern PRB. Soil surveys of Campbell County, Wyoming, including the Eagle Butte West LBA Tract soils analysis area, have also recently been conducted by the NRCS (Prink et al. 2004). The Eagle Butte West LBA Tract soils analysis area (2,373 total acres) is the BLM study area for the tract (the LBA tract as applied for and the additional area evaluated under Alternative 1). Soil surveys were completed in 2005 by James Nyenhuis to an Order 1-2 resolution. The inventories included field sampling and observations at the requisite number of individual sites, and laboratory analysis of representative collected samples. Soils within the analysis area were identified by series, which consist of soils that have similar horizons in their profile.

Soils vary depending upon where and how they were formed. Major factors involved in the formation of soils include whether or not the material was transported and how the material was weathered during transportation. Four primary soil formation processes causing different soil types were noted in this area: 1) soils developing predominantly in thin residuum from sandstone or shale on upland ridges, 2) soils developing predominantly in slopewash, colluvium, or alluvial fan deposits from mixed sources on gently sloping uplands, 3) soils developing predominantly in coarse-textured alluvium or sandy eolian deposits on rolling uplands, and 4) drainage soils developing in mixed stream-laid alluvium on terraces and channels, and in fine-textured playa deposits in depressions and closed basins.

The soil depths and types on the Eagle Butte West LBA Tract soils analysis area are similar to soils currently being salvaged and utilized for reclamation at the adjacent Eagle Butte Mine and other mines in the eastern PRB. Additional more detailed information about the soil types on the LBA tract is included in the supplemental information document, which is available on request. The site-specific soil surveys have located hydric soils and/or inclusions of hydric soils, which are one component used in identifying wetlands. Areas with soils that are not suitable to support plant growth include sites with high alkalinity, salinity, or clay content.

3.8.2 Environmental Consequences

3.8.2.1 Proposed Action and Alternative 1

Removal and replacement of soils during mining and reclamation would cause changes in the soil resources. In reclaimed areas, soil chemistry and soil nutrient distribution would generally be more uniform and average soil quality would be improved because soil material that is not suitable to support plant growth would not be salvaged for use in reclamation. This would result in more uniform vegetative productivity on the reclaimed land.

The Eagle Butte West LBA Tract baseline soils analysis indicates that the amount of suitable soil that would be available for redistribution on all disturbed acres within the soils analysis area during reclamation would vary from an average depth of 0.67 ft to an average depth of 5.0 ft. The replaced soil would support a stable and productive vegetation community adequate in quality and quantity to support the planned postmining land uses (wildlife habitat and rangeland).

There would be an increase in the near-surface bulk density of the soil resources on the LBA tract after reclamation. As a result, the average soil infiltration rates would generally decrease, which would increase the potential for runoff and soil erosion. Topographic moderation following reclamation would potentially decrease runoff, which would tend to offset the effects of decreased soil infiltration capacity. The change in soil infiltration rates would not be permanent because revegetation and natural weathering action would form a new soil structure in the reclaimed soils, and infiltration rates would gradually return to premining levels. The reclaimed landscape would contain stable landforms and drainage systems that would support the postmining land uses. Reconstructed stream channels and floodplains would be designed and established to be erosionally stable.

Direct biological impacts to soil resources on the Eagle Butte West LBA Tract would include short-term to long-term reduction in soil organic matter, microbial populations, seeds, bulbs, rhizomes, and live plant parts for soil resources that are stockpiled before placement.

Potential impacts to soil resources on the LBA tract after final reclamation under the Proposed Action or Alternative 1 are quantified as follows. Under the currently approved mining and reclamation plan, approximately 6,076 acres of soil resources will be disturbed in order to mine the coal in the existing leases at the Eagle Butte Mine (Table 3-1). If the Eagle Butte West LBA Tract is leased, disturbance related to coal mining would directly affect from approximately 2,395 to 2,415 additional acres of soil resources on and adjacent to the LBA tract under the Proposed Action or under BLM's preferred tract configuration for Alternative 1, respectively (Table 3-1). Average soil thickness would be about 24 inches across the entire reclaimed surface. The types of soils and the quantities of the soil resource included in the LBA tract as applied for and in BLM's preferred tract

configuration under Alternative 1 are similar to the soils on the existing leases at the Eagle Butte Mine. As discussed in Section 3.0, the estimates of recoverable coal, associated disturbance, and mine life shown in Table 3-1 assume that U.S. Highway 14-16 is not moved.

3.8.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal and the associated disturbance and impacts to soils would not occur on from 2,395 additional acres (Proposed Action) up to 2,415 additional acres (BLM's preferred tract configuration under Alternative 1). Coal removal and the associated soil removal and replacement would occur on the existing Eagle Butte Mine leases as currently permitted (as summarized in Table 3-1). Impacts to soils related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.8.3 Regulatory Compliance, Mitigation and Monitoring

Soils suitable to support plant growth would be salvaged for use in reclamation. Soil stockpiles would be protected from disturbance and erosional influences. Soil material that is not suitable to support plant growth would not be salvaged. Soil or overburden materials containing potentially harmful chemical constituents (such as selenium) would be specially handled.

At least four ft of suitable overburden would be selectively placed on the graded backfill surface below the replaced soil to meet guidelines for vegetation root zones. After soil is replaced on reclaimed surfaces, revegetation would reduce wind erosion. The mine would construct sediment control structures as needed to trap eroded soil.

Regraded overburden would be sampled for compliance with root zone criteria. Vegetation growth would be monitored on reclaimed areas to determine if soil amendments are needed.

These measures are required by regulation and are therefore considered to be part of the Proposed Action and Alternative 1 for the Eagle Butte West LBA Tract.

3.8.4 Residual Impacts

Existing soils would be mixed and redistributed, and soil-forming processes would be disturbed by mining. This would result in long-term alteration of soil characteristics.

3.9 Vegetation

3.9.1 Affected Environment

The Eagle Butte West LBA Tract vegetation analysis area (2,373 total acres) is the BLM study area for the LBA tract (the tract as applied for and the additional area evaluated under Alternative 1). Part of the Eagle Butte West LBA Tract vegetation analysis area is located within the current Eagle Butte Mine permit boundary (Figure 3-1). Consequently, portions of the analysis area were previously mapped and sampled in accordance with the current WDEQ/LQD mine permitting requirements. The balance of the vegetation assessment was completed by Habitat Management, Inc. of Gillette, Wyoming in 2004. The vegetation communities in this area were appraised and mapped to provide a preliminary assessment.

The vegetation within the analysis area consists of species common to eastern Wyoming and consistent with vegetation that occurs within the adjacent Eagle Butte Mine permit area. A total of five vegetation types have been preliminarily identified and mapped within the Eagle Butte West LBA vegetation analysis area. Water and disturbed areas were also mapped. The vegetation types include Agricultural Pasture 1, Sagebrush/Grassland, Agricultural Pasture 2, Grassland, and CBNG Impacted Bottomland. Table 3-9 presents the acreage and percent of the analysis area encompassed by each vegetation type. Additional more-detailed information about the vegetation types within the LBA tract is included in the supplemental information document, which is available on request.

In terms of total acres of occurrence in the vegetation analysis area, the predominant vegetation types are Agricultural Pasture 1 (36.1 percent), Sagebrush/Grassland (27.6 percent), and Agricultural Pasture 2 (11.9 percent). Common plant species on these types include crested wheatgrass, smooth brome, needleandthread, threadleaf sedge, Sandberg bluegrass, western wheatgrass, and cheatgrass brome. Shrub/subshrub species are absent or a minor component of the Agricultural Pasture 1 vegetation community. Dominant shrubs in the Sagebrush/Grassland and Agricultural Pasture 2 vegetation communities include silver sagebrush and Wyoming big sagebrush. Lichen can make a substantial contribution to ground cover within the Sagebrush/Grassland type, particularly in dry years. Disturbed Area, Open Water, CBNG-Impacted Bottomland, and Grassland cumulatively occupy approximately 24 percent of the vegetation analysis area. CBNG-Impacted Bottomlands and Disturbed Areas were identified and mapped but not quantitatively sampled in this study. The CBNG-Impacted

Table 3-9. Vegetation Types Identified and Mapped Within the Eagle Butte West LBA Tract Vegetation Analysis Area.

Vegetation Type	Acres	Percent of Area
Agricultural Pasture 1	850.3	36.1
Sagebrush/Grassland	651.6	27.6
Disturbed Area	389.7	16.5
Agricultural Pasture 2	280.6	11.9
Grassland	134.9	5.7
CBNG-Impacted Bottomland	31.5	1.3
Open Water (Reservoir)	19.2	0.8
Total	**2,357.8**	**100.0**

Source: Nyenhuis 2005

Bottomlands community would be characterized during a formal jurisdictional wetland inventory. The common species in the Grasslands community, which occupies about 5.7 percent of the vegetation analysis area, include western wheatgrass, Sandberg bluegrass, cheatgrass brome, needle and thread, green needlegrass, and prairie Junegrass. Shrubs and subshrubs are essentially absent from the Grassland community and plains pricklypear cactus is found in varying densities. In addition to the five vegetation communities, there are also two domestic shelterbelts associated with the two residences that are within the vegetation analysis area containing a total of approximately 310 trees. Roughly 12 mature cottonwood trees also occur around the perimeter of the stock reservoir that is located within the southern portion of the additional area evaluated by BLM under Alternative 1, but outside of BLM's preferred tract configuration under Alternative 1.

3.9.2 Environmental Consequences

3.9.2.1 Proposed Action and Alternative 1

Under the currently approved mining and reclamation plan, approximately 6,076 acres of vegetation will be disturbed in order to mine the coal in the existing leases at the Eagle Butte Mine. Under the Proposed Action, mining of the Eagle Butte West LBA Tract would progressively remove the native vegetation on 2,395 additional acres on and near the LBA tract. Under BLM's preferred tract configuration for Alternative 1, mining of the LBA tract would progressively remove the native vegetation on up to 2,415 additional acres on and near the LBA tract. Vegetation removal on the LBA tract under both alternatives is presented as the additional mine disturbance area in Table 3-1. As discussed in Section 3.0, the estimates of recoverable coal, associated disturbance, and mine life shown in Table 3-1 assume that U.S. Highway 14-16 is not moved.

Short-term impacts associated with the removal of vegetation from the Eagle Butte West LBA tract would include increased soil erosion and habitat loss for wildlife and livestock. Potential long-term impacts include loss of habitat or loss of habitat carrying capacity for some wildlife species as a result of reduced plant species diversity or reduced plant density for some species, particularly big sagebrush, on reclaimed lands. However, grassland-dependent wildlife species and livestock would benefit from the increased grass cover and production.

Reclamation, including revegetation of these lands, would occur contemporaneously with mining on adjacent lands, i.e., reclamation would begin once an area is mined. Estimates of the time elapsed from soil stripping through reseeding of any given area range from two to four years. This would be longer for areas occupied by stockpiles, haulroads, sediment-control structures, and other mine facilities. Some roads and facilities would not be reclaimed until the end of mining. No new life-of-mine facilities would be located on the LBA tract under the Proposed Action or Alternative 1 because the LBA tract would be mined as an extension of an existing mine using existing facilities.

Grazing restrictions prior to mining and during reclamation would remove up to 100 percent of the LBA area from livestock grazing. This reduction in vegetative production would not seriously affect livestock production in the region, and long-term productivity on the reclaimed land would return to premining levels within several years following seeding with the approved final seed mixture. There would not be a substantial restriction of wildlife use of the area throughout the operations.

In an effort to approximate premining conditions, the applicant would plan to reestablish vegetation types that are similar to the premine types during the reclamation operation. Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures (to be approved by WDEQ). The majority of the approved species are native to the LBA tract. Initially, the reclaimed lands would be primarily a mixture of prairie grasslands with graminoid/forb-dominated areas. An overall reduction in species diversity, especially for the shrub component, would occur. At least 20 percent of the native vegetation area would be reclaimed to native shrubs at a density of one per square meter as required by current regulations. Estimates for the time it would take to restore shrubs, including sagebrush, to premining density levels range from 20 to 100 years. As indicated previously, sagebrush is a component of both the Sagebrush/Grassland and Agricultural Pasture 2 vegetation communities, which occupy about 40 percent of the vegetation analysis area. Following completion of reclamation (seeding with the final seed mixture) and before release of the final reclamation bond (a minimum of 10 years), a diverse, productive, and permanent vegetative cover would be established on the LBA tract. The decrease in plant diversity would not seriously affect the potential productivity of the reclaimed areas, and the proposed postmining land use (wildlife habitat and rangeland) should be achieved even with the changes in vegetation composition and diversity.

Native vegetation from surrounding areas would gradually invade and become established on the reclaimed land.

Following reclamation bond release, management of the privately owned surface areas would revert back to the private surface owners, who would have the right to manipulate the reclaimed vegetation.

A reduction in sagebrush would result in a long term reduction of habitat for some species and may delay use of the reclaimed area by shrub-dependent species, such as the sage-grouse. An indirect impact of this vegetative change could be decreased big game habitat carrying capacity.

On average, roughly 200 to 300 acres of surface would be disturbed per year of mining if the Eagle Butte West LBA Tract is leased and mined, regardless of which alternative is selected. By the time mining ceases, over 75 percent of these disturbed lands would have been reseeded. The remaining 25 percent would be reseeded during the following two to three years as the life-of-mine facilities area is reclaimed.

The reclamation plan for the existing Eagle Butte Mine includes steps to control invasion by weedy (invasive nonnative) plant species because WDEQ/LQD rules and regulations require surface coal mine operators to control and minimize the introduction of noxious weeds until bond release, in accordance with federal and state requirements. As a result, there are few occurrences of noxious weeds in the mine area. The reclamation plan for the Eagle Butte West LBA Tract would also include steps to control invasion from such species.

Wyoming, including the PRB, has been experiencing drought conditions for the past seven or eight years. The climatic record of the western U.S. suggests that droughts have occurred in the past and could occur periodically during the life of the mine. Droughts tend to hamper revegetation efforts because lack of sufficient moisture reduces germination and could damage newly established plants. Same-aged vegetation is more susceptible to disease than plants of various ages. Severe thunderstorms could also adversely affect newly seeded areas. Once a stable vegetative cover is established, however, these events would have similar impacts as would occur on native vegetation.

Changes expected in the surface water network on the LBA tract as a result of mining and reclamation would affect the reestablishment of vegetation patterns on the reclaimed areas to some extent. The postmining maximum overland slope would be 20 percent, in accordance with WDEQ policy. The average reclaimed overland slope on the LBA tract would not be known until WDEQ's technical review of the permit revision application is complete. No major changes in the average overland slope are predicted.

There would be no net loss of jurisdictional wetlands. They would be restored under the jurisdiction of the COE (Section 3.7). Non-jurisdictional and functional wetlands would be restored in accordance with the requirements of the surface landowner or as required by WDEQ/LQD.

3.9.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and coal removal and the associated disturbance and impacts to vegetation would not occur on from 2,395 to 2,415 acres that would be disturbed under the Proposed Action or BLM's preferred tract configuration for Alternative 1, respectively. Coal removal and the associated vegetation removal and replacement would occur on the existing Eagle Butte Mine leases as currently permitted (as summarized in Table 3-1). Impacts to vegetation related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.9.3 Threatened, Endangered, Proposed, and Candidate Plant Species, and BLM Sensitive Species

Refer to Appendices E and F.

3.9.4 Regulatory Compliance, Mitigation and Monitoring

Reclaimed areas would be revegetated as specified in the approved mine plan using reclamation seed mixtures which would be approved by WDEQ. The majority of the species would be native to the LBA tract. At least 20 percent of the native vegetation area would be reclaimed to native shrubs at a density of one per square meter as required by current regulations. Shrubs would be selectively planted in riparian areas.

WDEQ/LQD Rules and Regulations require that:

- Permit applications for surface coal mines include a description of any weeds or other plants listed by the local Weed and Pest Control District as harmful (Chapter 2, Section 2(a)(vi)(C)(2)); and

- Surface coal mine operators control and minimize the introduction of noxious weeds in accordance with federal or state requirements (Chapter 4, Section 2(d)(xiv)).

In accordance with these requirements, the Eagle Butte Mine works with the Campbell County Weed and Pest Department and conducts an active noxious weed control program on their existing coal leases and would be required to continue those practices if they acquire a lease for the Eagle Butte West LBA Tract.

Detailed wetland mitigation plans would be developed and approved by COE during the permitting stage to ensure no net loss of jurisdictional wetlands occurs within the total disturbance area (Section 3.7). Non-Jurisdictional and functional wetlands would be restored in accordance with the requirements of the surface landowner or as required by WDEQ/LQD, as discussed in Section 3.7.

Revegetation growth and diversity would be monitored until the final reclamation bond is released (a minimum of 10 years following seeding with the final seed mixture). Erosion would be monitored to determine if there is a need for corrective action during establishment of vegetation. Controlled grazing would be used during revegetation to determine the suitability of the reclaimed land for post-mining land uses.

3.9.5 Residual Impacts

Reclaimed vegetative communities may never completely match the surrounding native plant community.

3.10 Wildlife

3.10.1 General Setting

This section discusses the affected environment and potential environmental consequences to wildlife in general. The subsequent sections address the potential impacts to specific groups of wildlife species.

3.10.1.1 Affected Environment

Background information on wildlife in the vicinity of the Eagle Butte West LBA Tract was drawn from several sources, including the South Powder River Basin Coal FEIS (BLM 2003a), WGFD and USFWS records, and personal contacts with WGFD and USFWS biologists. Site-specific data for the Eagle Butte West LBA Tract general analysis area were obtained from several sources, including WDEQ/LQD mine permit applications and annual wildlife monitoring reports for the applicant and nearby coal mines. Baseline and annual wildlife monitoring surveys have been conducted for the adjacent Eagle Butte Mine since the mid-1970s. A majority of the proposed lease area has previously been surveyed during these baseline and annual wildlife surveys because the required survey area extends beyond the mine permit area. FCW initiated baseline investigations in 2004 expressly for the Eagle Butte West LBA Tract. Site-specific surveys for the

tract and adjacent area would be a part of the mine permitting process if the tract is leased.

The topography within the vicinity of the LBA tract is generally level to gently rolling, dissected by locally shallow gullies and the broader meandering floodplain of Little Rawhide Creek, an intermittent stream. The steepest terrain is located in the extreme northwestern corner of the BLM study area, outside of the tract as applied for or BLM's preferred tract configuration (Figure 3-1). Unmined lands surrounding the LBA tract are characterized by low rolling hills with a prominent ridgeline immediately to the west. Surface mine lands, both active and reclaimed, dominate the landscape adjacent to the LBA tract's eastern edge. Elevations range from approximately 4,240 to 4,560 feet above sea level.

In an undisturbed condition, the major vegetation types in the general analysis area would provide habitat for many species. Vegetation types tend to occur in a mosaic across the landscape; therefore, many wildlife species can be expected to utilize more than one habitat type. Predominant wildlife habitat types classified on the LBA tract and adjacent area correspond with the major plant communities defined during the vegetation baseline survey. As discussed in Section 3.9, they consist primarily of seeded grassland (Agricultural Pasture 1 and 2), Grassland, and Sagebrush/Grassland vegetation types. Various, relatively small parcels of crested wheatgrass pasture occur throughout the area. As a result of oil and gas development, there are networks of road and well-pad disturbance areas overlaying much of the Sagebrush/Grassland and Grassland vegetation areas, as well as tank batteries and pipeline disturbance with varying degrees of recovering vegetative cover. No designated crucial or unique habitats are present.

Seeded grassland (Agricultural Pasture 1 and 2 vegetation types combined) is the largest overall habitat type (48 percent) within the vegetation analysis area. It is dominated by crested wheatgrass, but older seedings have a mixture of less dominant native plant species and, with the passage of time, these seedings begin to resemble sagebrush grassland again. The predominant native habitats are Sagebrush/Grassland and Grassland types (26.6 percent and 5.7 percent, respectively). Bottomland grassland or streamside bottomland habitat is limited to a narrow band along limited reaches of Little Rawhide Creek. Trees are present within residential windbreaks and around an impoundment located within the BLM study area, but outside of the tract as applied for or BLM's preferred tract configuration under Alternative 1 (Section 3.9).

Little Rawhide Creek passes through the eastern portion of the LBA tract from south to north and its tributary, Prong Draw, passes through the central portion of the tract from southwest to northeast (Figure 3-13). Under natural conditions, Little Rawhide Creek is classified as an intermittent stream and its tributaries, including Prong Draw, are all ephemeral streams. Essentially all water courses in the study area are currently receiving discharge water from CBNG development. At least seven distinct in-channel impoundments are located on the Eagle Butte

West LBA Tract as applied for and three others are located on the additional area evaluated under Alternative 1. Due to the discharge water from CBNG development, streamflow occurrence is more persistent and these shallow impoundments along Little Rawhide Creek and Prong Draw are seldom completely dry, resulting in an increase in habitat for waterfowl, shorebirds, and aquatic species.

Eagle Butte Mine's approved WDEQ/LQD mine permit allows disturbance of the Little Rawhide Creek channel. Approximately 3.5 miles of the natural channel has been diverted to-date within the Eagle Butte Mine's current permit area. FCW would propose another diversion of Little Rawhide Creek if they acquire a lease for the Eagle Butte West LBA Tract.

3.10.1.2 Environmental Consequences

3.10.1.2.1 Proposed Action and Alternative 1

If the Eagle Butte West LBA Tract is leased under the Proposed Action or BLM's preferred tract configuration for Alternative 1, coal mining operations at the Eagle Butte Mine would be extended by up to nine years. Impacts to wildlife that would be caused by mining the LBA tract would be addressed as part of the review of the mine permit application by the WGFD and the WDEQ/LQD when the mining and reclamation permit is amended to include the LBA tract.

Mining directly and indirectly impacts local wildlife populations. These impacts are both short-term (until successful reclamation is achieved) and long-term (persisting beyond successful completion of reclamation). The direct impacts of surface coal mining on wildlife occur during mining and are therefore short-term. They include road kills by mine-related traffic, restrictions on wildlife movement created by fences, spoil piles, and pits, and displacement of wildlife from active mining areas. Displaced animals may find suitable habitat that is not occupied by other animals, occupy suitable habitat that is already being used by other individuals, or occupy poorer quality habitat than that from which they were displaced. In the second and third situations, the animals may suffer from increased competition with other animals and are less likely to survive and reproduce. If the Eagle Butte West LBA Tract is leased and mined, the direct impacts related to mine traffic and mine operations would be extended within the general analysis area by up to nine years.

The indirect impacts are longer term. After the LBA tract is leased, mined, and reclaimed, alterations in the topography and vegetative cover, particularly the reduction in sagebrush density, would cause a decrease in carrying capacity for some species and a decrease in vegetative diversity. Sagebrush would gradually become reestablished on the reclaimed land, but the topographic changes would be permanent. Microhabitats may be reduced on reclaimed land due to flatter topography, less diverse vegetative cover, and reduction in sagebrush density.

3.10.1.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and the impacts to wildlife and wildlife habitat associated with coal removal described above would not occur on the Eagle Butte West LBA Tract. Wildlife habitat on from 2,395 to 2,415 additional acres (under the Proposed Action and BLM's preferred tract configuration for Alternative 1, respectively) would not be disturbed. Mining operations and associated impacts to wildlife and wildlife habitat would continue as currently permitted on the existing Eagle Butte Mine coal leases but would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

3.10.2 Big Game

3.10.2.1 Affected Environment

The two big game species that are common in suitable habitat throughout the general analysis area are pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*). White-tailed deer (*Odocoileus virginianus*) are occasionally observed and there have been isolated reports of elk sightings. No crucial big game habitat or migration corridors are recognized by the WGFD in this area.

Pronghorn are by far the most common big game species in this area. This species is most abundant in the sagebrush grassland or mixed-grass prairie habitats. Reclaimed grassland constitutes only a small portion of the available habitat around the PRB mines, although pronghorn are observed during all seasonal surveys in these areas. Home range for pronghorn can vary between 400 acres to 5,600 acres, according to several factors including season, habitat quality, population characteristics, and local livestock occurrence. Typically, daily movement does not exceed six miles. Pronghorn may make seasonal migrations between summer and winter habitats, but migrations are often triggered by availability of succulent plants and not local weather conditions (Fitzgerald et al. 1994). The WGFD has classified the general analysis area as primarily winter/yearlong pronghorn range, which means that a population or a portion of a population of animals makes general use of this habitat on a year-round basis and that there is a significant influx of additional animals onto this habitat from other seasonal ranges in the winter. The entire general analysis area is within the WGFD Gillette Herd Unit. In post-season 2005, the WGFD estimated the Gillette Herd Unit to be 17,400 animals, with an objective of 11,000 (WGFD 2006).

Mule deer use nearly all habitats, but prefer sagebrush grassland, rough breaks, and riparian bottomland. Browse is an important component of the mule deer's diet throughout the year, comprising as much as 60 percent of total intake during autumn, while forbs and grasses typically make up the rest of their diet (Fitzgerald et al. 1994). Mule deer are frequently observed on Eagle Butte Mine reclaimed lands. In certain areas of the state, this species tends to be more migratory than

white-tailed deer, traveling from higher elevations in the summer to winter ranges that provide more food and cover. However, monitoring indicates that mule deer are not very migratory in the vicinity of the Eagle Butte West LBA Tract. The WGFD has classified a majority of the general analysis area as being out of normal mule deer use range, which means an area that does not contain enough animals to be an important habitat or is a habitat that is of limited importance to a species. The entire area is located within the WGFD Powder River Mule Deer Herd Unit. No crucial mule deer ranges or migration corridors are present on or within several miles of the Eagle Butte West LBA Tract. Crucial range is defined as any particular seasonal range or habitat component that has been documented as the determining factor in a population's ability to maintain and reproduce itself at a certain level. The WGFD estimated the 2005 post-season mule deer for the herd unit at 53,000, which is near the current objective of 52,000 (WGFD 2006).

White-tailed deer are generally managed separately by the WGFD in the Central Herd Unit. White-tailed deer prefer riparian habitats and are therefore seldom observed in the general analysis area due to the lack of that particular habitat. The WGFD classifies the entire general analysis area as out of the normal white-tailed deer use range. White-tailed deer are occasionally recorded along Rawhide Creek and the Little Powder River to the north but have rarely been recorded in the general analysis area.

The nearest elk population is in the Fortification Unit, approximately 15 miles to the west of the general analysis area. None of the general analysis area is classified by the WGFD as within normal elk use range. The LBA tract does not include the types of terrain or vegetation that would provide security cover for elk. Although there have been isolated sightings of elk in the general area, no elk have been observed recently within the general analysis area.

3.10.2.2 Environmental Consequences

3.10.2.2.1 Proposed Action and Alternative 1

Under the Proposed Action and the BLM's preferred tract configuration under Alternative 1, big game would be displaced from portions of the Eagle Butte West LBA Tract to adjacent ranges during mining. Pronghorn would be most affected; however, no areas classified as crucial pronghorn habitat occur on or within two miles of the LBA tract. Mule deer would not be substantially impacted, given their infrequent use of these lands and the availability of suitable habitat in adjacent areas. White-tailed deer are not usually found in the area but are occasionally observed to the north. None of the land within the general analysis area is considered by WGFD to be an elk use area and no elk have been observed within the general analysis area for the Eagle Butte West LBA Tract in recent years.

Big game displacement would be incremental, occurring over several years, which would allow for gradual changes in distribution patterns. Big game residing in the

adjacent areas could be impacted by increased competition with displaced animals. Noise, dust, and associated human presence would cause some localized avoidance of foraging areas adjacent to mining activities. On the existing coal leases, however, big game have continued to occupy areas adjacent to and within areas of active mining disturbance, suggesting that some animals may become habituated to such disturbances.

Big game animals are highly mobile and can move to undisturbed areas. There would be restrictions on big game movement on or through the tract due to the construction of fences, spoil piles, and pits related to mining. During winter storms, pronghorn may not be able to negotiate these barriers. WDEQ guidelines require fencing to be designed to permit pronghorn passage to the extent possible. Following reclamation, topographic moderation and changes in vegetation may result in a long-term reduction in big game carrying capacity.

3.10.2.2.2 No Action Alternative

The impacts to big game under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.3 Other Mammals

3.10.3.1 Affected Environment

A variety of small and medium-sized mammal species occur in the vicinity of the general analysis area, although not all have been observed on the LBA tract. These include predators and furbearers, such as coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*), badger (*Taxidea taxus*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), and beaver (*Castor canadensis*). Prey species include various rodents [including mice, rats, voles, gophers, ground squirrels, chipmunks, and black-tailed prairie dogs (*Cynomys ludovicianas*)] and lagomorphs (jackrabbits and cottontails). These prey species are cyclically common and widespread throughout the region. Porcupines (*Erethizon dorsatum*) and bats [such as hoary (*Lasiurus cinereus*) and big brown (*Eptesicus fuscus*)] also have habitat in the vicinity. The prey species are important for raptors and other predators.

The black-tailed prairie dog was added to the list of candidate species for federal listing on February 4, 2000 (USFWS 2000a). The USFWS has since removed the black-tailed prairie dog from the list of candidate species (USFWS 2002a), but continues to encourage the protection of prairie dog colonies for their value to the prairie ecosystem and the myriad of species that rely on them (USFWS 2004).

The black-tailed prairie dog is a highly social, diurnally active, burrowing mammal. Aggregations of individual burrows, known as colonies, form the basic unit of prairie dog populations. Found throughout the Great Plains in shortgrass

and mixed-grass prairie areas (Fitzgerald et al. 1994), the black-tailed prairie dog has declined in population numbers and extent of colonies in recent years. The three major impacts that have influenced black-tailed prairie dog populations are the initial conversion of prairie grasslands to cropland in the eastern portion of its range from approximately the 1880s-1920s; large-scale control efforts conducted from approximately 1918 through 1972, when an Executive Order was issued banning the use of compound 1080; and the introduction of sylvatic plague into North American ecosystems in 1908 (USFWS 2000b). In Wyoming, this species is primarily currently found in isolated populations in the eastern half of the state (Clark and Stromberg 1987). USFWS recently estimated that about 125,000 acres of black-tailed prairie dog occupied habitat exists in Wyoming (USFWS 2000b). Many other wildlife species, such as the black-footed ferret, swift fox, mountain plover, ferruginous hawk, and burrowing owl may be dependent on the black-tailed prairie dog for some portion of their life cycle (USFWS 2000b).

The species is considered a common resident in eastern Wyoming, utilizing shortgrass and mid-grass habitats (Luce et al. 1999). Prairie dogs construct extensive burrow systems in fine- to medium-textured upland soil types. According to USDA-FS observations on the Thunder Basin National Grassland, the largest concentrations of prairie dog colonies in the vicinity of the eastern PRB surface coal mines are found east of the coal burnline, which is outside and east of the area of surface coal mining (Tim Byer, personal communication 9/11/2003). The large prairie dog complexes in this area east of the coal burnline have recently been drastically impacted by outbreaks of plague. The prairie dog colonies west of the burnline, including the areas near the Eagle Butte West LBA Tract, are generally smaller and less densely concentrated. These colonies have not been affected by plague.

Surveys have been conducted to locate prairie dog colonies on and within one mile of the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1). One prairie dog town was found within this survey area. This small town (approximately one acre in area) is located just over ¾-mile north of the BLM study area (Figure 3-14). Additional discussion of prairie dog colonies identified in the vicinity of the Eagle Butte Mine area is included in the Biological Assessment (Appendix E) of this EIS.

3.10.3.2 Environmental Consequences

3.10.3.2.1 Proposed Action and Alternative 1

Medium-sized mammals (such as lagomorphs, coyotes, and foxes) would be temporarily displaced to other habitats by mining, potentially resulting in increased competition and mortality. However, these animals would rebound as forage is developed or small mammal prey species recolonize the reclaimed areas. Direct losses of small mammals would be higher than for other types of wildlife because the mobility of small mammals is limited and many would retreat into

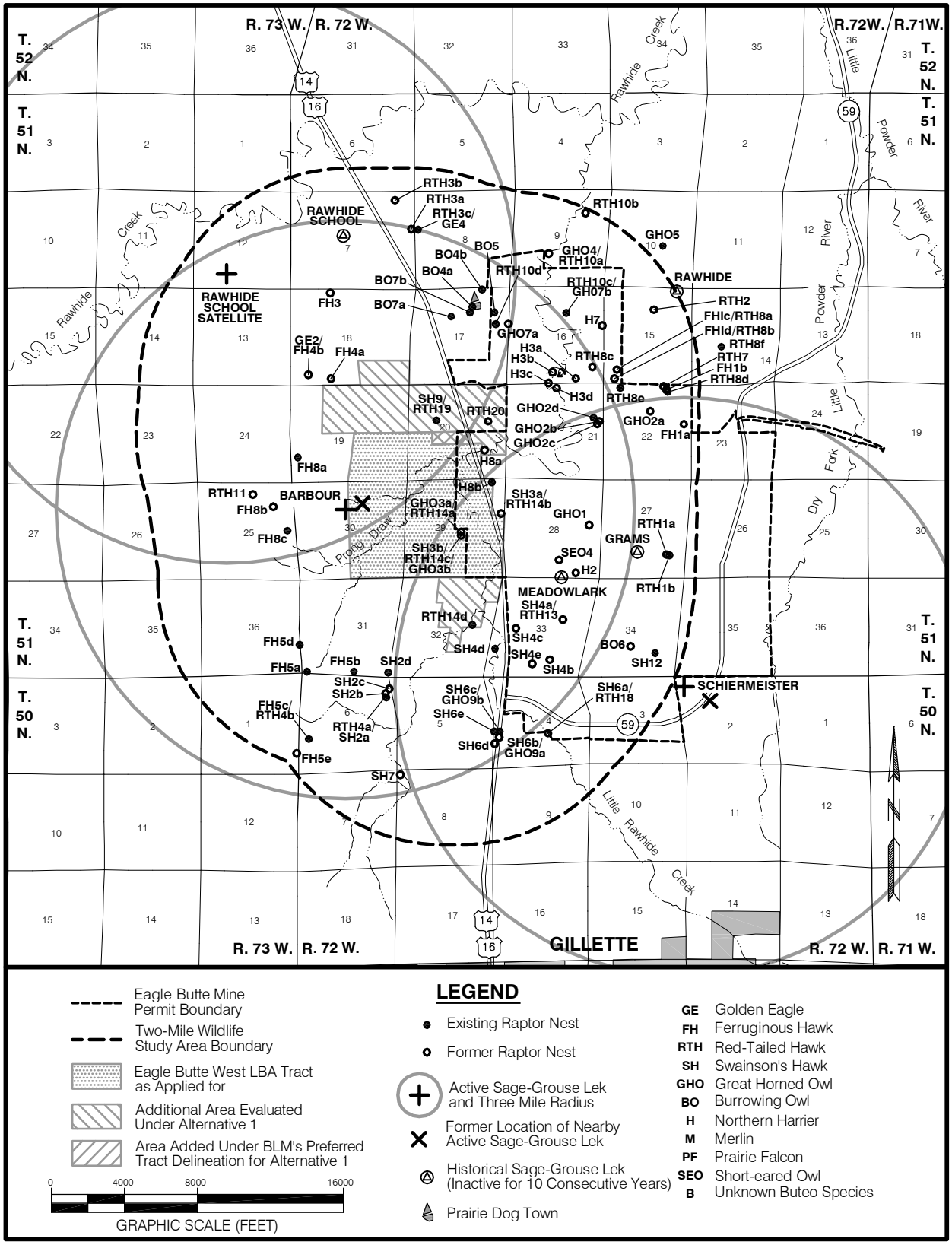


Figure 3-14. Raptor Nest Sites, Sage-Grouse Leks, and Prairie Dog Towns Within and Adjacent to the Eagle Butte West LBA Tract.

burrows when disturbed. Therefore, populations of such prey animals as voles, ground squirrels and mice would decline during mining. However, these animals have a high reproductive potential and would tend to re-occupy and adapt to reclaimed areas quickly. A research project on habitat reclamation on mined lands within the PRB for small mammals and birds concluded that reclamation objectives to encourage recolonization by small mammal communities are being achieved (Shelley 1992). That study evaluated sites at five separate mines.

Black-tailed prairie dogs would not be affected by leasing and mining the Eagle Butte West LBA Tract because no colonies are currently present on or within ¾ mile of the BLM study area for the tract.

3.10.3.2.2 No Action Alternative

The impacts to small mammals under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.4 Raptors

3.10.4.1 Affected Environment

The raptor species expected to occur in suitable habitats in the general analysis area include the golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), rough-legged hawk (*Buteo lagopus*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), great horned owl (*Bubo virginianus*), burrowing owl (*Athene cunicularia*), and short-eared owl (*Asio flammeus*). The bald eagle (*Haliaeetus leucocephalus*) is a migrant and winter resident as discussed in the Biological Assessment (Appendix E) of this EIS. Those species that commonly nest in the general analysis area are the golden eagle, red-tailed hawk, Swainson's hawk, northern harrier, burrowing owl, and great horned owl. The short-eared owl and ferruginous hawk occasionally nest in the area. Habitat is limited for those species that nest exclusively in trees or on cliffs, but several species are adapted to nesting on the ground, creek banks, buttes, or rock outcrops.

Figure 3-14 shows the locations of raptor nests identified since monitoring began for Eagle Butte Mine in an area that includes the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1). Over time, natural forces have destroyed many nests, while others have been relocated for mitigation or removed by mining activities. In some cases, nests have been created to mitigate nest sites that were impacted by mining operations at this mine.

During surveys that were completed in 2004 by TWC, a total of five raptor species (golden eagle, northern harrier, red-tailed hawk, Swainson's hawk, and burrowing

owl) were currently nesting on the raptor survey area, which includes the BLM study area for the Eagle Butte West LBA Tract and a two-mile radius. In the past, the great horned owl, ferruginous hawk, and short-eared owl have also been identified as nesting within or adjacent to the raptor survey area. The 2004 survey identified 28 intact raptor nests in the survey area, 10 of these nests were active. No active nests were observed in 2004 on the Eagle Butte West LBA Tract as applied for or on the BLM's preferred tract configuration under Alternative 1. One active northern harrier nest and one active red-tailed hawk nest were documented on the additional area evaluated under Alternative 1. There are no intact ferruginous hawk nests within the BLM study area, but five nests are located within one mile of the Eagle Butte West LBA Tract. These nests have not been active since at least 2000. One intact, unoccupied Swainson's hawk/red-tailed hawk nest is present on the additional area evaluated by BLM under Alternative 1. No other intact raptor nests were present on the BLM study area for the Eagle Butte West LBA Tract.

3.10.4.2 Environmental Consequences

3.10.4.2.1 Proposed Action and Alternative 1

Mining the LBA tract would not impact regional raptor populations; however, individual birds or pairs may be impacted. Mining activity could cause raptors to abandon nests. USFWS recommends a one-mile buffer around all ferruginous hawk nests. No intact ferruginous hawk nests are within the BLM study area for the LBA tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1), but five nests are located within one mile of the Eagle Butte West LBA Tract. These nests have not been active since at least 2000.

USFWS and WDEQ/LQD approval would be required before mining would occur within buffer zones for active raptor nests. The Eagle Butte Mine annually monitors territorial occupancy and nest productivity on and around their existing leases. Raptor nesting activity has previously occurred in active mining and construction areas and the applicant mine has successfully executed state-of-the-art mitigation techniques to protect nest productivity.

Mining near raptor territories would minimally impact availability of raptor forage species. At the applicant mine, lack of nesting habitat for many raptor species that nest in trees or on cliffs, not a lack of forage area, has been determined to be the most important limiting factor. During mining, nesting habitat is created by the excavation process (highwalls), as well as through enhancement efforts (nest platforms, nest boxes, and tree plantings).

3.10.4.2.2 No Action Alternative

The impacts to raptor species under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.5 Upland Game Birds

3.10.5.1 Affected Environment

Four upland game bird species are known to occur in suitable habitats in the general analysis area. These species are sage-grouse (*Centrocercus urophasianus*), mourning doves (*Zenaida macroura*), sharp-tailed grouse (*Tympanuchus phasianellus*), and gray partridge (*Perdix perdix*).

Sage-grouse are a large upland game bird considered a "landscape species", annually using widespread areas of sagebrush habitats. This grouse is referred to as both sage-grouse and greater sage-grouse, and the terms are interchangeable. Sage-grouse are found in sagebrush shrub-land habitat, and sagebrush is essential for sage-grouse during all seasons of the year. During winter, sage-grouse feed almost exclusively on sagebrush leaves and buds. Suitable winter habitat requires sagebrush above snow. Sage-grouse tend to select wintering sites where sagebrush is 10-14 inches above the snow. Population and habitat analyses suggest that wintering habitat can be as limiting as mating and breeding habitats. Breeding occurs on strutting grounds (leks) during late March and April. Leks are generally situated on sites with low vegetation and little or no sagebrush, broad ridge tops, grassy openings, and disturbed sites such as burns, abandoned well locations, airstrips or roads. However, often there are areas of denser sagebrush near the lek that are used for foraging, loafing, and hiding cover (WGFD 2003). Approximately two-thirds of hens nest within three miles of the lek where they were bred. The rest of the hens usually nest within 15 miles of the lek. Sage-grouse typically nest under tall sagebrush, but may use other large shrubs. Sagebrush stands used for nesting range in height from eight to 18 inches, with individual plants reaching up to 32 inches tall. Both new spring herbaceous growth and residual cover are important in the understory for nesting sage-grouse (WGFD 2003). Hens move their brood immediately upon hatching from the nest site to brood-rearing areas. Sites used during the first 10-14 days after hatching are typically within 1.5 miles of the nest. The vast majority of chick mortality (87 percent of total brood loss in four studies conducted in Wyoming) occurs during this period. After the first 10 days, broods may have dispersed five or more miles from the nest. As summer progresses and food plants mature and dry, sage-grouse move to areas still supporting succulent herbaceous vegetation. They continue to rely on adjacent sagebrush for protection from weather and predators, and for roosting and loafing. Sage-grouse normally move off late brood-rearing habitat onto transitional fall habitat before moving onto winter range (WGFD 2003).

On and after July 2, 2002, the USFWS received three petitions requesting that the greater sage-grouse be listed as endangered across its entire range. Following a 12-month status review of the best available scientific and commercial information on the species, the USFWS found that listing was not warranted at this time. However, the USFWS continues to have concerns regarding sage-grouse

population status, trends and threats, as well as concerns for other sagebrush obligates (USFWS 2005). USFWS indicated the need for continued efforts to conserve sage-grouse and sagebrush habitat on a long-term basis. USFWS encouraged continued development and implementation of conservation strategies throughout the grouse's range.

On September 11, 2003, the Wyoming Game and Fish Commission announced that the 2003 hunting season for sage-grouse in Johnson, Sheridan, and Campbell Counties would be closed, following the deaths of 11 sage-grouse in northeastern Wyoming from West Nile virus in August and early September of that year. According to a press release, the commission took this action because the incidence of infection is much higher in northeastern Wyoming than the rest of the state and the area is on the fringe of sage-grouse range with marginal, fragmented habitat (WGFD September 11, 2003 press release). Recent lek, or strutting ground, count data indicate that Wyoming's sage-grouse populations increased slightly in 2004 and 2005. Lower incidences of West Nile virus mortalities were documented in 2004 and 2005, primarily the result of cooler temperatures that reduced mosquito populations. Sage-grouse hunting seasons were consequently reopened in 2004 (Christiansen 2004).

In May 2002, the USFWS office in Cheyenne, Wyoming released a list entitled *Coal Mine List of 40 Migratory Bird Species of Management Concern in Wyoming,* which replaced the previous *Migratory Birds of High Federal Interest List.* The greater sage-grouse is included on the new list. The presence of sage-grouse and sage-grouse sign are included in the annual sage-grouse surveys that are conducted in the spring as required by WDEQ/LQD.

Eagle Butte Mine conducts surveys to identify new sage-grouse leks and sage-grouse lek attendance at previously identified leks in the spring as part of the annual wildlife surveys that are conducted for the mine. These surveys and baseline inventories, which include the mine's permit area and a one-mile perimeter, were initiated in the mid-1970s when the mine was initially permitted. As a result, most of the area included in the proposed Eagle Butte West LBA Tract has been included in previous annual survey areas.

It is unlikely that the sage-grouse are yearlong residents in the area for the following reasons:

- As discussed in Section 3.9, the Sagebrush/Grassland vegetation type, which is characterized by the moderate to heavy presence of Wyoming big sagebrush, occupies about 28 percent of the BLM study area for the Eagle Butte West LBA Tract. Sagebrush is also present within the Agricultural Pasture 1 vegetation type.

- The lands included in the BLM study area have been included in annual wildlife monitoring for the Eagle Butte Mine since 1986. No confirmed sage-

grouse nests have been discovered during at least the last 14 years of annual monitoring. One suspected nesting attempt was recorded in 1998 (McKee 2007).

- Specific surveys for sage-grouse broods were conducted twice annually from 1993 through 2002 for the Eagle Butte Mine, including the portion of Little Rawhide Creek that is located within the Eagle Butte West LBA Tract. No sage-grouse or their sign (e.g., droppings, feathers) were recorded along the drainage during those surveys. The only documentation of the presence of sage-grouse broods since 1993 occurred three miles northeast of the LBA tract as applied for or BLM's preferred tract configuration under Alternative 1 (McKee 2007).

Four historic and two active sage-grouse leks have been monitored within the wildlife study area (Figure 3-14). The two active leks have had displaying males within the last ten years. The locations of three of the four historic leks were previously disturbed by mining operations at the Eagle Butte and Rawhide Mines. Each active lek is generally surveyed three times each breeding season.

The two active sage-grouse leks are the Barbour lek and the Rawhide School Satellite lek. The Barbour lek, located at the western edge of the Eagle Butte West LBA Tract, was first documented in 1984 during Eagle Butte Mine baseline surveys. The peak number of males was 28 in 1991. No males were recorded in surveys conducted between 1994 and 2000. Breeding activities shifted approximately 1,000 ft southwest of the original lek in 2001. Twenty-four males were observed on the strutting ground in 2001, but numbers declined through 2005 (FCW 2005b). Two sage-grouse were spotted in the general vicinity of the Barbour lek on two separate occasions in 2004 and no sage-grouse were recorded on the Barbour lek in 2005 (FCW 2005b). The Rawhide School Satellite lek was first discovered in 2001. At least 16 males were in attendance at that time. Peak male attendance declined during each of the four subsequent years and no birds were observed in the vicinity of the lek in 2005 (FCW 2005b). The fact that neither lek has been consistently active over time suggests that one or both locations could be satellites to other, larger leks located beyond the survey area (FCW 2005b).

The three historic strutting grounds that were removed in conjunction with mining activities at Eagle Butte and Rawhide Mines were the Grams, Rawhide, and Meadowlark leks. No males were in attendance at these three grounds at least one year prior to lek disturbance. No grouse have been observed at the historic Rawhide School lek since at least 1988 (WGFD data), though it was not checked every year. Figure 3-14 shows the location of the two active leks and the four historic lek sites.

As discussed above, research has indicated that most hens (approximately two-thirds) will nest within three miles of the lek where they were bred. The three-mile

radius around the Barbour and Rawhide School Satellite leks extends onto the LBA tract as proposed (Figure 3-14). The three-mile radius around another lek, the Schiermeister lek also extends onto the LBA tract. The Schiermeister lek, which is located east of Eagle Butte Mine's active mining operation just outside of the wildlife study area for the Eagle Butte West LBA Tract (Figure 3-14), was active in 2004 and 2005 (FCW 2005b). There is limited potential for use of the LBA tract by nesting sage-grouse hens due to the relatively small amount of nesting habitat (sagebrush) on the tract. As discussed above, no sage-grouse broods were recorded during at lease 16 years of brood surveys on the portion of Little Rawhide Creek that is located within the tract.

Mourning doves are a migrant and relatively common in the area during migration, particularly near sites with water sources and trees and in the summer for breeding and nesting. This species is a relatively common breeding bird in Campbell County and may be found in a variety of habitat types. Mourning doves were observed on the survey area in 2004 and 2005 (FCW 2005b).

Sharp-tailed grouse were observed in 2004 approximately one mile southeast of the LBA tract, but these sightings were infrequent, occurring only during the winter. The nearest sharp-tailed grouse lek is over six miles northeast of the survey area.

Gray (or Hungarian) partridge, an introduced species, have been infrequently observed on reclaimed areas, sagebrush shrublands, upland grassland, and cultivated lands in the vicinity of the LBA tract. In some years this species is occasionally encountered while in other years partridge appear to be totally absent. Hungarian partridge were not observed on the survey area in2004 and 2005 (FCW 2005b).

3.10.5.2 Environmental Consequences

3.10.5.2.1 Proposed Action and Alternative 1

Overall, the sage-grouse population has been steadily declining in Wyoming and across the rest of the west. A study prepared by the Western Association of Fish and Wildlife Agencies estimated that sage-grouse populations in western North America declined at an overall rate of 2.0 percent per year from 1965 to 2003 (Connelly et al. 2004). The decline rate was larger from 1965 to 1985, with populations stabilizing and some increasing from 1986 to 2003. For Wyoming, this study estimated that sage-grouse populations declined at an average rate of 9.66 percent from 1968 to 1986, and at an average rate of 0.33 percent per year from 1987 to 2003. Population lows were reached in the mid-1990s and there has been some gradual increase in numbers since that time (Connelly et al. 2004).

The Eagle Butte West LBA Tract is within the Northeast Wyoming Local Sage-Grouse Working Group (NWLSWG) Area, which includes portions of the WGFD

Sheridan and Casper regions and the Thunder Basin National Grassland, which is located south of the Eagle Butte West LBA Tract. Sage-grouse monitoring has occurred within the NWLSWG Area since 1967. Within this area, sage-grouse population trends have exhibited a cyclical pattern, with each successive peak of a cycle being lower than the preceding peak. This suggests a long term population decline since at least 1967 (Figure 3-15).

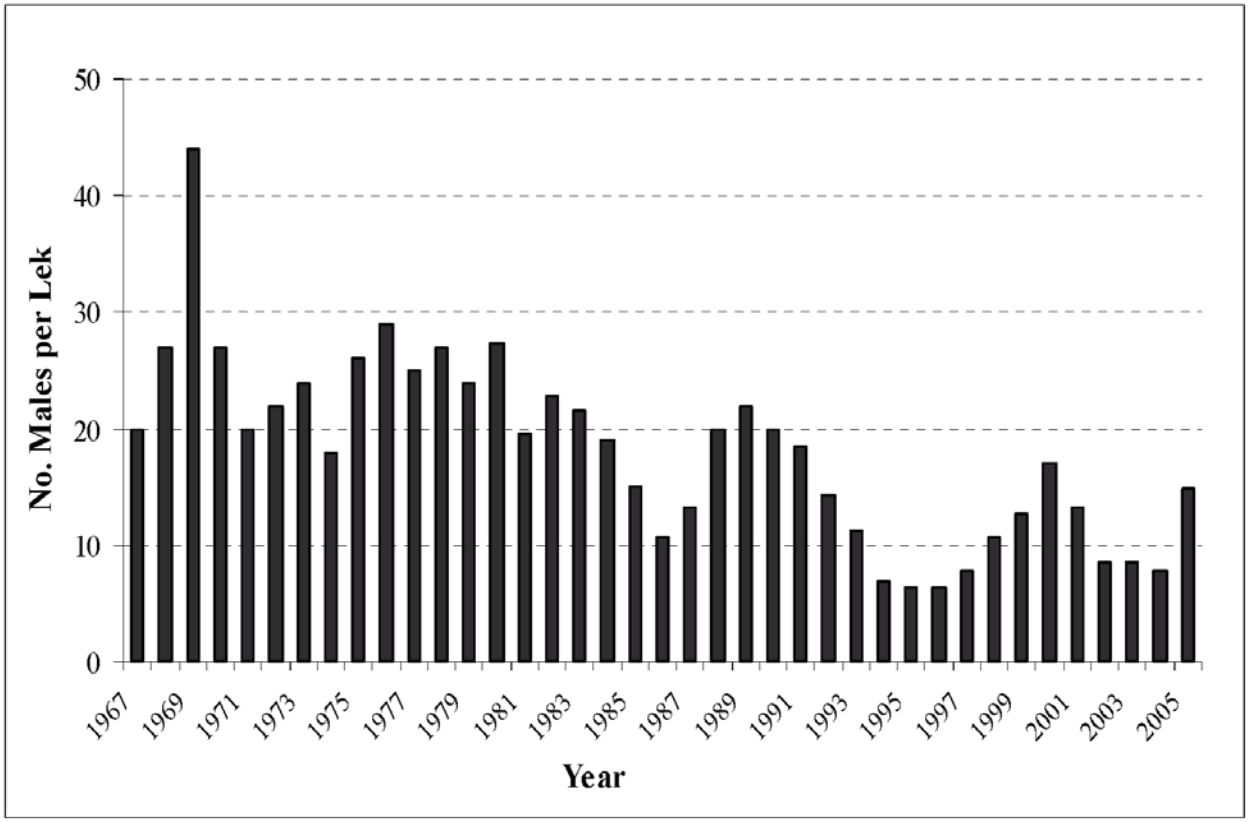


Figure 3-15. Average Male Sage-Grouse Lek Attendance Within the Northeast Wyoming Local Working Group Area (1967-2005).
(Source: USFS 2006)

Population trends within the NWLSWG Area appear to be mirroring statewide trends in Wyoming, although the average number of males per lek in the NWLSWG Area, including in the Thunder Basin National Grassland, has typically been lower than those observed state wide (Figure 3-16). Since 1996, sage-grouse populations within the state and in northeast Wyoming have fluctuated but exhibited an overall increase, with a recent peak in male lek attendance occurring in 2000 or 2001.

The causes of the range-wide decline in sage-grouse population levels are not completely understood, but they may be influenced by local conditions. However, habitat loss due to disturbance of leks, nesting and brood-rearing areas as a result of increasing development, drought, and the potential for West Nile virus, as well as loss of population connectivity are key threats to this species (Braun 1998, Wisdom et al. 2002, Naugle et al. 2004).

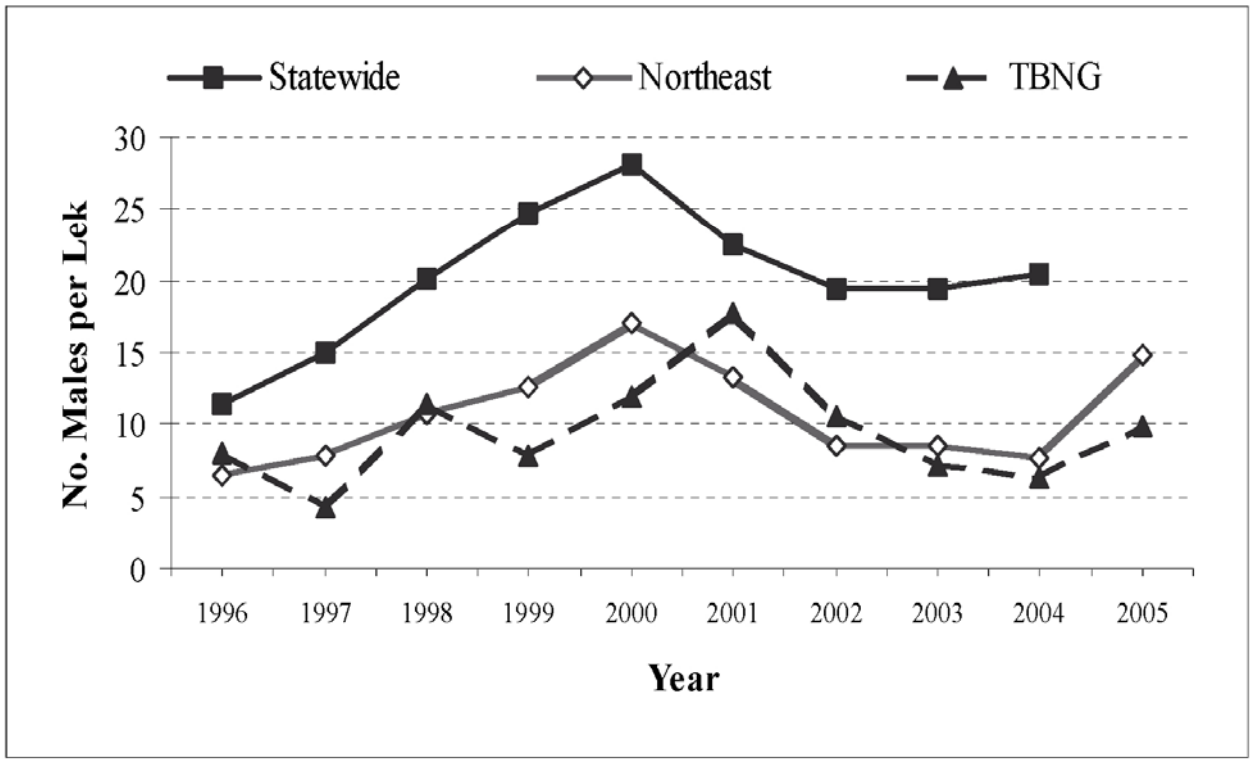


Figure 3-16. Average Male Sage-Grouse Lek Attendance Statewide, Within the Northeast Wyoming Local Working Group Area, and Within the Thunder Basin National Grasslands (1996-2005).
(Source: USFS 2006)

Some potential impacts of mineral development (including coal mining and oil and gas development) on sage-grouse include: (1) direct habitat loss and fragmentation from mine, well, road, pipeline, transmission and power line construction, (2) alteration of plant and animal communities, (3) increased human activity which could cause animals to avoid the area, (4) increased noise, which could cause animals to avoid an area or reduce their breeding efficiency, (5) increased motorized access by the public leading to legal and illegal harvest, (6) direct mortality associated with water evaporation ponds and production pits, and (7) reduced water tables resulting in the loss of herbaceous vegetation. Some of these impacts are short-term and related to specific periods of activity. In some cases, mineral development may result in positive effects, which may include increased forb production, habitat diversity, and additional water sources. Some impacts may be long-term (30 years or more), and rehabilitation of impacted habitats may take many years to complete (WGFD 2003). In the case of sage-grouse lek attendance near the Eagle Butte Mine, the decline in attendance preceded physical mining disturbance and thus may not be attributable to mine-related activities (McKee 2007).

Areas of suitable habitat for nesting and strutting grounds are needed to sustain sage-grouse populations. One recent study suggests that availability of winter habitat may also affect sage-grouse populations (Naugle et al. 2006). During mining, there is a short-term loss of potential nesting habitat and potential

disturbance to breeding activities, especially when mining operations occur in proximity to sage-grouse leks. Following reclamation, there may be a long term loss of nesting and winter habitat, depending on the amount of sagebrush that is restored relative to the amount of sagebrush that is present before mining. Sagebrush is a component of both the Sagebrush/Grassland and Agricultural Pasture 2 vegetation communities, which occupy about 40 percent of the vegetation analysis area. WDEQ/LQD reclamation standards call for restoration of sagebrush on at least 20 percent of the reclaimed area. Estimates for the time it would take to restore shrubs, including sagebrush, to premining density levels range from 20 to 100 years. Until sagebrush returns to its premining density levels, there would be a reduction in sage-grouse nesting habitat and winter habitat on the Eagle Butte West LBA Tract.

If mining activities disturb a lek, sage-grouse would have to use an alternate lek or establish a new lek site for breeding activities. There is currently one active sage-grouse strutting ground (Barbour lek) located at the edge of the Eagle Butte West LBA Tract; however, long-term monitoring at the Barbour lek suggests that it may be a satellite site to a larger source lek beyond the wildlife monitoring area, as it only appears to be used during years when regional grouse populations are high (McKee 2007). Fidelity to lek sites has been well documented (WGFD 2003), but monitoring of sage-grouse activities has indicated that the birds may change lek sites.

As discussed in Section 3.10.5.1, the Barbour, Rawhide School Satellite, and Shiermeister leks are located within three miles of the BLM study area for the Eagle Butte West LBA Tract, which is where two-thirds of the hens that were bred at those leks would be expected to nest. If the LBA tract is leased and mined, potential nesting habitat for grouse that were bred at those leks would be affected by the mining activity on the tract. However, as also previously discussed, no confirmed sage-grouse nests or sage-grouse broods have been recorded in the vicinity of the Eagle Butte West LBA Tract since 1994. The noise associated with mining operations may also disrupt sage-grouse breeding and nesting.

There is some evidence that grouse populations do repopulate areas after reclamation for the species, but there is no evidence that populations attain their previous levels and reestablishment in reclaimed areas may take 20 to 30 years, or longer (Braun 1998). Estimates for the time it would take to restore shrubs, including sagebrush, to premine density levels range from 20 to 100 years, which may delay sage-grouse repopulation in the reclaimed areas.

Leasing and mining the Eagle Butte West LBA Tract would also affect potential habitat for mourning doves, sharp-tailed grouse, and gray partridge; however, the tract does not provide unique habitat for these species. Sightings of sharp-tailed grouse and gray partridge are infrequent in this area.

3.10.5.2.2 No Action Alternative

Impacts to upland game birds under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.6 Other Birds

3.10.6.1 Affected Environment

USFWS uses a list entitled *Migratory Bird Species of Management Concern in Wyoming*, specifically the *Coal Mine List of 40 Migratory Bird Species of Management Concern in Wyoming*, for reviews related to existing and proposed coal mine leased land (USFWS 2002b). This list was taken directly from the Wyoming Bird Conservation Plan (Cerovski et al. 2001). The *Migratory Bird Species of Management Concern in Wyoming* replaced the *Migratory Birds of High Federal Interest* (MBHFI) list. Eagle Butte Mine previously conducted annual surveys for the species included on the MBHFI list and now conducts annual surveys for the species included on the coal mine list. The surveys, which are conducted in the spring and summer, include the permit area and a one-half to one mile perimeter.

The wildlife section of the supplementary information document to this EIS, which is available on request, includes a tabulation of the regional status and expected occurrence, historical observations, and breeding records for each of the species on the list of *Migratory Bird Species of Management Concern in Wyoming*, based on a compilation of the results of the annual surveys conducted on and near the proposed lease area. Twenty-four of the listed species have historically been observed within the general analysis area. Species that have been recorded nesting in the area include the burrowing owl, Brewer's sparrow (*Spizella breweri*), Swainson's hawk, short-eared owl, ferruginous hawk, lark bunting (*Calamospiza melanocorys*), grasshopper sparrow (*Ammodramus savannarum*), upland sandpiper (*Bartramia longicauda*), loggerhead shrike (*Lanius ludovicianus*), lark sparrow (*Chondestes grammacus*), and the vesper sparrow (*Pooecetes gramineus*). Other species observed in the area include the greater sage-grouse, long-billed curlew (*Numenius americanus*), peregrine falcon (*Falcon peregrinus*), bald eagle, dickcissel (*Spiza Americana*), bobolink (*Dolichonyx oryzivorus*), common loon (*Gavia immer*), red-headed woodpecker (*Melanerpes erthrocephalus*), Merlin (*Falco coumbarius*), and Spague's pipit (*Anthus spragueii*). The bald eagle is only observed in the winter or as a migrant and the long-billed curlew, peregrine falcon, dickcissel, bobolink, loon, red-headed woodpecker, Spague's pipit, and merlin have been observed infrequently as migrants.

The mountain plover (*Charadrius montanus)* is included on the list of *Migratory Bird Species of Management Concern in Wyoming*. The mountain plover was designated as a proposed threatened species by the USFWS in October 2001 (USFWS 2001). USFWS subsequently published a withdrawal of the proposed rule to list the mountain plover as threatened on September 9, 2003, (USFWS 2003).

The USFWS continues to encourage provisions that would provide protection for this species, as it continues to be protected under the Migratory Bird Treaty Act and as a sensitive species under BLM policy (Bureau Manual 6840.06 E. Sensitive Species).

Wildlife surveys conducted at the Eagle Butte Mine since the 1970s have failed to detect the presence of this species in the area. The survey area, which includes the Eagle Butte Mine permit area and a half-mile perimeter, is inventoried for suitable mountain plover habitat annually. No sightings of mountain plover have ever been recorded in the vicinity of the LBA tract.

The bald eagle is seasonally common and most frequently observed during the winter months. Bald eagles are relatively common winter residents and migrants in northeastern Wyoming's PRB. No bald eagle roosting habitat is present on the BLM study area for the Eagle Butte West LBA Tract. No known nest sites, or consistent yearly concentrated prey or carrion sources for bald eagles are present in the area of the Eagle Butte Mine, including the BLM study area for the Eagle Butte West LBA Tract. This species is infrequently observed in the general vicinity of the Eagle Butte West LBA Tract in the winter. Additional information about the observed occurrence of the bald eagle on the Eagle Butte West LBA Tract can be found in the Biological Assessment (Appendix E).

The burrowing owl is common and a pair of owls has nested in a small prairie dog town in the wildlife study area (Figure 3-14) during 10 of the last 12 years. Sage-grouse on and in the near vicinity of the Eagle Butte West LBA Tract are discussed in Section 3.10.5, above.

Suitable nesting habitat is scarce if not absent in the general analysis area for the remainder of the *Migratory Bird Species of Management Concern in Wyoming*; therefore, the other species have rarely or never been recorded.

Under natural conditions, the Eagle Butte West LBA Tract provides limited waterfowl and shorebird habitat. The natural aquatic habitat, prior to CBNG development within the Little Rawhide Creek drainage basin, was mainly available during spring migration as ponds (primarily stock reservoirs) and ephemeral streams. Many of these water features generally got quite low or dried up during the summer. However, the relatively recent development of CBNG resources upstream and within the general analysis area has supplied the creek, its tributaries, and in-stream reservoirs/ponds with water nearly continuously, resulting in an increase in habitat for waterfowl and shorebird species. Broods of blue-winged teal (*Anas discors*), mallard (*Anas platyrhynchos*), northern shoveler (*Anas clypeata*), Canada goose (*Branta canadensis*), killdeer (*Charadrius vociferous*), and American avocet (*Recurvirostra americana*) were observed during 2004 and 2005 (FCW 2005b).

3.10.6.2 Environmental Consequences

3.10.6.2.1 Proposed Action and Alternative 1

Of the twenty-four *Migratory Bird Species of Management Concern in Wyoming* that have historically been observed in the general analysis area, the Level 1 species (those identified as needing conservation action) that have been recorded nesting in the area include the burrowing owl, Brewer's sparrow, and Swainson's hawk. Level 1 species that do not have abundant nesting habitat available in the wildlife study area, but have been documented to nest include the short-eared owl, greater sage-grouse, and ferruginous hawk. Other Level 1 species observed in the area include the long-billed curlew, McCown's longspur, upland sandpiper, and bald eagle.

The existing habitat for these species on the Eagle Butte West LBA Tract would be destroyed during mining. The habitat loss would be short-term for grassland species, but would last longer for shrub-dependent species. There are currently no naturally-occurring trees on the LBA tract as applied for or the BLM preferred tract configuration under Alternative 1. Some domestic trees are planted within two residential windbreaks; one of which is located on the LBA tract as applied for and the other is located within the northern portion of the additional area evaluated by the BLM under Alternative 1. A few mature cottonwood trees occur within the southern portion of the additional area evaluated by the BLM under Alternative 1 (refer to Section 3.9.1). Eagle Butte Mine's current reclamation practices are designed to provide a mosaic of upland grass and sagebrush habitats that would potentially host most of these species. Periodic songbird surveys completed at the Eagle Butte Mine from 1987 through 2002 verified that the average number of species in collective reclaimed habitats was greater than in collective native habitats (FCW 2002).

No impacts to mountain plovers are anticipated because they have not been observed in the vicinity of the LBA tract during wildlife surveys conducted for the Eagle Butte Mine that began in the 1970s, and the typical suitable habitat for this species is not currently present on the tract.

Potential impacts to the bald eagle, other raptors in general, and sage-grouse, as well as measures in place to prevent impacts to these species from existing mining operations, are included in the preceding discussions or in Appendix E.

Mining the LBA tract would have a negligible effect on migrating and breeding waterfowl and shorebirds. Sedimentation ponds created during mining would provide interim habitat for these fauna. The Little Rawhide Creek diversion channel would not provide the same habitat as the natural stream channel, although natural streamflow and the presence of CBNG discharge water would not be affected. Eagle Butte Mine's current reclamation plan requires that the portion of the stream channel affected by currently permitted mining be reclaimed to

restore its premining functions and aquatic habitats. If the LBA tract is leased and mined, these reclamation efforts would be extended onto the portion of the stream affected by mining the tract. Replacement of all impacted jurisdictional wetlands would be required in accordance with Section 404 of the CWA (Section 3.7). If the replaced wetlands on the Eagle Butte West LBA Tract do not duplicate the exact function and/or landscape features of the premine wetlands, waterfowl and shorebirds could be beneficially or adversely affected as a result.

3.10.6.2.2 No Action Alternative

Impacts to migratory bird species, waterfowl, and shorebirds under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.7 Amphibians, Reptiles, and Aquatic Species

3.10.7.1 Affected Environment

Wildlife surveys completed specifically for the applicant and adjacent mines, as well as biological research projects in the eastern PRB, have documented numerous other wildlife species that inhabit the region, including various amphibians, reptiles, and aquatic species. All these species are generally common inhabitants of the area.

Under natural conditions, aquatic habitat is limited by the ephemeral nature of surface waters in the general analysis area. The lack of deep-water habitat and extensive and persistent water sources limits the presence and diversity of fish and other aquatic species. Fish surveys were conducted in Little Rawhide Creek during baseline studies for the Eagle Butte Mine in between 1977 and 1984 and again in 1985. The 1977-84 surveys were completed along Little Rawhide Creek in the northern and northwestern portion of the Eagle Butte Mine area. The 1985 survey was completed on the portion of Little Rawhide Creek that is within the Eagle Butte West LBA Tract. No fish were noted during any of these surveys.

As discussed above, water discharged from CBNG wells has supplied Little Rawhide Creek and some tributaries and ponds with water nearly continuously, resulting in an increase in habitat for aquatic species. However, due to the nature of the Little Rawhide Creek hydrologic system (as explained in Section 3.5.2.1), only short reaches of the channel length through the Eagle Butte West LBA Tract currently contains water year-round, while the remaining channel length is dry. Little Rawhide Creek has not become perennial, even with the addition of CBNG discharge water. The in-channel reservoirs on Prong Draw hold CBNG discharge water throughout the year; however, Prong Draw has not become perennial either.

Numerous reptile and amphibian species have been recorded during the various surveys on the Eagle Butte Mine area and adjacent lands including the LBA tract. These species include the tiger salamander (*Ambystoma tigrinum*), plains spadefoot

(*Scaohiopus bombifrons*), great plains toad (*Bufo cognatus*), Woodhouse's toad (*Bufo woodhousei*), boreal chorus frog (*Pseudacris triseriata maculata*), northern leopard frog (*Rana pipiens*), common snapping turtle (*Chelydra serpentina serpentina*), western painted turtle (*Chrysemys picta belli*), short-horned lizard (*Phrynosoma douglassi*), prairie rattlesnake (*Crotalus viridis viridis*), bullsnake (*Pituophis melanoleucas sayi*), western plains garter snake (*Thamnophis radix haydeni*), and eastern yellowbelly racer (*Coluber constrictor flaviventris*). In 2004 and 2005, the only reptiles or amphibians that were encountered on the LBA tract were the boreal chorus frog (2004 and 2005), leopard frog (2004), and western painted turtle (2005) (FCW 2004b and 2005b). The western painted turtle and common snapping turtle have also been recorded along Little Rawhide Creek within the eastern portion of the survey area. The scarcity of mesic habitat elsewhere within the survey area reduces the potential of the area to attract numerous species, particularly amphibians. No fish were observed in Little Rawhide Creek during the 2004 survey.

3.10.7.2 Environmental Consequences

3.10.7.2.1 Proposed Action and Alternative 1

Mining the LBA tract would remove habitat for aquatic species, amphibians, and reptiles in a portion of Little Rawhide Creek and sections of the ephemeral tributaries within the proposed lease area. Although the channel and surface water flow would be restored during reclamation, the stream would be diverted and habitat for these species would be lost during the initial diversion process. Under natural conditions, habitat for aquatic species is limited on the Eagle Butte West LBA Tract, however, as discussed above, a variety of aquatic species and reptiles and amphibians have been observed on and in the vicinity of the tract.

Under jurisdiction of Eagle Butte Mine's current WDEQ/LQD mine permit, a portion of Little Rawhide Creek has been diverted in order to recover coal from the existing coal leases (Section 3.5.2.1). Reptiles and amphibians have been recorded in both unmined and diverted reaches of Little Rawhide Creek adjacent to and within the current permit area (McKee 2007).

Reclamation of the stream channel and restoration of surface water flow quantity and quality after mining to approximate pre-mining conditions would restore aquatic resources of Little Rawhide Creek.

3.10.7.2.2 No Action Alternative

Impacts to reptiles, amphibian, and aquatic species under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.8 Threatened, Endangered, Proposed, and Candidate Animal Species, and BLM Sensitive Species

Refer to Appendices E and F.

3.10.9 Regulatory Compliance, Mitigation and Monitoring

Regulatory guidelines and requirements designed to prevent or reduce surface coal mining impacts to wildlife include:

- fencing designed to permit pronghorn passage to the extent possible;
- creation of raptor nests to mitigate other nest sites impacted by mining operations at this mine;
- relocation of raptor nests that would be impacted by mining in accordance with the approved raptor monitoring and mitigation plan;
- obtaining a permit for removal and mitigation of golden eagle nests;
- buffer zones for protection of raptor nests;
- restriction of mine-related disturbances from encroaching in the near vicinity of any active raptor nest from March until hatching;
- restriction of disturbances near raptor nests containing nestlings to prevent danger to, or abandonment of, the young;
- creation of nesting habitat through enhancement efforts (nest platforms, nest boxes, and tree plantings);
- reestablishment of the ground cover necessary for the return of a suitable raptor prey base after mining;
- restoration of sage-grouse habitat after mining including reestablishment of sagebrush and other shrubs on reclaimed lands and grading of reclaimed lands to create swales and depressions;
- development of a *Migratory Bird Species of Management Concern for Coal Mines in Wyoming Monitoring and Mitigation Plan*, which must be approved by USFWS;
- required use of raptor-safe power lines;

- restoration of diverse landforms, direct soil replacement, and the construction of brush piles, snags, and rock piles to enhance habitat for wildlife;

- restoration of habitat provided by jurisdictional wetlands; and

- reclamation of the stream channels and restoration of surface water flow quantity and quality after mining to approximate pre-mining conditions.

FCW's current mine permit requires reconstruction of bed form features in the stream channel of Little Rawhide Creek, such as pools and runs, that should help restore the channel's natural form and function, as well as provide habitat. Restoration will be achieved by salvaging sufficient material from channel terrace alluvium to reconstruct naturally-occurring features. Current reclamation, as well as future reclamation of Little Rawhide Creek by the Eagle Butte Mine would incorporate alluvium salvaged from the original channel.

These measures are included in the existing mining and reclamation permit and would be included in the amended mining and reclamation plans, if the LBA tract were leased and proposed for mining.

Baseline wildlife surveys were conducted for the Eagle Butte Mine before mining operations began. Annual wildlife monitoring surveys have been conducted since 1986. These surveys are required by state and federal regulations. The Eagle Butte Mine also voluntarily conducts annual and/or periodic surveys for additional species that are not included in the monitoring required by state or federal regulations. The wildlife monitoring surveys cover the area included in the mine permit area and a perimeter beyond the permit area that varies in size according to the species being surveyed. As a result, a majority of the Eagle Butte West LBA Tract has been surveyed as part of the wildlife monitoring surveys for the Eagle Butte Mine.

The annual monitoring program includes:

- spring surveys for new and/or occupied raptor nests, upland game bird lek locations, T&E species, and migratory birds;

- late spring surveys of raptor production for occupied nests, opportunistic observations of all wildlife species, T&E species, and migratory birds;

- raptor territorial occupancy and nest productivity is surveyed annually on and around the existing leases;

- summer surveys for raptors, migratory birds, and lagomorph density;

- voluntary winter surveys for big game on and surrounding the permit area (currently conducted during alternate years);

- voluntary annual surveys for migrating and nesting waterfowl, shorebirds, and other water obligate avian species;

- voluntary breeding bird surveys (previously periodic, now annual); and

- voluntary periodic small mammal trapping (1986-2001).

Monitoring data were collected by all of the surface coal mines in the PRB for big game species until 1999. At that time, the WGFD reviewed monitoring data and requirements for big game species on those mine sites. They concluded that the monitoring had demonstrated a lack of impacts to big game on existing mine sites. No severe mine-caused mortalities had occurred and no long-lasting impacts on big game had been noted on existing mine sites. The WGFD therefore recommended at that time that big game monitoring be discontinued on all existing mine sites. New mines will be required to conduct big game monitoring if located in crucial winter range or in significant migration corridors, neither of which are present within the general analysis area. Although big game surveys are no longer required as part of the annual wildlife monitoring program at the Eagle Butte Mine, FCW has voluntarily continued these surveys on a reduced but regular schedule.

There is an approved raptor monitoring and mitigation plan for the Eagle Butte Mine. This monitoring and mitigation plan would be amended to include the Eagle Butte West LBA Tract if it is leased and proposed for mining. The amended raptor mitigation plan would be subject to review and approval by USFWS before the amended mining plan is approved.

Mitigation plans for *Migratory Bird Species of Management Concern* have been developed in cooperation with USFWS for the existing Eagle Butte mining operations, and those plans would be amended to include the LBA tract. If additional species are documented nesting or using the area regularly, a mitigation plan would be developed to protect those birds and their habitat.

3.10.10 Residual Impacts

Although the Eagle Butte West LBA Tract would be reclaimed in accordance with the requirements of SMCRA and Wyoming statutes, there would be some residual wildlife impacts. The topographic moderation would result in a permanent loss of habitat diversity and a potential decrease in slope-dependent shrub communities. This would reduce the carrying capacity of the land for shrub-dependent species. Reclamation standards may limit replacement of habitat for some species. Some species, such as sage-grouse, may repopulate reclaimed areas but populations may not attain pre-mining levels.

3.11 Land Use and Recreation

3.11.1 Affected Environment

The majority of the surface of the lands included in the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for under the Proposed Action and the additional area evaluated under Alternative 1) is privately owned. Campbell County owns the surface on approximately 15 acres in the northern portion of the additional area evaluated by BLM under Alternative 1. A school, Rawhide Elementary School, is located on these lands. Campbell County Airport Board owns the surface on four small parcels of land in the southern portion of the additional area evaluated by BLM under Alternative 1. FCW is the major private surface owner, but there are 15 other private surface owners in the Echo Subdivision, which is included in the northern portion of the additional area evaluated by BLM under Alternative 1. All of the surface of the lands included in the BLM's preferred tract configuration under Alternative 1 are owned by FCW. Surface ownership of the BLM study area for the Eagle Butte West LBA Tract is available from the Campbell County Assessor's Office (2007) and is shown on Figures 3-17 and 3-18. The Campbell County lands, including the school, the Campbell County Airport Board lands, and the Echo Subdivision are not included in the BLM's preferred tract configuration for the Eagle Butte West LBA Tract under Alternative 1.

Livestock grazing on native rangeland is the primary land use within the tract under the Proposed Action and the additional area evaluated under Alternative 1. Other uses for both public and private lands include oil and gas production, wildlife habitat, and recreation as well as the elementary school, airport, and housing subdivision discussed above.

As discussed in Section 2.2, BLM included the coal underlying the Rawhide Elementary School and the Echo Subdivision in the BLM study area for the Eagle Butte West LBA Tract for geological evaluation purposes because it is underlain by unmined federal coal that could logically be mined if the Eagle Butte West LBA Tract is leased and mined. However, according to the regulations at 43 CFR 3461.5(c)(1), BLM must consider the coal underlying the Rawhide Elementary School and Echo Subdivision as unsuitable for mining. BLM's preferred tract configuration for the Eagle Butte West LBA Tract does not include the coal underlying the Rawhide School or the Echo Subdivision.

Areas of disturbance within and near the BLM study area for the Eagle Butte West LBA Tract are generally associated with roads, oil and gas wells and production facilities, surface mine-related facilities, and ranching operations. U.S. Highway 14-16 crosses eastern limits of the LBA tract. State Highway 59 and the Hannum Road (a paved county road) are located roughly a mile south of the LBA tract. There are residential streets in the area of the Rawhide Elementary School and the

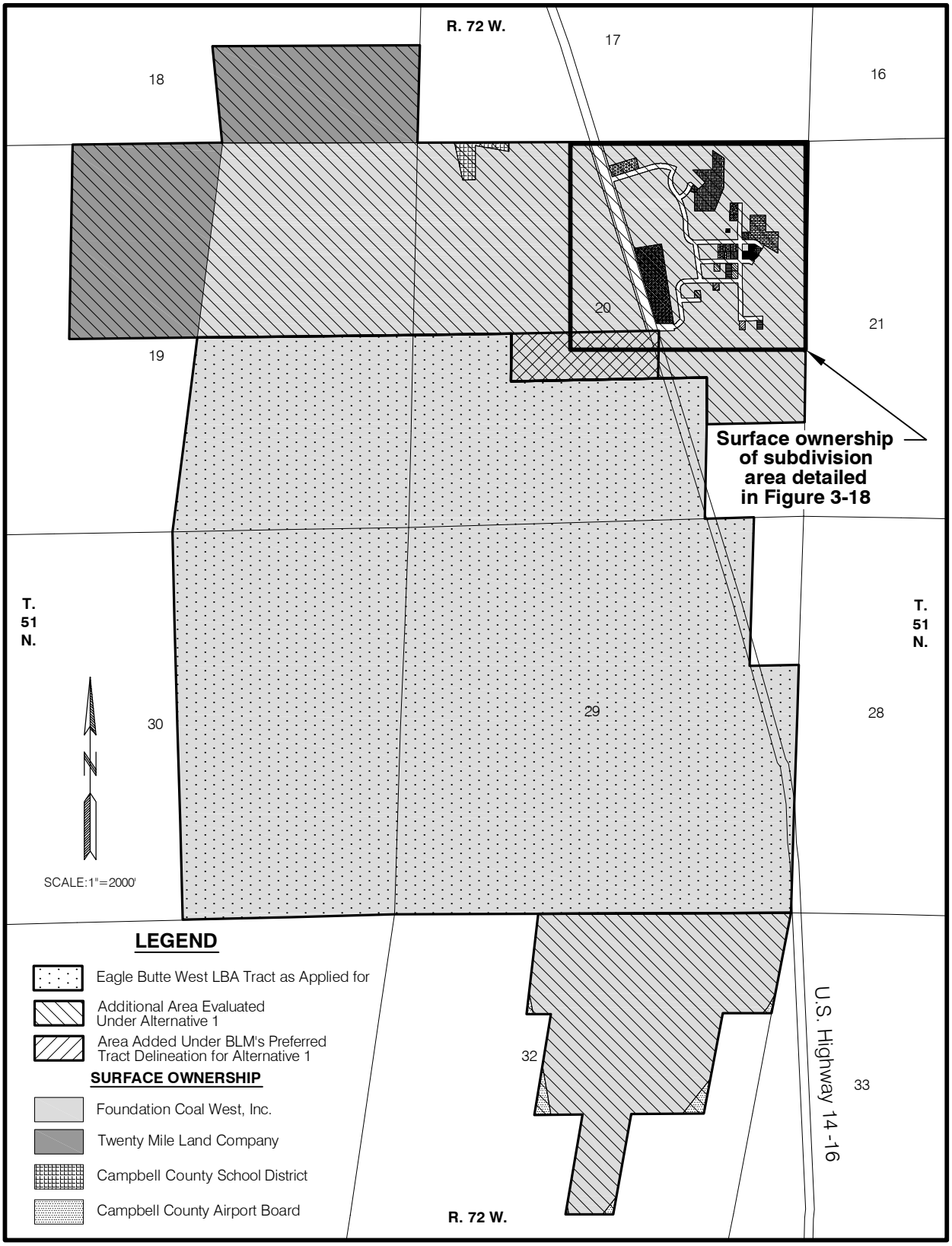


Figure 3-17. Surface Ownership Within the Eagle Butte West LBA Tract.

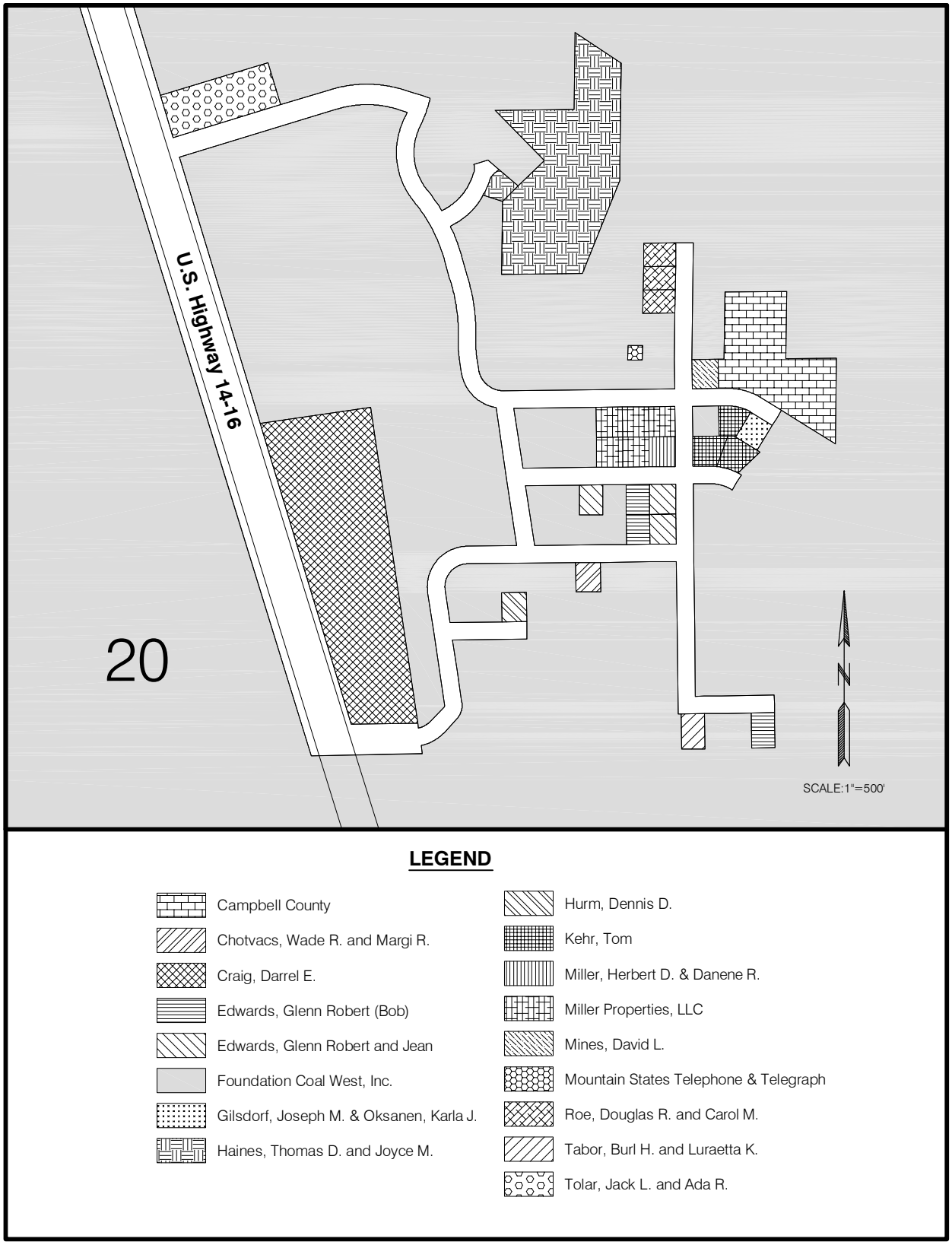


Figure 3-18. Surface Ownership Detail of Echo Subdivision Area.

Echo Subdivision, and several unnamed two-track roads traverse and provide public and private access within and near the LBA tract.

The oil and gas estate within the BLM study area for the Eagle Butte West LBA Tract is federally and privately owned, with the majority (approximately 88 percent) being privately owned. All of the federally owned oil and gas estate is leased. The ownership of the oil and gas estate for the LBA tract is shown in Figure 3-19. A list of the current federal oil and gas lessees is given in Table 3-10.

According to the WOGCC records as of May 19, 2006, there were no permitted conventional oil and gas wells on lands included in the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1) (Figure 3-19). Four unproductive conventional oil wells were drilled on private leases and subsequently plugged and abandoned (WOGCC 2006).

The Supreme Court has ruled that the CBNG belongs to the owner of the oil and gas estate (98-830). Therefore, the oil and gas lessees have the right to develop CBNG as well as conventional oil and gas on the LBA tract.

According to the WOGCC records as of May 19, 2006, there were 20 CBNG wells that were producing, 17 plugged and abandoned, 27 were shut-in, five were dormant, temporarily abandoned or intended to be abandoned, three were recently spudded, and 10 were permitted to be drilled within the BLM study area for the Eagle Butte West LBA Tract (Figure 3-19). Extensive CBNG development has occurred north, south, and west of the tract. CBNG wells capable of production on or in sections adjacent to the Eagle Butte West LBA Tract are listed in Appendix G.

Additional information on the conventional oil and gas and CBNG development in the Eagle Butte West LBA Tract and surrounding area is included in Section 3.3.2. Certain ancillary facilities are needed to support oil and gas production. These support facilities may include well access roads, well pads, production equipment at the wellhead (which may be located on the surface and/or underground), well production casing (which extends from the surface to the zone of production), underground pipelines (which gather the oil, gas, and/or water produced by the individual wells and carry it to a larger transmission pipeline or collection facility), facilities for treating, discharging, disposing of, containing, or injecting produced water, central metering facilities, electrical power utilities, gas compressor stations, and high-pressure transmission pipelines for delivering the gas to market. Currently, there are some oil and gas production facilities, primarily oil and gas pipelines, on the LBA tract, as discussed in Section 3.15 of this EIS. It is unlikely that additional support facilities would be constructed on the LBA tract because no productive conventional oil and gas wells have been drilled on the tract and most of the CBNG wells that exist on the tract have been either shut in or plugged and abandoned due to exhausted reserves and diminished production.

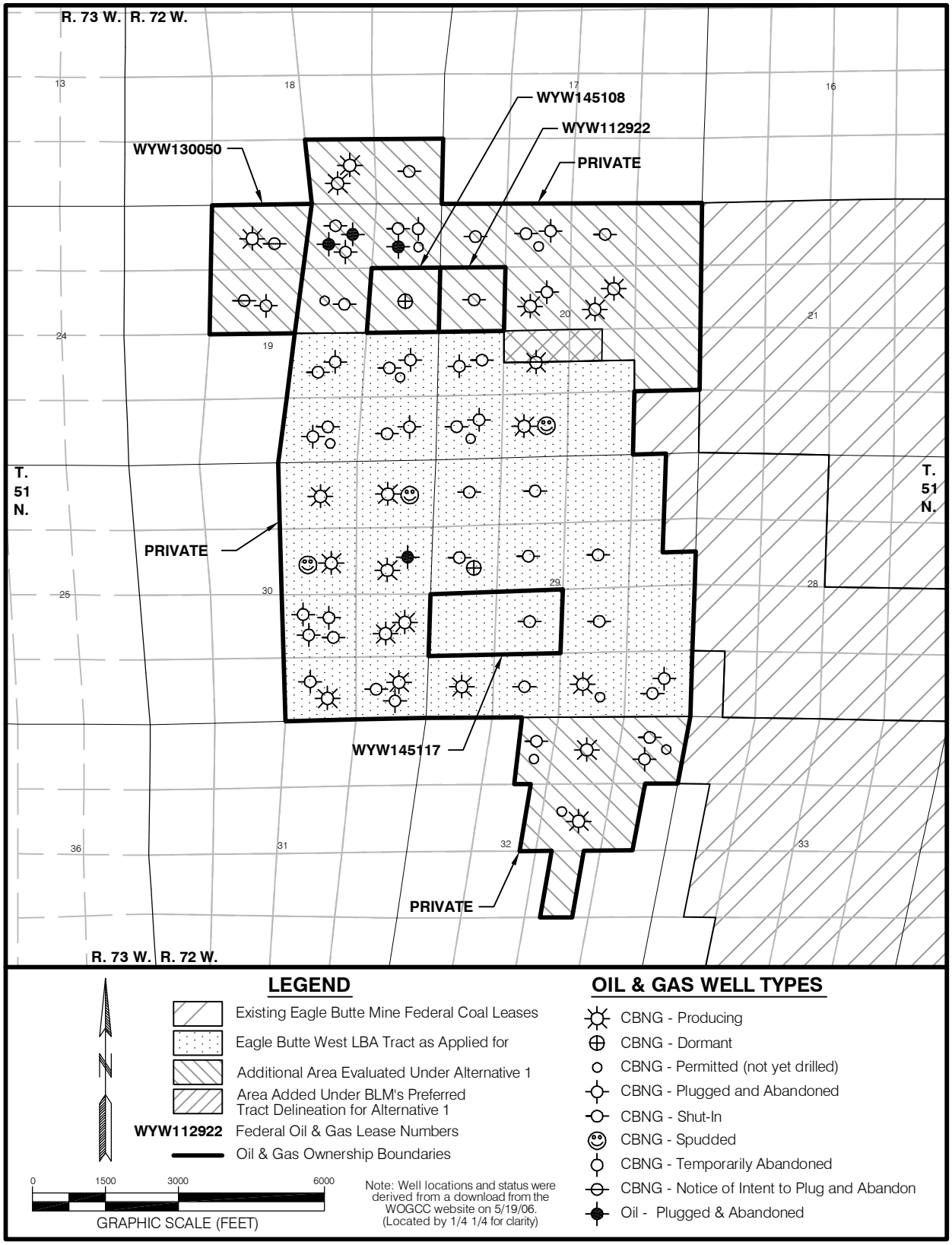


Figure 3-19. Oil and Gas Wells and Oil and Gas Ownership Within the Eagle Butte West LBA Tract.

Table 3-10. Eagle Butte West LBA Tract Oil and Gas Ownership.

Location	Lease Number	Lessees of Record
T.51N., R.72W.		
Section 19 Lots 8, 10	WYW-130050	Maurice W. Brown
Section 19 Lot 12	WYW-145108	Devon Energy Corporation
Section 20 Lot 5	WYW-112922	Maurice W. Brown
Section 29 Lots 11, 12	WYW-145117	Lance Oil and Gas Co. Inc.

Note: From BLM Oil & Gas Plat (4/4/06). The oil and gas rights (including CBNG) and coal rights for the above locations are owned by the federal government. For the rest of the LBA tract, the oil and gas rights (including CBNG) are privately owned, and the coal rights are federally owned.

Coal mining is a dominant land use to the north, east, and southeast of the LBA tract. The Buckskin, Rawhide, Eagle Butte, Dry Fork, and Wyodak Mines form a group of contiguous or nearly contiguous surface coal mines located in Campbell County (Figure 1-1). Coal production from these five active mines increased by 48 percent between 1993 and 2005 (from approximately 44 million tons in 1994 to 65 million tons in 2005). Three leases, including two LBA tracts (the Eagle Butte Tract and the West Hay Creek Tract) and one exchange tract (the Belco Exchange tract adjacent to the Buckskin Mine), have been issued within this group of four mines since decertification of the federal coal region. The Eagle Butte West LBA Tract being evaluated in this EIS and the pending Hay Creek II lease application are in this group of mines (Tables 1-1 and 1-2).

Campbell County does not have a county-wide land use plan, but is currently developing a comprehensive land use plan jointly with the City of Gillette (City of Gillette 1978 and Campbell County 2005). The Gillette area land use plan is an integral part of the overall plan for Campbell County and recommends general types of uses for the area immediately surrounding the City of Gillette (City of Gillette 1978). The proposed lease area does not have a designated zoning classification. The *City of Gillette/Campbell County Comprehensive Planning Program* (City of Gillette 1978) provides general land use goals and policies for state and federal coal leases in the county.

Big game hunting is the principal recreational land use within the general analysis area, and pronghorn, mule deer, and white-tailed deer are present within the area (Section 3.10.2). On private lands, hunting is allowed only with landowner permission. Land ownership within the PRB is largely private (approximately 80 percent), with some private landowners permitting sportsmen to cross and/or hunt on their land. There has been a trend over the past two to three decades towards a substantial reduction in private lands that are open and reasonably available for hunting. Access fees continue to rise and many resident hunters feel

these access fees are unreasonable. This trend has created problems for the WGFD in their attempt to distribute and control harvest at optimal levels, as well as for sportsmen who desire access to these animals (WGFD 2004).

In general, publicly owned lands (i.e., Forest Service or BLM-administered federal lands and state school sections) are open to hunting if legal access is available. Due to safety concerns, however, public surface lands contained within an active mining area are generally closed to the public, further limiting recreational use. As shown in Figures 3-17 and 3-18, no public surface lands are included in the Eagle Butte West LBA Tract as applied for or the BLM's preferred tract configuration under Alternative 1. Fifteen acres of land owned by Campbell County are included in the additional area evaluated by BLM under Alternative 1, but not all of that area is currently accessible to the public.

Recreational use on the privately owned surface is allowed only with landowner permission. Sport hunting in varying degrees occurs on the LBA tract. Sage-grouse, mourning dove, waterfowl, rabbit, and coyote are hunted in the vicinity, and some coyote and red fox trapping may occur.

Specific details regarding big game herd management objectives within and near the general analysis area are contained in the WGFD's Annual Big Game Herd Unit Report (WGFD 2006). The WGFD classifies the general analysis area as winter/yearlong (67 percent) or yearlong (33 percent) habitat for antelope. No crucial pronghorn habitat is recognized by the WGFD in this area. The proposed lease area is within pronghorn antelope Hunt Area 17, which is contained in the Gillette Herd Unit. In post-season 2005, the population of the Gillette Herd Unit was estimated to be approximately 17,400 animals, which is above the WGFD objective of 11,000 (WGFD 2006).

Historical problems associated with the management of the Gillette Herd Unit include hunter access, over-harvest on the limited public lands, and quantifying landowner preferences and desires. Prior to 1997, the herd population was fairly stable and near the objective of 11,000 antelope. Losses from severe winters, poor production rates, and disease subsequently decreased the population, but it has recently recovered and begun to stabilize near the objective level. Hunt Area 17 contains mostly privately owned surface lands and hunter access to the limited areas of public land is poor; therefore, the number of antelope is expected to steadily increase. If the population exceeds objective levels, more licenses will be needed and these may be difficult to sell in this mostly private land area. Nearly all landowners charge access fees for hunting and private land access is based on the desires and perceptions of the landowners. Increased harvest may be difficult to achieve because of the increased CBNG development, which is limiting rifle hunting on associated lands. Given the predicted harvest and average winter conditions, the 2006 post-season population was expected to be 18,600 antelope, considerably above the objective of 11,000 (WGFD 2006).

The WGFD has classified the majority of the general analysis area as out of normal mule deer use range. Crucial mule deer habitat does not occur on or within several miles of the general analysis area. The proposed lease area is located within the Powder River Mule Deer Herd Unit, which also includes Hunt Areas 17, 18, 23, and 26. A majority of the surface of the Powder River Herd Unit is privately owned. Access fees are common, resulting in heavy hunting pressure on accessible public lands, particularly in recent years. Between 1998 and 2002, the post-season objective for this mule deer herd was 52,000 and the average population was at that objective. The 2000 post-season population was estimated at near 55,000 animals. Numbers dropped to near 47,000 deer in 2001 and 2002. The herd has been slowly recovering toward the objective over the last several years. The 2005 post-season mule deer population was estimated at 53,000, just slightly exceeding the objective of 52,000. The 2006 post-season population was expected to be further above objective, given favorable weather conditions and predicted harvest (WGFD 2006).

The nearest elk population is in the Fortification Unit, approximately 15 miles west of the general analysis area. None of the general analysis area is classified by the WGFD as within normal elk use range. No elk have been observed recently within the wildlife study area.

White-tailed deer are currently managed separately by the WGFD in the Powder River and Black Hills Herd Units. White-tailed deer prefer riparian habitats and are therefore seldom observed in the general analysis area due to the lack of that particular habitat type. The WGFD classifies the entire general analysis area as out of the normal white-tailed deer use range. White-tailed deer are occasionally recorded along the Rawhide Creek/Little Powder River area several miles to the north but are rarely recorded in the general analysis area.

Under natural conditions, aquatic habitat is limited by the ephemeral nature of surface waters in the general analysis area. The lack of deep-water habitat and extensive and persistent water sources limits the presence and diversity of fish and other aquatic species. Fish surveys were conducted in the Little Rawhide Creek during baseline studies for the Eagle Butte Mine in between 1977 and 1984 and again in 1985. The 1977-84 surveys were completed along Little Rawhide Creek in the northern and northwestern portion of the Eagle Butte Mine area. The 1985 survey was completed on the portion of Little Rawhide Creek that is within the Eagle Butte West LBA tract. No fish were noted during any of these surveys.

3.11.2 Environmental Consequences

3.11.2.1 Proposed Action and Alternative 1

The major adverse environmental consequences of leasing and mining the Eagle Butte West LBA Tract on land use would be the reduction of livestock grazing (cattle and sheep), loss of wildlife habitat (particularly big game), and curtailment

of oil and gas development while the coal is being mined and during reclamation. This would include removal of all existing oil and gas surface and downhole production and transportation equipment and facilities. Wildlife and livestock use would be displaced while the tract is being mined and reclaimed. Access for recreational and other (i.e., ranching, oil and gas development) activities would be restricted during mining operations. As discussed above, there are no federal surface lands within the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for or the additional area evaluated by BLM under Alternative 1), but 15 acres of county-owned surface are included in the northern portion of the additional area evaluated by BLM under Alternative 1. The county-owned surface is not included in BLM's preferred tract configuration under Alternative 1. The loss of accessibility to lands within the tract is long term (during mining and reclamation), but is not permanent. Estimated disturbance areas for the Eagle Butte West LBA Tract under the Proposed Action, the BLM study area for the Eagle Butte LBA Tract, and the BLM's preferred tract configuration under Alternative 1 are presented in Table 3-1. As discussed in Section 3.0, the estimates of recoverable coal, associated disturbance, and mine life shown in Table 3-1 assume that Highway 14-16 is not moved.

Sections 3.3.2 and 3.11.1 and Appendix G of this document address producing, abandoned, and shut-in oil and gas (conventional and CBNG) wells in the BLM study area for the Eagle Butte West LBA Tract. Well location information, federal oil and gas ownership, and federal oil and gas lessee information are presented in Figure 3-19 and Table 3-10. BLM manages federal lands on a multiple use basis, in accordance with the regulations. In response to conflicts between oil and gas and coal lease holders, BLM policy advocates optimizing the recovery of both coal and CBNG resources to ensure that the public receives a reasonable return for these publicly owned resources. Optimal recovery of both coal and oil and gas resources requires negotiation and cooperation between the oil and gas lessees and the coal lessees. In the past, negotiations between an applicant mine and some of the existing oil and gas lessees have resulted in agreements to allow development of both resources in the PRB. Producing CBNG wells are present on the Eagle Butte West LBA Tract. In the PRB, royalties have been and would be lost to both the state and federal governments if the federal CBNG is not recovered prior to mining, or if federal coal is not recovered due to conflicts. State and federal governments can also lose bonus money when the costs of the agreements between the lessees are factored into the fair market value determinations.

Hunting on the Eagle Butte West LBA Tract would be eliminated during mining and reclamation. Pronghorn and mule deer have been observed on and adjacent to the LBA tract, as have sage-grouse, mourning dove, waterfowl, rabbit, and coyote.

Following reclamation, the land would be suitable for grazing and wildlife uses, which are the historic land uses. The reclamation standards required by SMCRA and Wyoming State Law meet the standards and guidelines for healthy

rangelands. Following reclamation bond release, management of the privately owned surface would revert to the private surface owner.

3.11.2.2 No Action Alternative

Under the No Action Alternative, coal removal would not occur and current land uses would continue on from 2,395 to 2,415 additional acres that would be disturbed under the Proposed Action or BLM's preferred tract configuration for Alternative 1, respectively. Currently approved mining operations would continue on the existing Eagle Butte Mine leases (Table 3-1). Impacts to land use related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.11.3 Regulatory Compliance, Mitigation and Monitoring

Mined areas would be reclaimed as specified in the approved mine plan to support the anticipated post-mining land uses of wildlife habitat and rangeland. The reclamation procedures would include stockpiling and replacing topsoil, using reclamation seed mixtures, which would be approved by WDEQ, and replacing stock reservoirs.

Steps to control invasion by weedy (invasive nonnative) plant species using chemical and mechanical methods would be included in the amended mine plan. (See discussion in Section 3.9.)

Revegetation growth and diversity would be monitored until the final reclamation bond is released (a minimum of 10 years following seeding with the final seed mixture). Erosion would be monitored to determine if there is a need for corrective action during establishment of vegetation. Controlled grazing would be used during revegetation to determine the suitability of the reclaimed land for anticipated post-mining land uses.

See Section 3.3.2.3 for discussion of regulatory requirements, mitigation and monitoring related to oil and gas development.

3.11.4 Residual Impacts

No residual impacts to land use and recreation are expected.

3.12 Cultural Resources

3.12.1 Affected Environment

Cultural resources, which are protected under the National Historic Preservation Act of 1966, are nonrenewable remains of past human activity. The PRB, including the general analysis area, appears to have been inhabited by aboriginal hunting and gathering people for more than 13,000 years. Throughout the prehistoric past, the area was used by highly mobile hunters and gatherers who exploited a wide variety of resources. Several thousand cultural sites have been recorded within the PRB.

Frison's (1978, 1991) chronology for the Northwestern Plains divides occupations from early to late into the Paleoindian, Early Plains Archaic, Middle Plains Archaic, Late Plains Archaic, Late Prehistoric, and Protohistoric periods. Frison's chronology is listed below. The Plains designation within the Early, Middle, and Late Archaic periods has been omitted from the list.

- Paleoindian period (13,000 to 7,000 years B.P.)
- Early Archaic period (7,000 to 5,000-4,500 years B.P.)
- Middle Archaic period (5,000-4,500 to 3,000 years B.P.)
- Late Archaic period (3,000 to 1,850 years B.P.)
- Late Prehistoric period (1,850 to 400 years B.P.)
- Protohistoric period (400 to 250 years B.P.)
- Historic period (250 to 120 years B.P.)

The Paleoindian period dates from about 13,000 to 7,000 years ago and includes various complexes (Frison 1978). Each of these complexes is correlated with a distinctive projectile point style derived from a general large lanceolate and/or stemmed point morphology. The Paleoindian period is traditionally thought to be synonymous with "big game hunters" who exploited megafauna such as bison and mammoth (plains Paleoindian groups), although evidence of the use of vegetal resources is noted at a few Paleoindian sites (foothill-mountain groups).

The Early Archaic period dates from about 7,000 to 5,000-4,500 years ago. Projectile point styles reflect the change from large lanceolate types that characterize the earlier Paleoindian complexes to large side- or corner-notched types. Subsistence patterns reflect exploitation of a broad spectrum of resources, with a much-diminished utilization of large mammals.

The onset of the Middle Archaic period (4,500 to 3,000 years B.P.) has been defined on the basis of the appearance of the McKean Complex as the predominant complex on the Northwestern Plains around 4,900 years B.P. (Frison 1978, 1991, 2001). McKean Complex projectile points are stemmed variants of the lanceolate point. These projectile point types continued until 3,100 years B.P. when they were replaced by a variety of large corner-notched points (i.e., Pelican

Lake points) (Martin 1999). Sites dating to this period exhibit a new emphasis on plant procurement and processing.

The Late Archaic period (3,000 to 1,850 years B.P.) is generally defined by the appearance of corner-notched dart points. These projectile points dominate most assemblages until the introduction of the bow and arrow around 1,500 years B.P. (Frison 1991). The period witnessed a continual expansion of occupations into the interior grasslands and basins, as well as the foothills and mountains.

The Late Prehistoric period (1,850 to 400 years B.P.) is marked by a transition in projectile point technology around 1,500 years B.P. The large corner-notched dart points characteristic of the Late Archaic period are replaced by smaller corner- and side-notched points for use with the bow and arrow. Around approximately 1,000 years B.P., the entire Northwestern Plains appears to have suffered an abrupt collapse or shift in population (Frison 1991). This population shift appears to reflect a narrower subsistence base focused mainly on communal procurement of pronghorn and bison.

The Protohistoric period (400 to 250 years B.P.) witnesses the beginning of European influence on prehistoric cultures of the Northwestern Plains. Additions to the material culture include most notably the horse and European trade goods, including glass beads, metal, and firearms. Projectile points of this period include side-notched, tri-notched, and unnotched points, with the addition of metal points. The occupants appear to have practiced a highly mobile and unstable residential mobility strategy.

The historic period (250 to 120 years B.P.) is summarized from Schneider et al. (2000). The use of the Oregon Trail by emigrants migrating to the fertile lands of Oregon, California, and the Salt Lake Valley brought numerous pioneers through the state of Wyoming, but few stayed. It was not until the fertile land in the West became highly populated, along with the development of the cattle industry in the late 1860s, that the region currently comprising the state of Wyoming became attractive for settlement. The region offered cattlemen vast grazing land for the fattening of livestock, which could then be shipped across the country via the recently completed (1867-1868) transcontinental railroad in southern Wyoming.

The settling of the region surrounding Gillette, Wyoming began in the late 1800s, after a government treaty in 1876 placed the Sioux Indians on reservations outside the territory. Cattlemen were the first settlers to establish themselves in the area, with dryland farmers entering the area after 1900. The town of Gillette was established by the railroad in 1891 in an effort to promote the settling of undeveloped areas along their rail lines. The presence of the railroad allowed for the greater development of the cattle industry because it facilitated shipping cattle from the area. Four homestead sites are located within the Eagle Butte West LBA Tract cultural resources survey area (the tract as applied for and the additional area evaluated by BLM under Alternative 1). The homesteads were patented in the

early 1900s and one site (48CA1137) is still occupied. FCW currently owns all four properties.

A Class III cultural resources survey is an intensive and comprehensive inventory of a proposed project area conducted by professional archaeologists and consultants. The survey is designed to locate and identify all prehistoric and historic cultural properties 50 years and older that have exposed surface manifestations. The goal of the survey is to locate and evaluate for the NRHP all cultural resources within the project area. Cultural properties are recorded at a sufficient level to allow for evaluation for possible inclusion to the NRHP. Determinations of eligibility are made by the managing federal agency in consultation with the SHPO. Consultation with the SHPO must be completed prior to the approval of the mining plan.

After completion of a Class III cultural resources survey, additional investigations may be undertaken to complete an individual site record. If necessary, site-specific testing or limited excavation may be utilized to collect additional data which will: 1) determine the final evaluation status of a site; and/or 2) form the basis of additional work to be conducted during implementation of a treatment plan if the site is determined eligible for the NRHP. A treatment plan is then developed for those sites that are eligible for the NRHP and are within the area of potential effect. Treatment plans are implemented prior to mining and can include such mitigation measures as avoidance (if possible), large scale excavation, complete recording, Historical American Building Survey/Historic American Engineering Record documentation, archival research, and other acceptable scientific practices.

Data recovery plans are required for sites that are recommended as eligible for the NRHP and cannot be avoided by project development, following testing and consultation with the SHPO. Until consultation has occurred and agreement regarding NRHP eligibility has been reached, all sites recommended as eligible or undetermined eligibility must be protected from disturbance. Full consultation with the SHPO will be completed prior to approval of the mining plans. Those sites determined to be unevaluated or eligible for the NRHP through consultation would receive further protection or treatment.

Numerous Class I (survey records review) and Class III cultural resource surveys associated with oil and gas field development and surface mining operations have been conducted in the general area. FCW contracted with ACR Consultants, Inc. of Sheridan, Wyoming to perform Class I and Class III surveys of the Eagle Butte West LBA Tract survey area in 2004.

The Eagle Butte West LBA survey area has been entirely surveyed for cultural resources at a Class III level. A total of 17 cultural sites (9 re-recorded and 8 new) were documented in the survey area. Twelve isolated finds were also recorded. Of the 17 cultural sites, nine are prehistoric, five are historic, and three are multi-

component. The inventory was reviewed by BLM in 2005 and submitted to SHPO, who concurred with the recommendations on site eligibility. Test excavations were carried out at some sites. No sites were recommended eligible to the NRHP based on testing and evaluation. Additional information about the cultural sites that were documented in the survey area is included in the supplementary information document for this EIS, which is available on request.

3.12.2 Environmental Consequences

3.12.2.1 Proposed Action and Alternative 1

Data recovery plans are required for sites that are recommended eligible to the National Register and cannot be avoided, following testing and consultation with the SHPO. In the case of a maintenance lease for an existing mine, full consultation with SHPO must be completed prior to approval of the MLA mining plan amendment for the mine. At that time, those sites determined to be unevaluated or eligible for the NRHP through consultation receive further protection or treatment. Impacts to eligible or unevaluated cultural resources cannot be permitted. Eligible sites that cannot be avoided or that have not already been subjected to data recovery action are carried forward in the mining plan as requiring protective stipulations until a testing, mitigation, or data recovery plan is developed to address the impacts to the sites. Unevaluated sites that cannot be avoided must be evaluated prior to disturbance. Ineligible properties may be destroyed without further work.

As indicated above, BLM reviewed the cultural inventory covering the BLM study area for Eagle Butte West LBA Tract and submitted it to SHPO, who concurred with the recommendation that no sites within the BLM study area for the Eagle Butte West LBA tract are eligible to the NRHP.

Cultural resources adjacent to the mine areas may be impacted as a result of increased access to the areas. There may be increased vandalism and unauthorized collecting associated with recreational activity and other pursuits outside of but adjacent to mine permit areas.

3.12.2.2 No Action Alternative

Under the No Action Alternative, coal removal would not occur on from 2,395 to 2,415 additional acres disturbed that would be disturbed under the Proposed Action or BLM's preferred tract configuration for Alternative 1, respectively. Currently approved mining operations would continue on the existing Eagle Butte Mine leases. Impacts to cultural resources related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.12.3 Native American Consultation

Native American heritage sites can be classified as prehistoric or historic. Some may be presently in use as offering, fasting, or vision quest sites. Other sites of cultural interest and importance may include rock art, stone circles, various rock features, fortifications or battle sites, burials, and locations that are sacred or part of the oral history and heritage but have no man-made features.

No Native American heritage, special interest, or sacred sites have been formally identified and recorded to date within the general analysis area. However, the geographic position of the general analysis area between mountains considered sacred by various Native American cultures (the Big Horn Mountains to the west, the Black Hills to the east, and Devils Tower to the north) creates the possibility that existing locations may have special religious or sacred significance to Native American groups. If such sites or localities are identified at a later date, appropriate action must be taken to address concerns related to those sites.

Tribes that have been identified as potentially having concerns about actions in the PRB include the Crow, Northern Cheyenne, Shoshone, Arapaho, Oglala Sioux, Rosebud Sioux, Crow Creek Sioux, Lower Brule Sioux, Standing Rock Sioux, Cheyenne River Sioux, Apache Tribe of Oklahoma, Comanche Tribe of Oklahoma, and Kiowa Tribe of Oklahoma. These tribal governments and representatives have been sent copies of the EIS. They have also been provided with more specific information about the known cultural sites on the tract in this analysis. Their help has been requested in identifying potentially significant religious or cultural sites in the general analysis area.

Native American tribes were consulted at a general level in 1995-1996 as part of an update to the BLM *Buffalo Resource Area RMP*. Some of the Sioux tribes were consulted by BLM on coal leasing and mining activity in the PRB at briefings held in Rapid City, South Dakota in March 2002.

3.12.4 Regulatory Compliance, Mitigation and Monitoring

Class I and III surveys are conducted to identify cultural properties on all lands affected by federal undertakings. Prior to any mining disturbance, SHPO is consulted to evaluate the eligibility of the cultural properties for inclusion in the NRHP. Cultural properties that are determined to be eligible for the NRHP are avoided or, if avoidance is not possible, a data recovery plan is implemented prior to disturbance.

Mining activities are monitored during topsoil stripping operations. If a lease is issued for the Eagle Butte West LBA Tract, BLM would attach a stipulation to the lease requiring the lessee to notify appropriate federal personnel if cultural materials are uncovered during mining operations (Appendix D).

3.12.5 Residual Impacts

Cultural sites that are determined to be eligible for the NRHP would be avoided if possible. Eligible sites that cannot be avoided would be destroyed by surface coal mining after data from those sites are recovered. Sites that are not eligible for the NRHP would be lost.

3.13 Visual Resources

3.13.1 Affected Environment

Visual sensitivity levels are determined by people's concern for what they see and their frequency of travel through an area. Landscapes within the general analysis area include rolling sagebrush and short-grass prairie, which are common throughout the PRB. There are also areas of altered landscape, such as oil fields and surface coal mines. The existing active surface coal mines located on the eastern side of the PRB form three geographic groups that are separated by areas with no mining (refer to Figure 1-1). Two of the groups of surface mines are located along the east side of State Highway 59, from south of Gillette to south of Wright; the third mine group, which includes the Eagle Butte Mine, is located on the east side of U.S. Highway 14-16, from Gillette north for about 13 miles. Other man-made intrusions include ranching activities (fences, homesteads, and livestock), oil and gas development (pumpjacks, pipeline ROWs, CBNG well shelters, and CBNG compressor stations), transportation facilities (roads and railroads), environmental monitoring installations, road signage, and electrical power transmission lines. The natural scenic quality in and near the immediate lease area is fairly low because of the industrial nature of the adjacent existing mining operations and oil and gas development.

VRM guidelines for BLM lands are to manage public lands for current VRM classifications and guidelines. The VRM system is the basic tool used by BLM to inventory and manage visual resources on public lands. The VRM classes constitute a spectrum ranging from Class I through Class V that provides for increasing levels of change within the characteristic landscape.

The inventoried lands were classified into VRM classes as follows:

Class I – Natural ecologic changes and very limited management activity is allowed. Any contrast (activity) within this class must not attract attention.

Class II – Changes in any of the basic elements (form, line, color, texture) caused by an activity should not be evident in the landscape.

Class III – Contrasts to the basic elements caused by an activity are evident but should remain subordinate to the existing landscape.

Class IV – Activity attracts attention and is a dominant feature of the landscape in terms of scale.

Class V – This classification is applied to areas where the natural character of the landscape has been disturbed up to a point where rehabilitation is needed to bring it up to the level of one of the other four classifications.

For management purposes, BLM evaluated the visual resources on lands under its jurisdiction in the 2001 BLM Buffalo RMP update (BLM 2001a). In the general analysis area, the predominant VRM classifications are Class IV for lands not yet disturbed by mining and Class V for lands that have already been disturbed by mining. For lands classified as VRM Class IV, activities, such as mining, attract attention and are dominant features of the landscape in terms of scale. Class V applies to areas where the natural character of the landscape has been disturbed up to a point where rehabilitation is needed to bring it up to the level of one of the other four classifications.

3.13.2 Environmental Consequences

3.13.2.1 Proposed Action and Alternative 1

U.S. Highway 14-16 crosses the eastern portion of the Eagle Butte West LBA Tract; however, FCW proposes to move the highway, as discussed in Section 3.15, below. The existing mining operations at the Eagle Butte Mine are visible from Highway 14-16 and it is likely that mining activities on the LBA tract would be visible from this major travel route whether it is moved or remains in its current location.

If the Eagle Butte West LBA Tract is leased and mined under the Proposed Action or BLM's preferred tract configuration for Alternative 1, the area that would be disturbed would be considered as VRM Class V prior to reclamation. After reclamation of the LBA tract and adjoining mines, the areas classified as Class V would improve to resemble the surrounding undisturbed terrain. No visual resources that are unique to this area have been identified on or near the Eagle Butte West LBA Tract.

Reclaimed terrain would be almost indistinguishable from the surrounding undisturbed terrain. Slopes might appear smoother (less intricately dissected) and gentler (less steep) than undisturbed terrain and sagebrush would not be as abundant for several years; however, within a few years after reclamation, the

mined land would not be distinguishable from the surrounding undisturbed terrain except by someone very familiar with landforms and vegetation.

3.13.2.2 No Action Alternative

Under the No Action Alternative, coal removal would not occur on from 2,395 to 2,415 additional acres that would be disturbed in the tract as applied for or in BLM's preferred tract configuration under Alternative 1, respectively, and the current VRM Class IV and V designations would not change for those lands. Currently approved mining operations would continue on the existing Eagle Butte Mine leases. Impacts to visual resources related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.13.3 Regulatory Compliance, Mitigation and Monitoring

Landscape character would be restored during reclamation to approximate original contour and would be reseeded with an approved seed mixture, including native species.

See Section 3.2 and Section 3.9 for additional discussion of the regulatory requirements, mitigation, and monitoring for topography and vegetation.

3.13.4 Residual Impacts

No residual impacts to visual resources are expected.

3.14 Noise

3.14.1 Affected Environment

Existing noise sources in the general analysis area include coal mining activities, traffic on the nearby highways and county roads, rail traffic, aircraft traffic to and from the nearby airport, wind, and CBNG compressor stations. Noise originating from CBNG development equipment (e.g., drilling rigs and construction vehicles) is apparent locally over the short term (i.e., 30 to 60 days) where well drilling and associated construction activities are occurring. The amount of noise overlap between well sites is variable and depends on the timing of drilling activities on adjacent sites and the distance between the site locations.

Studies of background noise levels indicate that ambient sound levels generally are low at many of the surface PRB mines, owing to the isolated nature of the

area. The unit of measure used to represent sound pressure levels (decibels) using the A-weighted scale is a dBA. It is a measure designed to simulate human hearing by placing less emphasis on lower frequency noise because the human ear does not perceive sounds at low frequency in the same manner as sounds at higher frequencies. Figure 3-20 presents noise levels associated with some commonly heard sounds.

No site-specific noise level data are available for the proposed lease area. Because the Eagle Butte Mine is adjacent to the proposed LBA tract, the current median noise level is estimated to be 40-60 dBA for day and night, with the noise level increasing with proximity to active mining operations at the adjacent mine. Mining activities are characterized by noise levels of 85-95 dBA at 50 ft from actual mining operations and activities (BLM 1992).

OSM prepared a noise impact report for the Caballo Rojo Mine (OSM 1980) that determined that the noise level from crushers and a conveyor would not exceed 45 dBA at a distance of 1,500 ft. The air overpressure created by blasting is estimated to be 123 dBA at the location of the blast. At a distance of approximately 2,500 ft (0.47 mile), the intensity of this blast would be reduced to 55 dBA. A noise level below 55 dBA does not constitute an adverse impact.

There is one residence located within the LBA tract as applied for and within the tract under the BLM's preferred tract configuration for Alternative 1. There is also a residence located within the northern portion of the additional area evaluated by BLM under Alternative 1. Seven residences are located in the Echo Subdivision, within the northern portion of the additional area evaluated by BLM under Alternative 1 but outside of the BLM's preferred tract configuration. Numerous other dwellings and businesses are located within a two-mile radius of the BLM study area for the Eagle Butte West LBA Tract. The Rawhide Elementary School is located within the northern portion of the additional area evaluated by BLM under Alternative 1 and the Gillette-Campbell County Airport is located immediately adjacent to the southern portion of the additional area evaluated by BLM under Alternative 1. Figure 3-8 depicts the locations of occupied residences, the school building, and the airport facility with respect to the Eagle Butte West LBA Tract. As shown in Figure 3-8, BLM's preferred tract configuration for the Eagle Butte West LBA Tract under Alternative 1 does not include the Rawhide Elementary School, the Echo Subdivision, or the area immediately adjacent to the Gillette-Campbell County Airport.

3.14.2 Environmental Consequences

3.14.2.1 Proposed Action and Alternative 1

Noise levels on the LBA tract would be increased considerably by mining activities such as blasting, loading, hauling, and possibly in-pit crushing. Since the LBA tract would be mined as an extension of existing operations under the Proposed

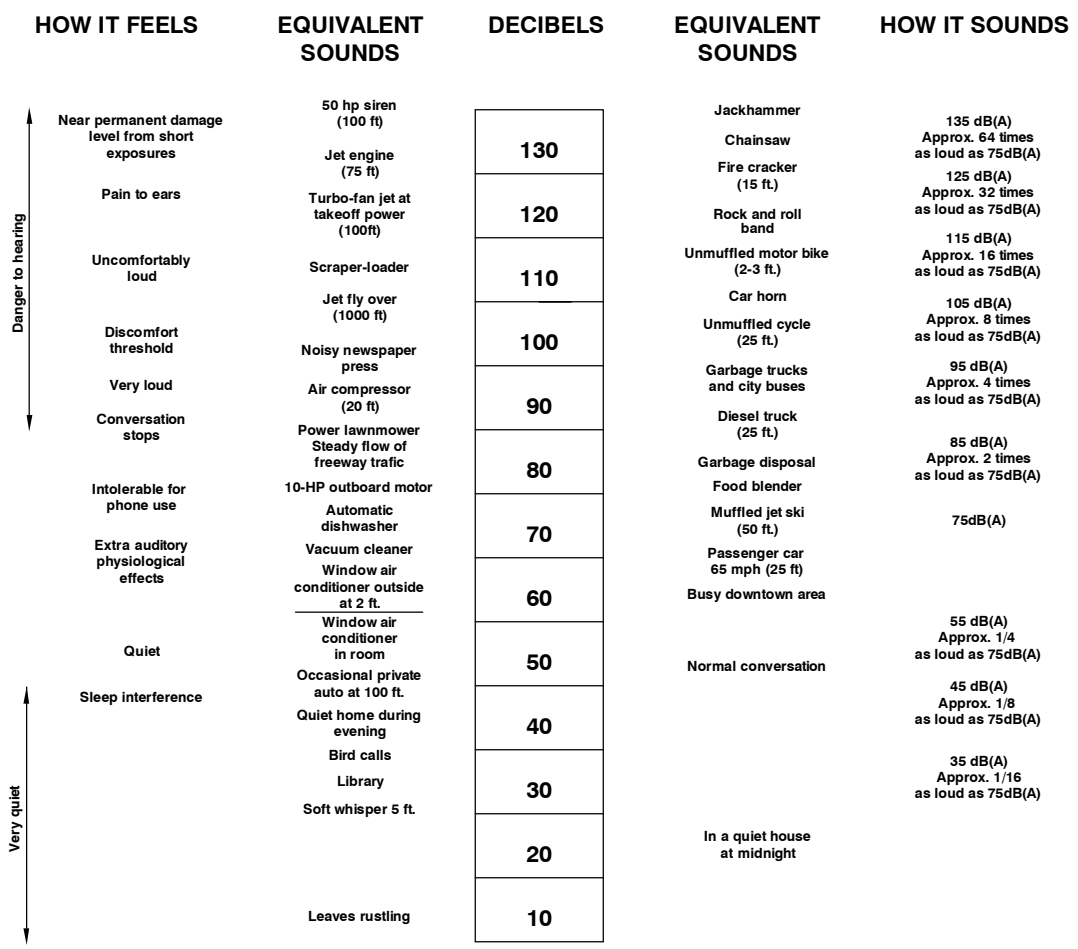


Figure 3-20. Relationship Between A-Scale Decibel Readings and Sounds of Daily Life.

Action or Alternative 1, no rail car loading would take place on the LBA tract. The Noise Control Act of 1972 indicates that a 24-hour equivalent level of less than 70 dBA prevents hearing loss and that a level below 55 dBA, in general, does not constitute an adverse impact.

The nearest public facilities and occupied dwellings to the Eagle Butte West LBA Tract are the Rawhide Elementary School, Gillette-Campbell County Airport, and nine residences located within the BLM study area for the tract. The two residences that are located outside of the Echo Subdivision are owned by FCW and would be removed prior to mining if the LBA tract is leased.

The distance between the Eagle Butte West LBA Tract (as applied for or under BLM's preferred tract configuration) and the occupied dwellings and the airport is similar to, but not less than, the distance between the existing Eagle Butte Mine federal coal leases and the dwellings and airport. The Eagle Butte West LBA Tract (as applied for or under BLM's preferred tract configuration) is closer to Rawhide Elementary School than the existing Eagle Butte Mine federal coal leases. Noise impacts at the dwellings and airport would be similar to the noise impacts that have occurred as a result of mining operations to recover the coal in the existing Eagle Butte Mine leases. Noise impacts at the school would be expected to be greater than the impacts that have occurred as a result of mining operations in the existing Eagle Butte Mine leases. If the tract is leased as applied for or under BLM's preferred tract configuration, the occupied dwellings, the Rawhide Elementary School, and the airport would experience adverse noise impacts if mining activities (particularly blasting) occur within 2,500 ft of them.

Wildlife in the immediate vicinity of mining may be adversely affected by the noise of the mining operations. Anecdotal observations at surface coal mines in the area suggest that some wildlife may adapt to increased noise associated with coal mining activity. After mining and reclamation are completed, noise would return to premining levels.

3.14.2.2 No Action Alternative

Under the No Action Alternative, coal removal and the associated noise impacts would not occur on from 2,395 to 2,415 additional acres that would be disturbed in the tract as applied for or in BLM's preferred tract configuration for Alternative 1, respectively. Currently approved mining operations and associated noise impacts would continue on the existing Eagle Butte Mine leases. Noise impacts related to mining operations at the Eagle Butte Mine would not extend onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.14.3 Regulatory Compliance, Mitigation and Monitoring

Mine operators are required to comply with MSHA regulations concerning noise, which include protecting employees from hearing loss associated with noise levels at the mines. MSHA periodically conducts mine inspections to ensure compliance with the requirements of the Federal Mine Safety and Health Act of 1977.

3.14.4 Residual Impacts

No residual impacts to noise are expected.

3.15 Transportation

3.15.1 Affected Environment

Transportation resources near the Eagle Butte West LBA Tract include U.S. Highway 14-16, State Highway 59, an improved two-lane county road (Hannum Road), several improved and unimproved local roads and accesses, numerous two-track trails, the Eagle Butte Mine BNSF railroad spur, oil and gas pipelines, utility/power lines, telephone lines, and associated ROWs. The Gillette-Campbell County Airport is located directly south of the LBA tract. Figure 3-21 depicts the current transportation facilities, excluding the oil and gas pipelines, within and near the proposed lease area. Figure 3-22 depicts the oil and gas pipelines within and near the proposed lease area.

U.S. Highway 14-16, State Highway 59, and Hannum Road are the major north-south public transportation corridors, while the principal east-west public transportation corridors are State Highway 59 and Hannum Road. Access to the Eagle Butte West LBA Tract is on unnamed local access roads and two-track trails off of U.S. Highway 14-16, which crosses the eastern edge of the proposed lease area. These highways and improved roads all provide public and private access within the general analysis area. The unimproved local access roads and trails in the area are primarily for private use.

The nearest railroad facilities are the BNSF Railroad spurs accessing the surface mines along the eastern edge of the PRB. The Buckskin Mine railroad loop is the northern terminus of a series of spur lines that serve the surface coal mines and extends approximately 13 miles north of Gillette. The individual spur lines connect each of the mines, including the Eagle Butte Mine, to the railroad for the purpose of transporting the coal out of the eastern PRB once it is mined.

The Gillette-Campbell County Airport complex consists of two runways (7,500 and 5,803 ft in length) and averages 44 aircraft operations per day. Approximately 53 percent of the airport's traffic is related to transient general aviation (general aviation operating away from their home base).

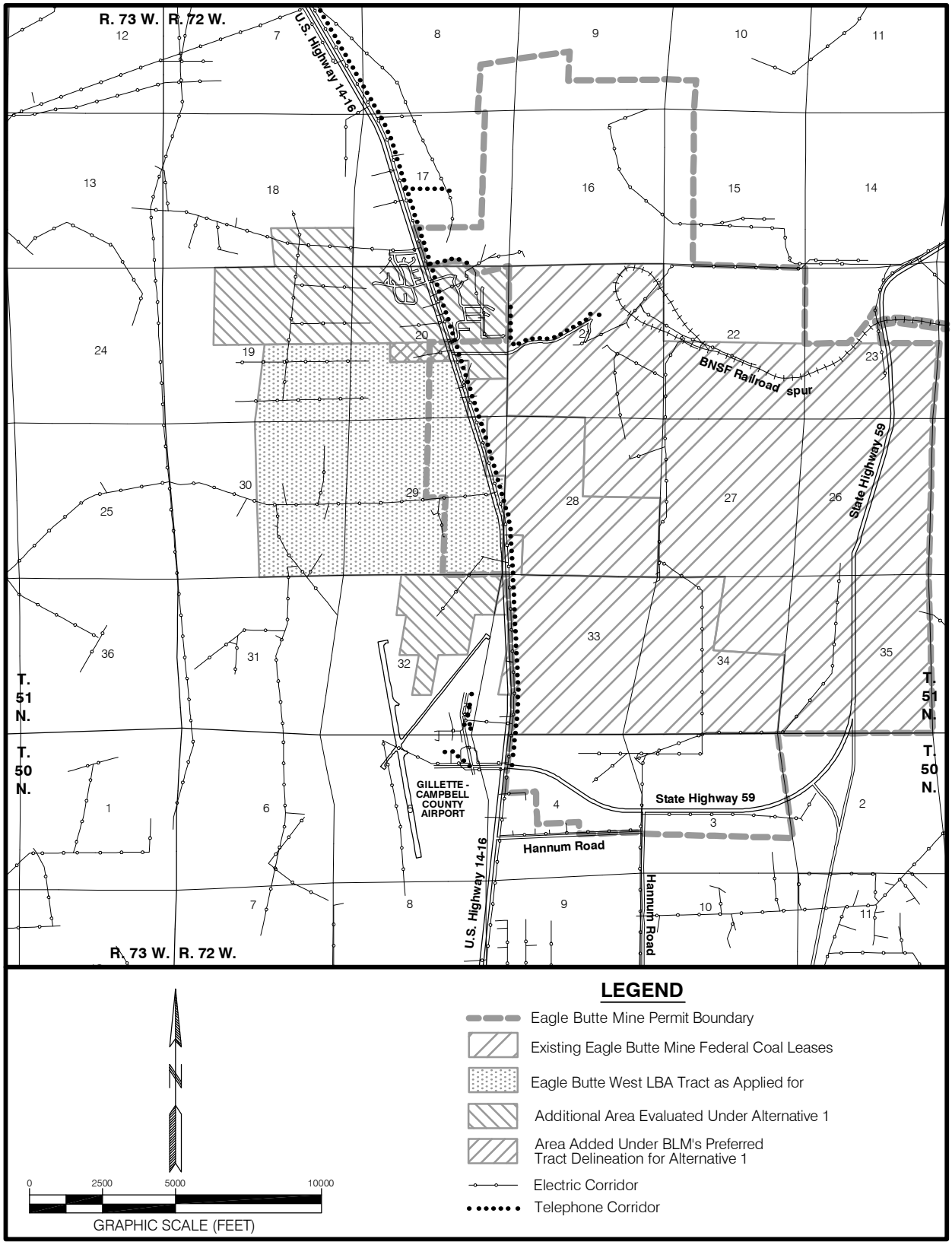


Figure 3-21. Transportation Facilities Within and Adjacent to the Eagle Butte West LBA Tract.

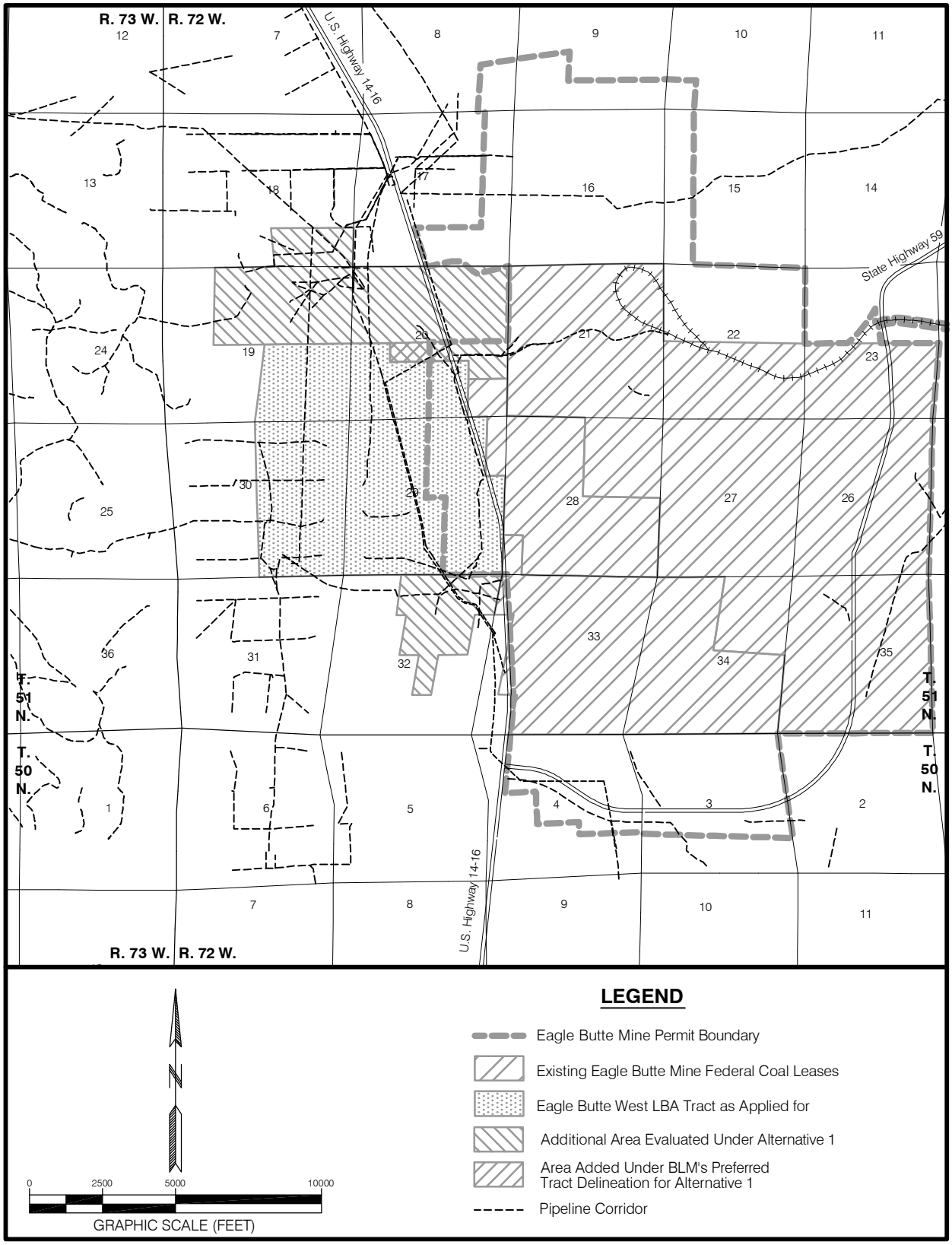


Figure 3-22. Oil and Gas Pipelines Within and Adjacent to the Eagle Butte West LBA Tract.

3.15.2 Environmental Consequences

3.15.2.1 Proposed Action and Alternative 1

Essentially all of the coal mined on the LBA tract would be transported by rail system. Since the Eagle Butte West LBA Tract would be an extension of the existing Eagle Butte Mine operations, the existing rail infrastructure would be used during mining of the proposed lease area. BNSF has upgraded and will continue to upgrade their rail capacities to handle the increasing coal volume projected for the PRB, with or without the leasing of the proposed Eagle Butte West LBA Tract.

Active pipelines and utility/power transmission lines currently cross the LBA tract. Any relocation of these pipelines and utility lines would be handled according to specific agreements between the coal lessee and the pipeline and utility owners, if the need arises. There would be additional surface disturbance associated with construction when pipeline is relocated.

As discussed in Chapters 1 and 2, not all of the coal included in the Eagle Butte West LBA Tract is mineable. Some of the coal included in the tract under both the Proposed Action and the BLM's preferred tract configuration for Alternative 1 is overlain by U.S. Highway 14-16. SMCRA prohibits mining within 100 ft of the outside ROW line of any public road unless the appropriate public road authority allows the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected [30 CFR 761.11(d)]. As a result, the coal underlying the highway ROW and adjacent buffer zone has been determined to be unsuitable for mining according to coal leasing Unsuitability Criterion Number 3 [43 CFR 3461(c)]. The coal underlying U.S. Highway 14-16 is included in the tract being considered for leasing because the coal under the highway could be mined if the authorized public road authority determines that the road could be moved [see 43 CFR 3461.5(c)(2)(iii) and discussion in Section 2.1]. If the road is not moved, including the coal underlying the highway in the lease would allow maximum recovery of all the mineable coal adjacent to the highway ROW and buffer zone (100 ft on either side of the highway ROW).

FCW and WYDOT are working on a plan to relocate U.S. Highway 14-16, which would allow recovery of the coal underlying the highway, the ROW and the buffer zone. FCW estimates that moving the highway would allow an estimated 25 million tons of coal underlying the highway ROW and buffer zone within the Eagle Butte West LBA Tract as applied for to be recovered (see Tables 2-2 and 2-3). FCW estimates that up to 26 million additional tons of coal would be recoverable within the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1) if U.S. Highway 14-16 were moved. Several of the existing Eagle Butte Mine leases located east of U.S. Highway 14-16 also include federal coal underlying the

highway, and those additional coal reserves would be recoverable if the highway is moved.

U.S. Highway 14-16 is a major public transportation route that is utilized by a large number of businesses (i.e., mining, CBNG development, agricultural) for transporting their products to and from the marketplace, as well as by many citizens commuting to and from the city of Gillette for jobs, business, shopping, and pleasure. Relocating the highway would affect the distances that these businesses and citizens would have to drive, which would potentially result in increased fuel costs. Relocating the highway could also affect the time it takes emergency vehicles to respond to fires, accidents, and medical emergencies.

In a public open house held by WYDOT at the Tower West Lodge in Gillette on February 7, 2006, FCW presented three potential relocation routes for U.S. Highway 14-16. The purpose of the open house was to provide information and gather public feedback for the proposed highway relocation. Figure 3-23 presents the three proposed alternative routes (Alternatives A, B, and C) for the U.S. Highway 14-16 relocation.

As depicted in Figure 3-23, the Alternative A route would result in an additional one-way travel distance of approximately 1.5 miles, the Alternative B route would result in an additional one-way travel distance of approximately 0.3 mile, and the Alternative C route would add approximately 5.6 miles of additional one-way travel distance. Alternative A would require 6.8 miles of new highway construction, Alternative B would require 2.7 miles of new highway construction, and Alternative C would require 3.7 miles of new highway construction. There would be additional surface disturbances associated with road construction of the Alternative A and C routes, although the Alternative B route would be across a backfilled pit that is partially reclaimed within Eagle Butte Mine's current permit area.

There are unmined coal resources underlying much of the Alternative A route, which would potentially mean that another relocation would be needed in the future, if that alternative is chosen. The coal has already been removed underlying the Alternative B route, and no coal is present under the Alternative C route.

People who attended the open house in Gillette on February 7, 2006 and who subsequently submitted comments to WYDOT generally expressed a preference for Alternative B, which represents the shortest additional travel distance of the three proposed alternative routes. The Campbell County Board of Commissioners also endorsed the Alternative B route (Gillette News Record 2006a).

WYDOT is evaluating FCW's proposal to relocate U.S. Highway 14-16. A subsurface geotechnical study has been conducted by FCW to evaluate the Alternative B route across Eagle Butte Mine's backfill area. Based on the public's

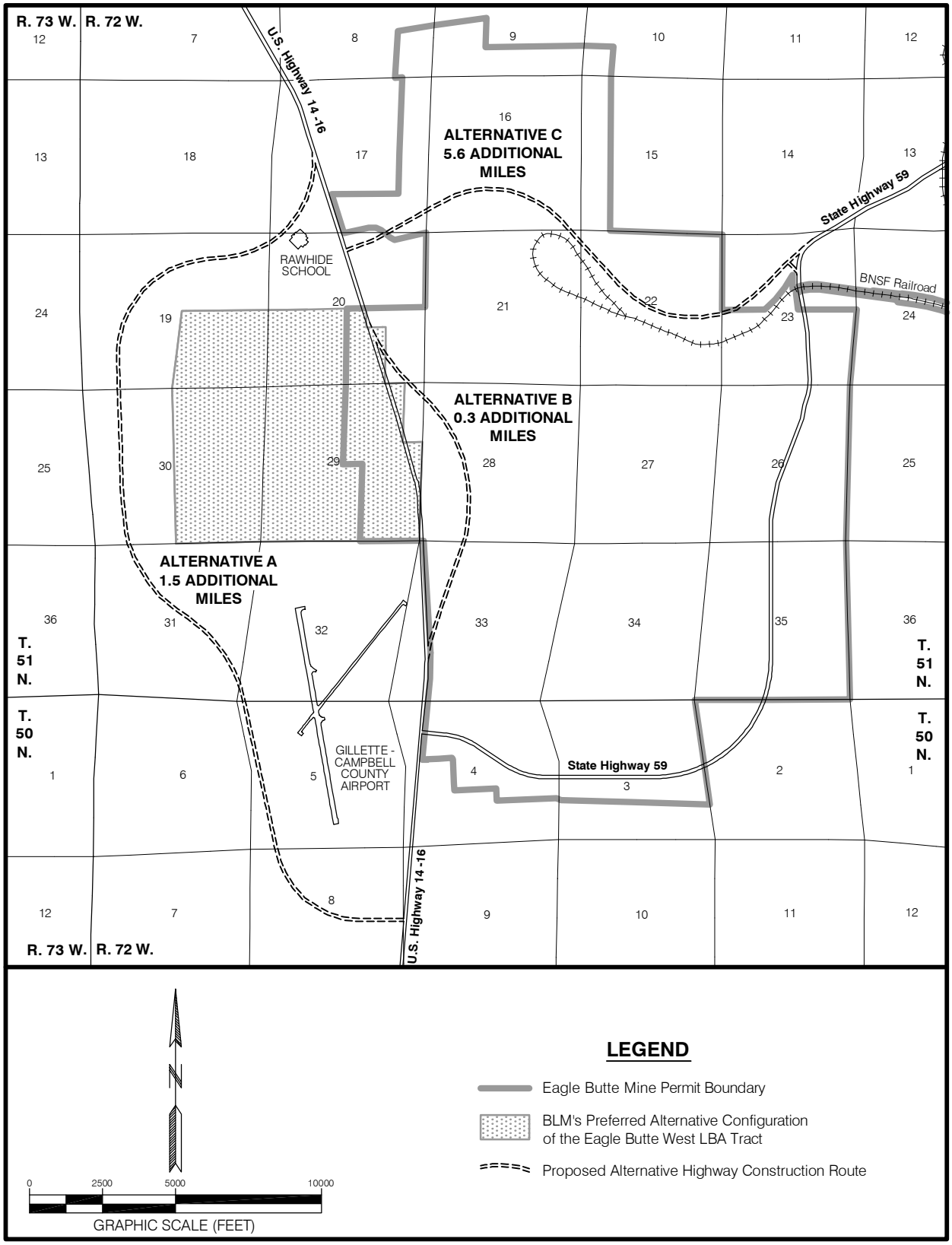


Figure 3-23. U.S. Highway 14 - 16 Proposed Alternative Relocation Routes.

preference for Alternative B and the results of the geotechnical study, WYDOT has indicated that moving the highway onto the backfill (Alternative B) is feasible. WYDOT must next make a decision as to whether the highway move will be permanent or temporary (Holwell 2006, Gillette New Record 2007).

Actions that will temporarily or permanently relocate a public highway or will require redesign of a highway require the designated regulatory authority to conduct its own public process and NEPA evaluation. According to WYDOT, FCW is required to obtain the necessary construction permits and provide a NEPA document (WYDOT 2005). Generally, WYDOT leads the design effort and conducts public meetings to obtain input on alignment, safety items, construction methods, schedule, and other factors prior to selecting a route. The final design is then completed and construction scheduled. FCW is interactive in the process and typically covers the costs related to all steps of work. This would likely be a design-build project by a firm or team of firms that is approved by WYDOT. The project steps are directed by WYDOT according to a previously defined procedure to ensure that the constructed roadway achieves all objectives for the involved parties.

It would not be necessary to relocate State Highway 59 in order to recover the coal included in the Eagle Butte West LBA Tract. Highway 59 has been relocated in advance of mining operations at the Eagle Butte Mine twice previously.

If the Eagle Butte West LBA Tract as applied for or under BLM's preferred tract configuration for Alternative 1 is leased, mining operations at the Eagle Butte Mine would not occur closer to the Gillette-Campbell County Airport than they currently are; however, mining activities would continue at existing levels for up to nine additional years. The southern portion of the additional area evaluated by BLM under Alternative 1 is located closer to the airport's runways than the current Eagle Butte mining operations are, but that portion of the BLM study area is not included in BLM's preferred tract configuration under Alternative 1. The airport is a vital component of transportation to many of the area's businesses and citizens and any disruptions to the operations of the airport by mining activities would have an impact upon those who depend on air travel.

The Gillette-Campbell County Airport expressed concerns in writing and orally about potential conflicts between mining activities and the airport and its air traffic during the scoping period and scoping meeting for the Eagle Butte West Coal Lease Application EIS. Following the scoping period, FCW provided information to the airport in response to their concerns. According to Jay Lundell, the Executive Director of the Gillette-Campbell County Airport, the responses provided by FCW addressed the airports concerns and the system that was previously put in place to manage mining operations adjacent to the airport has worked (Lundell 2007). The written comments received by BLM, from the Gillette-Campbell County Airport during the scoping period, FCW's written responses to

the airport addressing their concerns, and the response from the airport to FCW are included as Appendix H in this EIS.

Extending the life of the Eagle Butte Mine by up to nine years, which would occur under the Proposed Action or BLM's preferred tract configuration for Alternative 1, would help to maintain current use levels at the airport, which helps assure availability of regular airline service to citizens and businesses.

3.15.2.2 No Action Alternative

Under the No Action Alternative, coal removal would not occur on from 2,395 to 2,415 additional acres that would be disturbed in the tract as applied for or in BLM's preferred tract configuration under Alternative 1, respectively, and the transportation resources located in those areas would not be affected by mining. Currently approved mining operations and any associated impacts to transportation resources would continue on the existing Eagle Butte Mine leases. Impacts related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.15.3 Regulatory Compliance, Mitigation and Monitoring

The regulatory requirements regarding transportation facilities require that existing pipelines and utility lines be relocated, if necessary, in accordance with specific agreements between the coal lessee and the pipeline and utility owners.

The Eagle Butte Mine obtained a permit from the FAA while mining operations were conducted within the approach surface of the Gillette-Campbell County Airport's cross-wind runway. That permit included specific requirements for lighting of mine equipment and establishment of protocols and notification procedures when mining activities were conducted within designated areas. The mine would pursue the necessary permits from the FAA prior to mining the Eagle Butte West LBA Tract, if it is leased. Those permits would include specific requirements for conducting mining operations on the Eagle Butte West LBA Tract. The mine has indicated they would work with the airport to design a post-mine topography that would not impact protected airspace and would meet with the airport's approval. Additional information regarding FAA requirements and post-mine topography design is included in Appendix H.

Blasting would be conducted in accordance with Chapter 6 of the WDEQ Rules and Regulations. These regulations establish vibration standards that were developed to protect structures. A pre-blast survey of the airport complex was

conducted in 2001, and a follow-up survey would be conducted if required by the airport.

Eagle Butte's current mining and reclamation plan includes requirements to control fugitive dust in accordance with WDEQ/AQD requirements for BACT. Management practices that are used to control fugitive dust include timely reclamation, seeding and, in some cases, ripping soils to control erosion. The Eagle Butte Mine has purchased larger water trucks to increase dust control efficiency.

3.15.4 Residual Impacts

If WYDOT's evaluation concludes that U.S. Highway 14-16 can be relocated, and if the highway is relocated permanently, the residual impacts would include increased transportation and/or labor costs to businesses and citizens traveling to and from Gillette. The amount of the increased cost would depend upon the chosen relocation route. No other residual impacts to transportation facilities are anticipated.

3.16 Hazardous and Solid Waste

3.16.1 Affected Environment

Potential sources of hazardous or solid waste on the Eagle Butte West LBA Tract would include spilled, leaked or dumped hazardous substances, petroleum products, and/or solid waste associated with coal and oil and gas exploration, oil and gas development, utility line installation and maintenance, or agricultural activities. No such hazardous or solid wastes are known to be present on the Eagle Butte West LBA Tract. Wastes produced by current mining activities at the Eagle Butte Mine are handled according to the procedures described in Section 2.1.2.

3.16.2 Environmental Consequences

3.16.2.1 Proposed Action and Alternative 1

If the applicant mine acquires the LBA tract, the wastes that would be generated in the course of mining the tract would be similar to those currently being generated by the existing mining operation. The procedures that are used for handling hazardous and solid wastes at the existing mine are described in Chapter 2, Section 2.1.2. Wastes generated by mining the Eagle Butte West LBA Tract would be handled in accordance with the existing regulations using the procedures currently in use and in accordance with WDEQ-approved waste disposal plans at the Eagle Butte Mine.

3.16.2.2 No Action Alternative

Under the No Action Alternative, coal removal would not occur on from 2,395 to 2,415 additional acres that would be disturbed in the Eagle Butte West LBA Tract as applied for or in BLM's preferred tract configuration for Alternative 1, respectively, and no waste materials would be generated as a result of coal removal on the tract. Currently approved mining operations would continue on the existing Eagle Butte Mine leases. Impacts related to mining operations at the Eagle Butte Mine would not be extended onto portions of the LBA tract that will not be affected under the current mining and reclamation plan.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.16.3 Regulatory Compliance, Mitigation and Monitoring

The regulatory requirements regarding production, use, and/or disposal of hazardous or extremely hazardous materials are discussed in Section 2.1.2. All mining activities involving hazardous materials are, and would continue to be, conducted so as to minimize potential environmental impacts.

3.16.4 Residual Impacts

No residual hazardous and solid waste impacts are expected.

3.17 Socioeconomics

The social and economic study area for the proposed project includes Campbell County and the City of Gillette. The community of Gillette would most likely attract the majority of any new residents due to its current population levels and the availability of services and shopping amenities.

3.17.1 Local Economy

3.17.1.1 Affected Environment

Wyoming's coal mines produced 444.9 million tons in 2006, according to the Wyoming State Inspector of Mines. This was an increase of about10 percent over the 404.5 million tons produced in 2005. PRB coal production (Campbell and Converse Counties, 13 active mines) was over 430.9 million tons in 2006, which represented almost 97 percent of the state coal production (Wyoming Department of Employment 2005a and 2006a).

In the first quarter of 2005, 29 percent of the total employment and 45 percent of the total payroll in Campbell County were attributed to the mining sector, which

also includes oil and gas employment (Wyoming Department of Employment 2005b). In 2005, Campbell County employment grew faster than the statewide average (8.1 percent versus 3.3 percent change). Job growth occurred in construction, trade, manufacturing, transportation and utilities, and local government, but the most dramatic increase was in the mining sector (Wyoming Department of Employment 2006b).

Lease bonus bids are paid to the federal government for the right to enter into lease agreements for federal coal. Bonus bids are paid in five annual installments; the state receives half of each installment. In 2004 and 2005, BLM held competitive sealed-bid lease sales for six coal tracts (NARO South, West Antelope, West Hay Creek, Little Thunder, West Roundup, and NARO North). No coal lease sales were held for federal coal tracts in the PRB in 2006.

The successful bonus bids for the six lease sales held in 2004 and 2005 ranged from 30 cents per ton to 97 cents per ton and totaled $1.69 billion (BLM 2006c). Annual bonus bid payments from the six lease sales total $338.2 million. Combined with remaining bonus bid payments from lease sales held in previous years of $90.1 million, the annual bonus bid payment total for 2004 was $428.3 million, derived directly from federal coal in Campbell and Converse Counties. The Wyoming Consensus Revenue Estimating Group is projecting that coal lease bonus revenues to the state will be $169.8 million for fiscal years 2007, 2008, and 2009. The bonus money received by the state is allocated to fund capital construction for cities and towns, the state's highway fund, community colleges, and school capital construction (Wyoming CREG 2007).

Wyoming, Campbell County, and the cities and towns in the county receive revenue from a variety of taxes and royalties on the production of federal coal in addition to the bonus bids. These include ad valorem taxes, severance taxes, royalty payments, sales and use taxes, and required contributions to the AML program and the Black Lung Disability Trust Fund.

Federal royalties are collected at the time the coal is sold and equal 12.5 percent of the sale price. Federal royalties and bonus bids are divided equally with the State of Wyoming. Coal mines pay 31.5 cents per ton of surface coal mined to fund AML reclamation programs. Annual appropriations returned to the states vary depending on Congressional authorizations and AML program priorities. Additional sources of revenue include federal income tax and annual rentals that are paid to the government.

Sales and use taxes are distributed to cities and towns within the county and to the county's general fund. According to the Excise Tax Division of the Wyoming Department of Revenue (2004), the sales and use taxes collected from coal mines and coal mining-related services in Campbell County in FY 2004 was $8.2 million. In 1994, the University of Wyoming estimated that the total fiscal benefit to the State of Wyoming for coal produced in the PRB was $1.10 per ton (Borden et al.

1994). This study did not include AML fees or bonus bid payments in the calculation for fiscal benefits to the State of Wyoming. Calculating the estimated total fiscal benefit to the State of Wyoming in 2005 by including half of the bonus bid payments, half of the federal mineral royalties based on current prices, half of the AML fees, and all of the ad valorem taxes, severance taxes, and sales and use taxes for coal produced in Campbell County in 2005 results in an estimated $661 million, or $1.62 per ton. Figure 3-24 depicts the estimated total revenues to state and federal governments from 2005 coal production in Campbell County.

Recent GSP calculations for Wyoming (2004) indicate that the minerals industry accounted for about 21 percent of the GSP, which made it the largest sector of the Wyoming economy. Mining alone accounted for 8.3 percent of the Wyoming GSP (Wyoming Department of Administration and Information 2007).

3.17.1.2 Environmental Consequences

3.17.1.2.1 Proposed Action and Alternative 1

The federal and state revenues that would be generated by leasing and mining the Eagle Butte West LBA Tract would depend on which alternative is selected and the sale price of the coal. Coal prices increased in 2005, generally as a result of coal transportation and stockpile issues, but declined in 2006. According to the WSGS, the average spot price of 8,400 Btu coal in the second half of 2005 was $11.06 per ton (WSGS 2006). The spot price for 8,400 Btu coal declined to $9.17 per ton by the end of June, 2006 (WSGS 2007). The Wyoming Consensus Revenue Estimating Group forecast that the average gross sales prices for Wyoming coal production will range from $8.51 to $9.20 per ton from 2006 through 2010 (Wyoming CREG 2007). PRB coal prices are generally lower than prices for coal produced in other areas of Wyoming; however, most of the coal produced in Wyoming is from the PRB. For the purposes of this EIS, a conservative average price of $5.80 per ton is estimated for the coal included in the Eagle Butte West LBA Tract, which has an average Btu value of a little under 8,400.

Using the coal tonnages shown in Table 3-1, projected federal and state revenues for the Eagle Butte West LBA Tract are presented in Table 3-11, assuming an average coal price of $5.80 per ton recovered and a potential range of bonus payments on the leased (mineable) coal of 30 to 97 cents per ton. As discussed in Section 3.0, the estimates of recoverable coal, associated disturbance, and mine life shown in Table 3-1 assume that Highway 14-16 is not moved. If the highway is moved, FCW estimates that an additional 25 million tons of coal could be recovered.

If the Eagle Butte West LBA Tract is leased and mined under the Proposed Action, the potential additional federal revenues would range from approximately $188 to $259 million. For the BLM's preferred tract configuration under Alternative 1, the

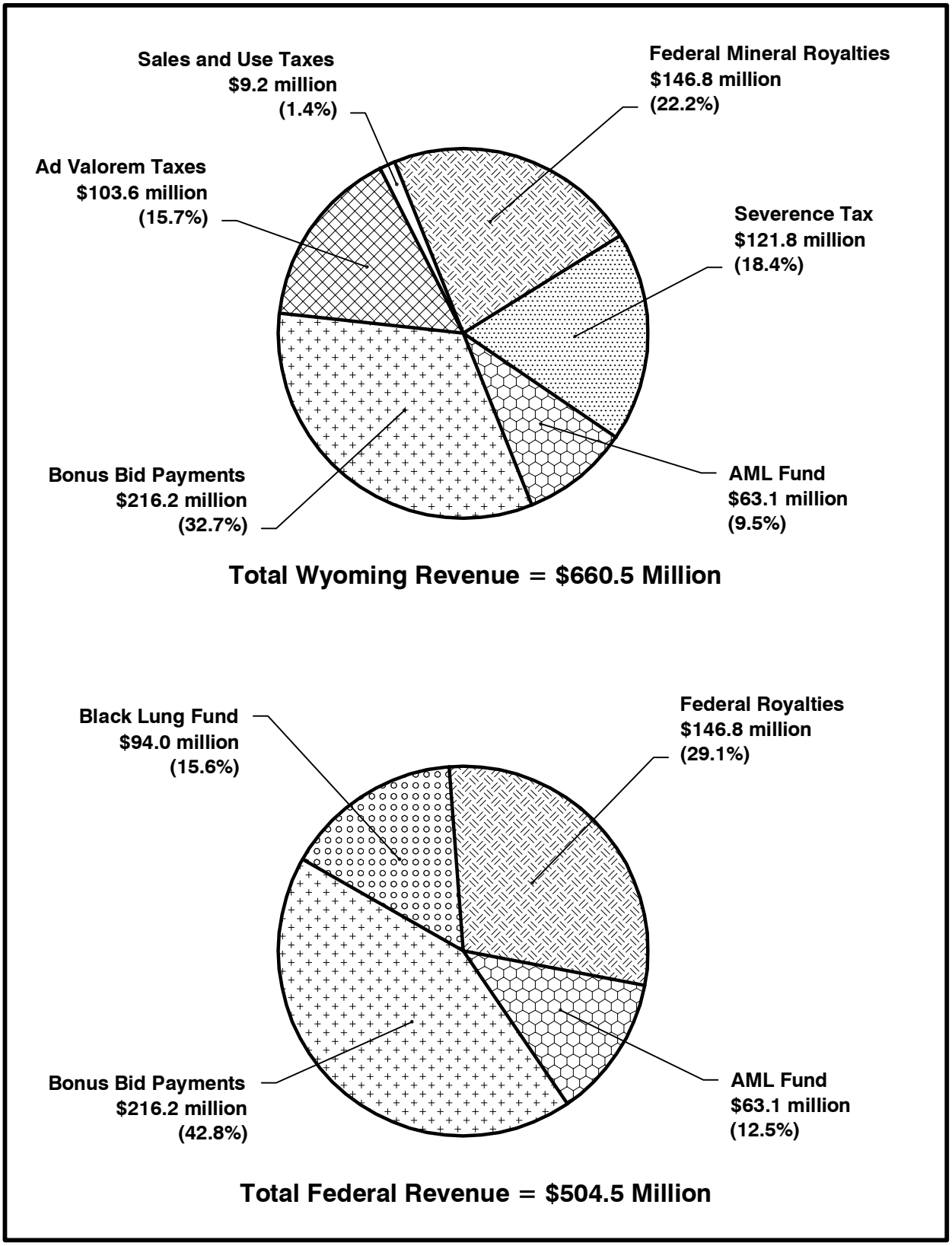


Figure 3-24. Estimated Wyoming and Federal Revenues from 2005 Coal Production in Campbell County.

Table 3-11. Projected Socioeconomic Impacts from Leasing the Eagle Butte West LBA Tract Under the Proposed Action or Alternative 1 – Assuming That Highway 14-16 Is Not Moved And The Coal Underlying The Highway Is Not Recovered.

Item	No Action Alternative (Existing Eagle Butte Mine)	Added by Proposed Action	Added by BLM's Preferred Tract Configuration Under Alternative 1
State Revenues	$ 384.5 mm	$ 261.1 to $ 331.8 mm	$ 264.2 to $ 336.0 mm
Federal Revenues	$ 261.6 mm	$ 187.9 to $ 258.5 mm	$ 190.7 to $ 262.5 mm
Increased Mine Life	0 yrs	8.1 yrs	8.2 yrs
Additional Employees	0	0	0

potential additional federal revenues would range from about $191 million to $263 million.

If the LBA tract is leased and mined under the Proposed Action, the potential additional state revenues would range from approximately $261 to $332 million. For the BLM's preferred tract configuration under Alternative 1, potential additional state revenues would range from about $264 to $336 million.

The base of economic activity provided by wages and local purchases would continue for about eight additional years under either alternative.

3.17.1.2.2 No Action Alternative

Under the No Action Alternative, the coal included in the LBA tract under the Proposed Action or the BLM's preferred tract configuration for Alternative 1 (about 203.0 to 206.1 million tons of recoverable coal, respectively, if Highway 14-16 is not moved) would not be recovered and the economic benefits associated with mining that coal would not be realized by the local, state, or federal governments. Currently approved mining operations and associated economic benefits would continue on the existing Eagle Butte Mine leases for approximately 13.6 more years.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.17.2 Population

3.17.2.1 Affected Environment

Campbell County had a population of 33,698 in 2000 and an estimated population of 37,812 in 2004. This represents a 12.2 percent growth rate between

2000 and 2004, making Campbell County the second fastest growing county in the state. Campbell County's population ranks it as the fourth largest of Wyoming's 23 counties and Gillette is the fourth largest city in the state, following only Cheyenne, Casper, and Laramie (USDOC 2000, CCEDC 2006, and Wyoming Department of Administration and Information 2005).

Gillette's population totaled 17,054 in 1987 and, according to census data, by 2000 Gillette's population was 19,646. Between 1990 and 2000, Gillette grew by 2,011 persons, averaging 1.1 percent per year. From December 2001 through December 2006, the population of Gillette increased from 22,867 to 27,533 (USDOC 1990 and 2000, Wyoming Department of Administration and Information 2005, and City of Gillette 2007).

3.17.2.2 Environmental Consequences

3.17.2.2.1 Proposed Action and Alternative 1

Leasing and subsequently mining the LBA tract would extend the life of the Eagle Butte Mine, and current employment at the mine, by about eight years at the current rate of production, under the Proposed Action and BLM's preferred tract configuration for Alternative 1. As indicated by Table 3-11, FWC is not projecting an increase in average yearly employment at the mine under either alternative. As discussed in Section 3.0, the estimates of recoverable coal, associated disturbance, and mine life shown in Table 3-1 assume that Highway 14-16 is not moved.

It is likely that if any additional employees would be needed at the Eagle Butte Mine they would be available from the existing workforce in Campbell County and no influx of new residents would occur as a result of filling those new positions.

3.17.2.2.2 No Action Alternative

Under the No Action Alternative, the coal included in the LBA tract would not be mined and population levels would not be affected by coal recovery from the LBA tract. Mining operations would not be extended by about eight years under the Proposed Action or BLM's preferred tract configuration for Alternative 1. FWC currently estimates that approved mining operations and associated employment levels would continue on the existing Eagle Butte Mine leases for approximately 13.6 more years.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.17.3 Employment

3.17.3.1 Affected Environment

Coal mining has changed a great deal since the 1970s, largely as a result of the introduction of new mining technologies. The local coal mining labor force grew during the 1970s. Between 1980 and 1998, overall production rose while employee numbers generally decreased or remained constant. The employment declines followed large industry capital investments in facilities and production equipment, the majority of which were aimed at increasing productivity. Direct employment in Campbell County at coal mines increased from 3,011 to 4,168 between 1998 and 2005 (Wyoming Department of Employment 1998 and 2005a).

The mining sector, which includes oil and gas workers, accounts for almost 28 percent of all employment in Campbell County, nearly four times the statewide percentage.

In 2005, around 6,007 people were directly employed by surface coal mines or coal contractors in Campbell County, representing about 25 percent of the employed labor force (Wyoming Department of Employment 2005a). Campbell County also has slightly higher percentages of construction and wholesale trade employment, which is keeping with the development demands of continuing growth and the county's position as a commercial center for northeast Wyoming.

3.17.3.2 Environmental Consequences

3.17.3.2.1 Proposed Action and Alternative 1

Leasing and subsequently mining the Eagle Butte West LBA Tract would extend the life of the Eagle Butte Mine by about eight years under the Proposed Action or BLM's preferred tract configuration for Alternative 1. As discussed above, FCW is not projecting an increase in average yearly employment at the mine under either alternative. In July 2005, the unemployment rate in Campbell County was 2.7 percent (641 persons) (Wyoming Department of Employment 2005d). It is likely that if any additional employees would be needed they would be available from the existing workforce in Campbell County, depending on the timing of the hiring at the mine as compared to the timing of hiring for other ongoing and proposed projects in the county, which are discussed in Section 4.1. The economic stability of the community of Gillette would benefit by having the current Eagle Butte Mine workforce living in the community and employed at the mine for about eight additional years.

3.17.3.2.2 No Action Alternative

Under the No Action Alternative, the coal included in the Eagle Butte West LBA Tract under the Proposed Action or Alternative 1 would not be mined and mining

operations and associated employment would not be extended about eight additional years. Currently approved mining operations and associated employment would continue on the existing Eagle Butte Mine leases for approximately 13.6 more years to recover the coal in the existing leases.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.17.4 Housing

3.17.4.1 Affected Environment

According to a 2001 report on housing needs in Campbell County, roughly 61 percent of PRB surface coal mining employees live in Gillette and surrounding areas, 14 percent live in Wright, and 25 percent live outside of Campbell County (BLM 2003a).

There were 11,538 housing units in Campbell County reported in the 1990 census. The 2000 census counted 13,288 housing units in Campbell County, of which 12,207 were occupied at the time. There were 8,989 (73.6 percent) owner occupied units and 3,218 (26.4 percent) occupied rental units (U.S. Census Bureau 2000).

The number of housing units in Gillette increased from 7,078 in 1990 to 7,931 in 2000, an increase of 12 percent. According to the City of Gillette, housing stock in Gillette increased to 10,194 units by the end of December 2006 (City of Gillette 2007). The number of units added in unincorporated, rural areas of Campbell County is not known because the county does not require building permits or certificates of occupancy for residential development in unincorporated areas (Braunlin 2004).

The types of housing units counted in 2000 included 6,698 single-family detached units, 794 single-family attached units, 2,276 multi-family units, 3,432 mobile homes, and 88 RVs, vans, or similar types of units. Subsequent construction through 2004 added 561 single-family detached, 61 single-family attached, 498 manufactured homes, and 352 multi-family units in Gillette and Wright, plus an unknown number of single-family and manufactured units in rural areas. The resulting estimated 2004 totals were 7,259 single-family detached units (49.2 percent), 855 single-family attached units (5.8 percent), 2,628 multi-family units (17.8 percent), 3,930 mobile/manufactured units (26.6 percent), and 88 RV/vans (0.6 percent) (CSI 2005).

The overall vacancy rate in Campbell County in 1990 was 13.6 percent, although the homeowner vacancy rate was just 3.6 percent while rental vacancies were at 19.4 percent (U.S. Census Bureau 1990). By 2000, the overall vacancy rate in the

county had dropped to 8.1 percent with the rate for rental units at 9.0 percent and the rate for owner units at 1.2 percent (U.S. Census Bureau 2000). Due to the population growth that has occurred in association with CBNG development, the housing vacancy rate within the City of Gillette has continued to decrease. A survey conducted in October 2004 estimated the vacancy rate of rental units to be 7.0 percent, based on a sample of approximately 40 percent of all rental units, mostly in larger complexes (CSI 2005). According to the City of Gillette, there was a 0.15 percent vacancy rate for rental property in 2006, while the average annual vacancy rate for manufactured home/mobile home rentals within the city limits was 9.05 percent (City of Gillette 2007). Many apartments had waiting lists.

The average selling price of a house in Campbell County was $133,482 in 2002. Prices tend to be lowest in Wright and highest in unincorporated areas, with the City of Gillette in between. Average selling prices in the first three quarters of 2004 ranged from $78,189 for a manufactured home in Gillette to $230,601 for a site-built home in rural Campbell County (CSI 2005).

An October 2004 survey found average apartment rents ranging from $363 per month for an efficiency apartment to $572 per month for a three-bedroom unit (CSI 2005). In the fourth quarter of 2003, average rent for a house in Campbell County was $707 and the average rent for a mobile home was $590 (Wyoming Department of Administration and Information 2005).

In addition to permanent housing, temporary or transient housing is a consideration for any project that might have a construction component. Temporary housing can include hotels or motels, campgrounds, and possibly mobile home parks.

There are 17 motels in Gillette with 1,346 guest rooms, one additional 27-room motel in Wright, and a two-room bed and breakfast in Gillette. Hotel occupancy rates have recently been very high and several new hotels are proposed for construction (Gillette News-Record 2006b). Gillette has two year-round commercial campgrounds with 150 hookups for RVs plus tent areas (Gillette Convention and Visitor's Bureau 2004). Campbell County has a multi-event facility, the CAM-PLEX, located in Gillette. It has 1,821 RV sites, which vary from 688 full service sites with rest rooms and shower facilities to electric only sites. The CAM-PLEX facilities are generally available only for scheduled special events, not for public camping (CAM-PLEX 2005).

Gillette also has approximately 1,595 mobile home park spaces. Mobile home parks are generally considered permanent housing resources, but they sometimes provide temporary spaces for RVs as well if there are vacant spaces available. The Gillette City Council approved a change which allows RVs to be placed in mobile home parks for up to three years (Gillette News-Record 2006c). As of early October 2004, the average vacancy rate in Gillette's mobile home parks was 35 percent, or 558 spaces (CSI 2005).

3.17.4.2 Environmental Consequences

3.17.4.2.1 Proposed Action and Alternative 1

As discussed above, FCW does not project an increase in average yearly employment at the mine under the Proposed Action or BLM's preferred tract configuration for Alternative 1. Current employment levels would continue for from about eight additional years under either alternative, but no additional demands on the existing infrastructure or services in the community would be expected. Although housing is tight in Gillette, it is likely that housing would be available from the existing and proposed units in Campbell County if any additional employees are needed at the Eagle Butte Mine.

3.17.4.2.2 No Action Alternative

Under the No Action Alternative, the Eagle Butte West coal lease application would be rejected and the coal included in the Eagle Butte West LBA Tract under the Proposed Action or BLM's preferred tract configuration for Alternative 1 would not be mined. Currently approved mining operations and associated employment levels would continue on the existing Eagle Butte Mine leases for approximately 13.6 more years on the existing Eagle Butte Mine leases, but would not be extended beyond that time to recover the coal in the Eagle Butte West LBA Tract.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.17.5 Local Government Facilities and Services

3.17.5.1 Affected Environment

The availability of revenues generated by mineral production has helped local government facilities and services keep pace with growth and are adequate for the current population.

Estimated enrollment in Campbell County School District No. 1 as of December, 2006 was 7,608 students, making it the third largest school district in Wyoming. Recent increases in enrollment have resulted in more crowded schools in the district. The district facilities include: one high school (with two campuses) and two junior high schools in Gillette, a junior-senior high school in Wright and 15 elementary schools (including one in Wright and three in rural areas). The district also operates an alternative high school and aquatic center in Gillette (Gillette News-Record 2006d and CCSD 2007). The Rawhide Elementary School, which is located within the BLM study area for the Eagle Butte West LBA Tract, is undergoing a renovation which will add classrooms and make room for more students (Gillette News-Record 2007b).

The Campbell County Sheriff provides police protection throughout the county, except within the City of Gillette. In addition to general law enforcement, the Sheriff's staff provides court security, detention facilities, and animal control. For the 2004 fiscal year, the department budgeted for 60 law enforcement employees. Recent improvements have increased the Campbell County detention facility to 128 beds, which includes separate modules for women and juveniles (BLM 2005b).

Fire protection throughout Campbell County is provided by the Campbell County Fire Department, which is governed by a city-county joint powers board (Vonsik 2005). The department maintains four stations in Gillette and six dispersed throughout the county. The department has 17 full-time staff and 150 trained volunteers. In addition, there are 30 to 40 volunteers in outlying areas who are trained and equipped primarily to fight wildland fires. Campbell County coal mines generally provide equipment and trained staff to fight fires on mine property. The County Fire Department provides backup assistance with personnel and equipment (Vonsik 2005).

The primary medical care facility in Campbell County is Campbell County Memorial Hospital, a 90-bed acute care hospital. The hospital has a medical staff of over 50 affiliated physicians in 20 specialties and a total staff of 800 (CCMH 2005). The hospital also operates the Wright Clinic, a satellite clinic with a full-time, family practice physician. Ambulance service for Campbell County is provided by the hospital, which has a 24-hour emergency service capability. The Campbell County Fire Department provides first responder service to emergency calls, but transport is the responsibility of the hospital affiliated ambulance service (Vonsik 2005).

Water and wastewater treatment systems are provided by the City of Gillette. Gillette serves the city and some urbanized areas nearby from groundwater wells. The water system has the capacity to serve approximately 25,000 people. Water use has recently approached capacity during the summer months when parks and private lawns are being irrigated (Morovits 2005). The Gillette City Council has approved a resolution supporting a voluntary summer water conservation program suggested by the city's water division (Gillette News-Record 2007c). An additional well field is being planned for completion in about five years. In the interim, the city has other wells it can pump if necessary, but high natural fluoride levels require careful monitoring if they are used (Morovits 2005). Improvements to Gillette's sewer treatment system were recently completed, which updated the system and increased the design capacity to accommodate 50,000 people (Gillette News-Record 2007d). The system was designed to serve about 35,000 people before the recent upgrade.

3.17.5.2 Environmental Consequences

3.17.5.2.1 Proposed Action and Alternative 1

As discussed above, FCW is not projecting an increase in average yearly employment at the mine under the Proposed Action or BLM's preferred tract configuration for Alternative 1. Current employment levels would continue for about eight additional years under either alternative, but no additional demands on the existing infrastructure or services in the community would be expected. If any additional employees are needed at the Eagle Butte Mine, it is likely that the demand for public facilities and services would be satisfied by the existing facilities and services currently in place in Campbell County.

3.17.5.2.2 No Action Alternative

Under the No Action Alternative, the coal included in the Eagle Butte West LBA Tract under the Proposed Action or BLM's preferred tract configuration under Alternative 1 would not be mined. Local government facilities and services would not be affected by an extension of mining operations of about eight additional years at the Eagle Butte Mine. Currently approved mining operations and associated employment levels would continue on the existing Eagle Butte Mine leases for approximately 13.6 more years.

As discussed in Section 2.2, a decision to reject the Eagle Butte West lease application at this time would not preclude an application to lease the tract in the future.

3.17.6 Environmental Justice

3.17.6.1 Affected Environment

Environmental Justice issues are concerned with actions that unequally impact a given segment of society as a result of physical location, perception, design, noise, or other factors. On February 11, 1994, Executive Order 12898, "Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations", was published in the *Federal Register* (59 FR 7629). The Executive Order requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations (defined as those living below the poverty level). The Executive Order makes it clear that its provisions apply fully to Native American populations and Native American tribes, specifically to effects on tribal lands, treaty rights, trust responsibilities, and the health and environment of Native American communities.

Communities within Campbell County, entities with interests in the area, and individuals with ties to the area all may have concerns about the presence of

surface coal mines in the area. Environmental Justice concerns are usually directly associated with impacts on the natural and physical environment, but these impacts are likely to be interrelated with social and economic impacts as well. Native American access to cultural and religious sites may fall under the umbrella of Environmental Justice concerns if the sites are on tribal lands or access to a specific location has been granted by treaty right.

Compliance with Executive Order 12898 concerning Environmental Justice was accomplished through opportunities for the public to receive information on this EIS in conjunction with consultation and coordination described in Section 1.6 of this document. This EIS and contributing socioeconomic analysis provide a consideration of the impacts with regard to disproportionately adverse impacts on minority and/or low-income groups, including Native Americans.

3.17.6.2 Environmental Consequences

3.17.6.2.1 Proposed Action and Alternative 1

Economic and demographic data indicate that neither minority populations nor people living at or below the poverty level make up "meaningfully greater increment" of the total population in Gillette or Campbell County than they do in the state as a whole. Also, the Native American population is smaller than in the state as a whole and there are no known Native American sacred sites on or near the proposed LBA site. Consequently, implementation of the proposed project would not adversely affect the environmental justice considerations in the area.

3.17.6.2.2 No Action Alternative

Economic and demographic data do not indicate that minority populations or people living at or below the poverty level make up "meaningfully greater increment" of the total population in Gillette or Campbell County than they do in the state as a whole. Also, the Native American population is smaller than in the state as a whole and there are no known Native American sacred sites on or near the existing Eagle Butte Mine. Consequently, the No Action Alternative would not adversely affect the environmental justice considerations in the area.

3.17.7 Regulatory Compliance, Mitigation and Monitoring

Surface coal mines are required to pay royalty and taxes as required by federal, state, and local regulations. The BLM compares the amount of coal reported as produced with the estimated amount of coal in the ground to verify that the federal coal is efficiently mined and royalties are paid on all of the coal that is recovered.

3.17.8 Residual Effects

No socioeconomic residual impacts are expected.

3.18 The Relationship Between Local Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

From 2006 on, the Eagle Butte Mine would be able to produce coal at an average production level of 25 mmtpy for almost 14 more years under the No Action Alternative, compared with an average of 25 mmtpy for about 22 years for the Eagle Butte West LBA Tract as applied for or under BLM's preferred tract configuration for Alternative 1, assuming that Highway 14-16 is not moved (Table 2-3).

As the coal is mined, almost all components of the present ecological system, which have developed over a long period of time, would be modified. In partial consequence, the reclaimed land would be topographically lower, and although it would resemble original contours, it would lack some of the original diversity of geometric form.

The forage and associated grazing and wildlife habitat that the LBA tract provides would be temporarily lost during mining and reclamation. During mining of the LBA tract there would be a loss of native vegetation on 2,395 acres (Proposed Action) up to a maximum of 2,415 acres (BLM's preferred tract configuration for Alternative 1) with an accompanying disturbance of wildlife habitat and grazing land. This disturbance would occur incrementally over a period of years. The mine site would be returned to equivalent or better forage production capacity for domestic livestock before the performance bond is released. Long-term productivity would depend largely on postmining range management practices, which to a large extent would be controlled by private landowners.

Mining would disturb pronghorn and sage-grouse nesting habitat. There would be loss and displacement of wildlife during mining, but it is anticipated that reclaimed habitat would support a diversity of wildlife species similar to premining conditions. The diversity of species found in undisturbed rangeland would not be completely restored on the leased lands for an estimated 50 years after the initiation of disturbance. Re-establishment of mature sagebrush habitat, which is crucial for pronghorn and sage-grouse, would be expected to take even longer.

CBNG is currently being recovered from within and/or near the LBA tract and BLM's analysis suggests that a large portion of the CBNG resources on the tract has been recovered or would be recovered prior to mining. CBNG that is not recovered prior to mining would be vented to the atmosphere during the mining process. CBNG is composed primarily of methane, which is a greenhouse gas that

contributes to global warming. According to the Energy Information Administration:

- U.S. anthropogenic methane emissions totaled 26.6 million metric tons in 2005.

- U.S. 2005 methane emissions from coal mining were estimated at 2.85 million metric tons, which represents approximately 10.7 percent of the U.S. total anthropogenic methane emissions in 2005.

- Methane emissions from surface coal mining in the U.S. were estimated to be responsible for about 0.54 million metric tons of methane emissions in 2005, which represents about 2.03 percent of the estimated U.S. anthropogenic methane emissions in 2001, and about 19 percent of the estimated methane emissions attributed to coal mining of all types (USDOE 2005a).

- Approximately 51.3 percent of the coal mined using surface mining techniques in the U.S. in 2005 came from the Wyoming PRB (USDOE 2005b), which means that Wyoming PRB surface coal mines were responsible for approximately 1.04 percent of the estimated U.S. anthropogenic methane emissions in 2005.

Total U.S. methane emissions attributable to coal mining would not be likely to decrease if the Eagle Butte West LBA Tract is not leased at this time because a decision to lease or not to lease the tract would not directly affect total U.S. coal production. However, the methane on an LBA tract could be more completely recovered if leasing is delayed.

Coal is a major source of electricity generation in the U.S. Approximately 51.1 percent of electric power in the U.S. is provided by coal (USDOE 2005b). Coal-fired power plant emissions include greenhouse gasses that contribute to global warming. According to the Energy Information Administration (USDOE 2005a and 2005b):

- CO_2 emissions represent about 84 percent of the total U.S. greenhouse gas emissions.

- Estimated CO_2 emissions in the U.S. totaled 6,008.6 million metric tons in 2005, which was 0.3 percent more than 2004.

- Estimated CO_2 emissions from the electric power sector totaled 2,375.0 million metric tons, or about 40 percent of total U.S. energy-related CO_2 emissions in 2005.

- Estimated CO_2 emissions from coal electric power generation in 2005 totaled 1,994.2 million metric tons or about 33 percent of total U.S. energy-related CO_2 emissions in 2005.

- The Wyoming PRB produced about 37.6 percent of the coal used for power generation in 2005, which means that Wyoming PRB surface coal mines were responsible for approximately 12.5 percent of the estimated U.S. CO_2 emissions in 2005.

The applicant mine plans to produce the coal included in the LBA tract at currently permitted levels using existing production and transportation facilities. As a result, leasing the Eagle Butte West LBA Tract to an existing mine under the Proposed Action or Alternative 1 would not be expected to result in increased or new emissions of CO_2 from coal-fired power plants.

Coal also releases mercury into the air when it is burned. Mercury in the air settles into water or onto land, where it can be washed into the water. Certain microorganisms can change it into methyl mercury, which is a highly toxic mercury compound that builds up in fish and shellfish when they feed. There are adverse health effects to both humans and other animals that consume these fish and shellfish. Research has shown that most people's fish consumption does not cause a health concern, but high levels of methyl mercury in the bloodstream of unborn babies and young children may harm the developing nervous systems of those children (EPA 2006e).

According to the EPA, coal-fired power plants are the largest remaining source of human-generated mercury emissions in the U.S., accounting for more than 40 percent of all domestic human-caused mercury emission; however, these emissions contribute little to the global mercury pool. EPA estimates that mercury emissions from U.S. coal-fired power plants account for about one percent of the global total (EPA 2007e). As indicated above, the Wyoming PRB produced about 37.6 percent of the coal used for power generation in 2005, which would represent less than 0.4 percent of the global mercury emissions.

As indicated previously, the Eagle Butte Mine plans to produce the coal included in the LBA tract at currently permitted levels using existing production and transportation facilities. As a result, leasing the Eagle Butte West LBA Tract under the Proposed Action or Alternative 1 would not be expected to result in increased or new emissions of mercury from coal-fired power plants.

If the Eagle Butte West LBA Tract is leased, mined, and reclaimed, there would be a deterioration of the groundwater quality in the lease area; however, the water quality would still be adequate for livestock and wildlife. This deterioration would probably occur over a long period of time. As a result of mining alone, depth to groundwater would increase during mining in an area extending roughly 11 miles west of the Eagle Butte Mine pits in the coal aquifer. The depth to groundwater in

the overburden aquifer would also increase during mining around the Eagle Butte Mine pits. The water levels in the coal and overburden aquifers should return to premining levels at some time after mining has ceased, as discussed in Section 3.5.4, because recharge areas would not be disturbed in order to recover the coal in the LBA tract.

Mining operations and associated activities would degrade the air quality and visual resources of the area on a short-term basis. Following coal removal, removal of surface facilities, and completion of reclamation, there would be no long-term impact on air quality. The long-term impact on visual resources would be minor.

Short-term impacts to recreation values may occur from reduction in big game populations due to habitat disturbance and reduction in access to some public lands. These changes would primarily impact hunting in the lease area. However, because reclamation would result in a wildlife habitat similar to that which presently exists and access to public lands would be restored, there should be no long-term adverse impacts on recreation.

The long-term economy of the region would be enhanced as a result of the Proposed Action and Alternative 1. The Proposed Action and Alternative 1 would extend the life of the Eagle Butte Mine up to eight years (Table 2-3).

3.19 Irreversible and Irretrievable Commitments of Resources

The major commitment of resources would be the mining and consumption of from 203.0 million tons (Proposed Action) to 206.1 million tons (the BLM's preferred tract configuration for Alternative 1) of coal to be used for electrical power generation. CBNG that is not recovered prior to mining would also be irreversibly and irretrievably lost (see additional discussion of the impacts of venting CBNG to the atmosphere in Section 3.18). It is estimated that one to two percent of the energy produced would be required to mine the coal, and this energy would also be irretrievably lost.

The characteristics of topsoil on from approximately 2,395 acres (Proposed Action) to approximately 2,415 acres (the BLM's preferred tract configuration for Alternative 1) would be irreversibly changed. Soil formation processes, although continuing, would be irreversibly altered during mining-related activities. Newly formed soil material would be unlike that in the natural landscape.

Direct and indirect wildlife deaths caused by mining operations or associated activity would be an irreversible loss.

Loss of life may conceivably occur due to the mining operations and vehicular and train traffic. On the basis of surface coal mine accident rates in Wyoming as determined by the Mine Safety and Health Administration (1997) for the 10-year

period 1987-1996, fatal accidents (excluding contractors) occur at the rate of 0.003 per 200,000 man-hours worked. Disabling (lost-time) injuries occur at the rate of 1.46 per 200,000 man-hours worked. Any injury or loss of life would be an irretrievable commitment of human resources.

Disturbance of all known historic and prehistoric sites on the mine area would be mitigated to the maximum extent possible. However, accidental destruction of presently unknown archeological or paleontological values would be irreversible and irretrievable.

4.0 CUMULATIVE ENVIRONMENTAL CONSEQUENCES

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. Cumulative impacts can result from individually minor, but collectively significant, actions occurring over time.

This section summarizes the cumulative impacts that are occurring as a result of existing development in the PRB[1] and considers how those impacts would change if other projected development in the area occurs and if the Eagle Butte West LBA Tract is leased and mined.

BLM completed three regional EISs evaluating the potential cumulative impacts of surface coal development in the 1970s and early 1980s (BLM 1974, 1979, and 1981). A draft document for a fourth regional EIS was prepared and released in 1984 (BLM 1984). Since those regional EISs were prepared, BLM has prepared a number of NEPA analyses evaluating coal leasing actions and oil and gas development in the PRB. Each of these NEPA analyses includes an analysis of cumulative impacts in the Wyoming PRB.

The BLM is completing a regional technical study, called the PRB Coal Review, to help evaluate the cumulative impacts of coal and other mineral development in the PRB. The PRB Coal Review consists of three tasks:

- Task 1 identifies current resource conditions in the PRB and, for applicable resources, updates the BLM's 1996 status check for coal development in the PRB. The baseline year for the Task 1 evaluation of the current conditions is 2003.

- Task 2 defines the past and present development activities in the PRB and their associated development levels as of 2003 and develops a forecast of reasonably foreseeable development in the PRB through 2020. The reasonably foreseeable activities fall into three broad categories: coal development (coal mine and coal-related), oil and gas development (conventional oil and gas, CBNG, and major transportation pipelines), and other development, which includes development that is not energy-related as well as other energy-related development.

- Task 3 predicts the cumulative impacts that could be expected to occur to air, water, socioeconomic, and other resources if the development occurs as projected in the forecast developed under Task 2.

A series of reports has been prepared to present the results of the PRB Coal Review task studies. The Task 1, 2, and 3 reports represent components of a technical study of cumulative development in the PRB; they do not evaluate specific proposed projects, but they provide information that BLM is using to

[1] Refer to page xv for a list of abbreviations and acronyms used in this document.

evaluate the cumulative impacts that would be expected to occur if specific projects or applications, such as the Eagle Butte West coal lease application, are approved. The Task 1 reports, which include air quality conditions, water resources conditions, social/economic conditions, and other resource conditions, and the Task 2 reports have been completed. The Task 3 reports for air quality conditions, social/economic conditions, and other resource conditions have been completed. The Task 3 evaluation of water resource conditions is in progress. The information in these reports is summarized later in this chapter, and the completed reports are available for viewing at the BLM offices in Casper and Cheyenne and on the Wyoming BLM website at http://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/prbdocs.html.

The PRB includes portions of northeastern Wyoming and southeastern Montana. The Wyoming portion of the PRB is the primary focus of the PRB Coal Review reports. The Montana portion of the PRB is included in the Task 2 report and in the Task 1 and 3 air resources studies. For the majority of resources in the Task 1 report and for the Task 2 report, the Wyoming portion of the PRB Coal Review study area encompasses all of Campbell County, all of Sheridan and Johnson Counties outside of the Bighorn National Forest, and the northern portion of Converse County (Figure 4-1). For some components of the Task 2 report and for the Task 1 and 3 air resource studies, the Montana PRB Coal Review study area includes portions of Big Horn, Custer, Powder River, Rosebud, and Treasure Counties. For several resources, the Task 1 and Task 3 study areas include only potentially affected portions of the Wyoming PRB Coal Review study area; for other resources, the study area extends outside of Wyoming and Montana because the impacts would extend beyond the PRB. For example, the groundwater drawdown is evaluated in the area surrounding and extending west of the mines, because that is the area where surface coal mining operations would impact groundwater resources; but air quality impacts are evaluated over a multi-state area because they would be expected to extend beyond the PRB.

Section 4.1 summarizes the information presented in the PRB Coal Review Task 1 and Task 2 reports. Section 4.2 summarizes the predicted cumulative impacts to air, water, socioeconomic, and other resources presented in the PRB Coal Review Task 3 reports.

4.1 Past, Present, and Reasonably Foreseeable Development

Past, present, and reasonably foreseeable development in the Wyoming PRB are considered in the Task 1 and Task 2 reports for the PRB Coal Review. The Task 1 reports describe the current situation, which reflects the past and present levels of development. The Task 2 report defines the past and present development activities in the PRB as of the end of 2003 and projects reasonably foreseeable development in the Wyoming PRB through 2020.

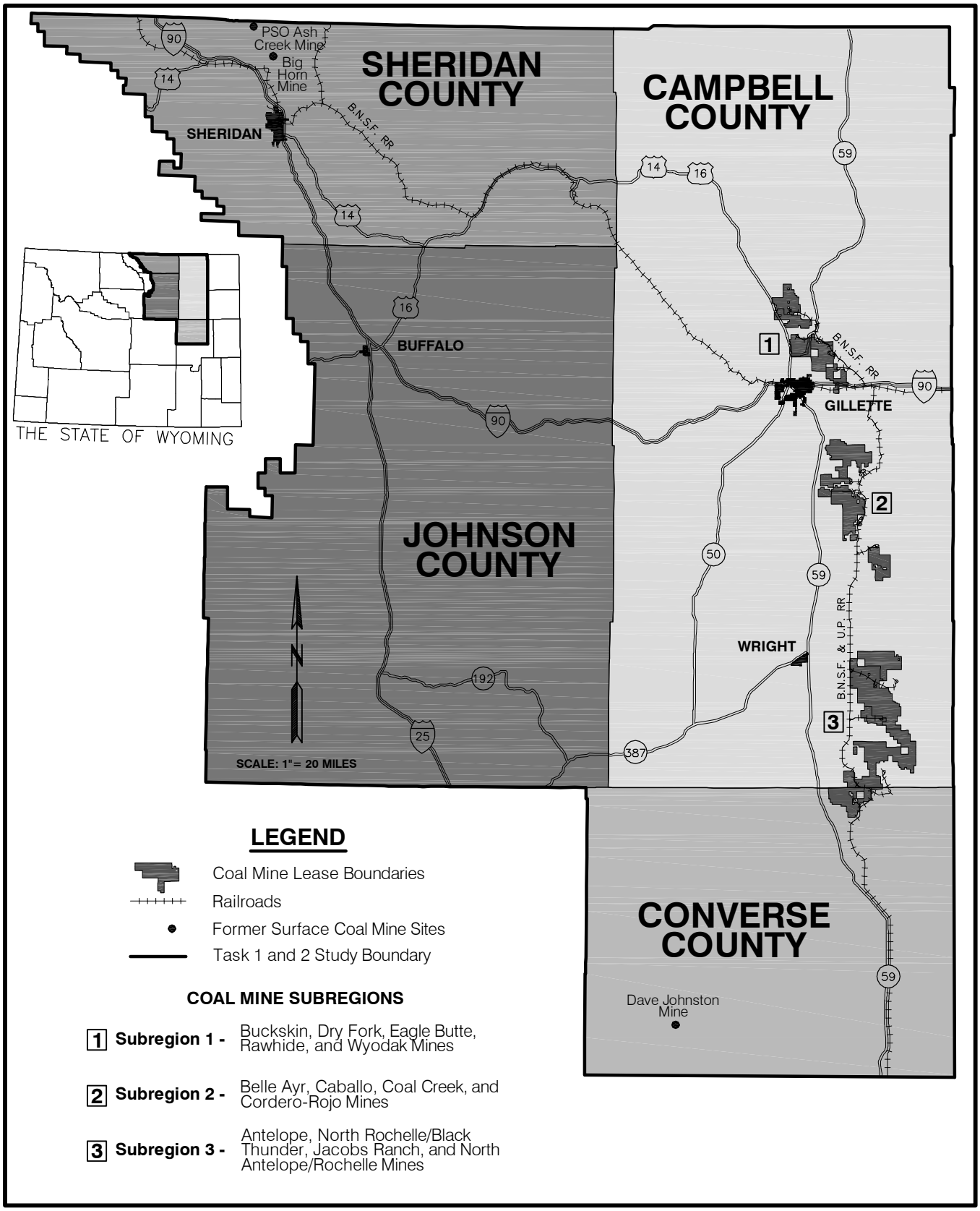


Figure 4-1. Wyoming Study Area for PRB Coal Review Studies Evaluating Current and Projected Levels of Development.

4.1.1 Coal Development

4.1.1.1 Coal Mine Development

The Powder River Federal Coal Region was decertified as a federal coal production region by the PRRCT in 1990. Decertification of the region allows leasing to take place on an application basis, as discussed in the regulations at 43 CFR 3425.1-5. Between 1990 and 2005, the BLM's Wyoming State Office held 23 competitive coal lease sales and issued 17 new federal coal leases containing almost 5.2 billion tons of coal using the LBA process. The lease sales are listed in Table 1-1, and the leased tracts are shown in Figure 1-1. This leasing process has undergone the scrutiny of two appeals to the IBLA and one audit by the GAO. As can be seen in Figure 4-2, leasing activity has generally paralleled production since decertification. This is consistent with the PRRCT's objective at the time of decertification, which was to use the LBA process to lease tracts of federal coal to maintain production at existing mines.

The Wyoming BLM has pending applications for 12 additional maintenance tracts for existing mines containing about 4.44 billion tons of coal (Table 1-2).

BLM has also completed three exchanges involving federal coal resources in the Wyoming PRB since decertification:

- Belco Exchange – an exchange of lease rights for a portion of the former Hay Creek federal coal tract for lease rights to coal near Buffalo, Wyoming, which became unmineable when Interstate 90 was constructed. This exchange was authorized by Public Law 95-554 and completed in 2000.

- Pittsburg and Midway Coal Mining Company (P&M) Exchange – an exchange of federal coal in Sheridan County, Wyoming, for land and mineral rights in Lincoln, Carbon, and Sheridan Counties, Wyoming, completed in 2004.

- Powder River Coal Company AVF Exchange - an exchange of lease rights underlying an AVF at the Caballo Mine, which cannot be mined, for lease rights of equal value adjacent to existing federal leases at Powder River Coal Company's North Antelope Rochelle Mine, completed in 2006.

Table 4-1 provides information about the status, ownership and production levels for the existing surface coal mines in the Wyoming PRB for 2003, which is the baseline year for the PRB Coal Review Task 1 and Task 2 studies. In the baseline year, there were 12 active surface coal mines and one inactive mine. The North Rochelle Mine was not operated as a separate mine in 2005 and 2006 following its purchase by the operator of the Black Thunder Mine. The North Rochelle Mine leases were divided between Black Thunder and North Antelope Rochelle Mines in 2006. These mines are all located in Campbell and Converse Counties, just west of the outcrop of the Wyodak coal, where the coal is at the shallowest depth (Figure 1-1). As indicated in Table 4-1, there have been

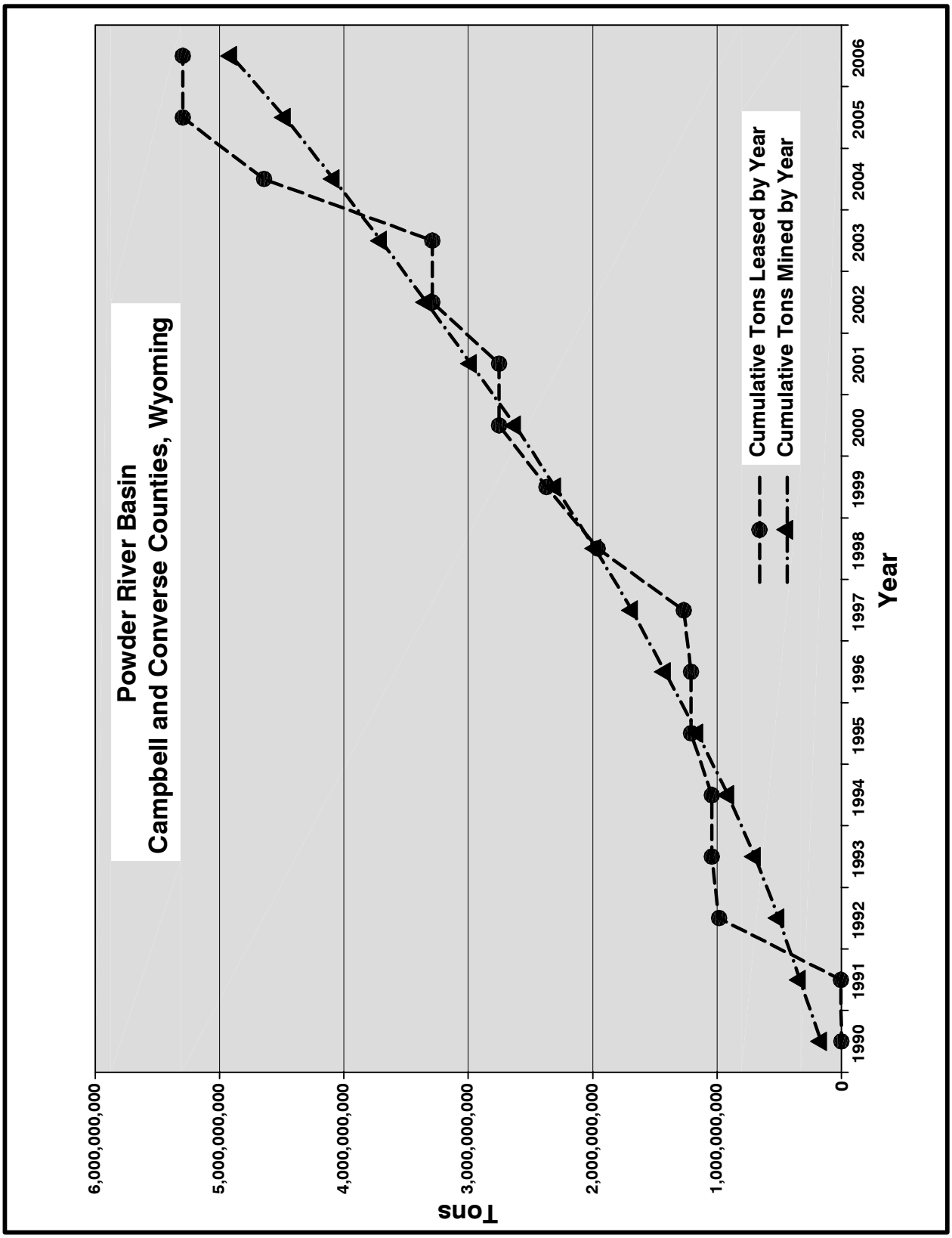


Figure 4-2. Tons of Federal Coal Leased Versus Tons of Coal Mined Since 1990.

Table 4-1. Status and Ownership of Wyoming PRB Coal Mines for 2003 the PRB Coal Review Baseline Year.

2003 Mine	1994 Mine Owner	2006 Mine Owner	Actual Coal Production (mm Tons)[1]	Permitted Production Level (mm Tons)[2]	Status and Additional Comments
SUBREGION 1 (North Gillette)					
Buckskin	SMC (Zeigler)	Kiewit Mining Properties	17.5	27.5	Active
Dry Fork	Phillips/WFA & Fort Union Ltd	WFA	4.4	24.4	Active (Includes former Fort Union Mine)
Eagle Butte	Cyprus-Amax	Foundation Coal West	24.5	35.0	Active
Rawhide	Carter (Exxon)	Peabody Holding Co.	3.6	24.0	Active
Wyodak	Wyodak Resources	Wyodak Resources	4.8	12.0	Active (Includes former Clovis Point Mine)
Total			**54.8**	**122.9**	
SUBREGION 2 (South Gillette)					
Belle Ayr	Cyprus-Amax	Foundation Coal West	17.9	35.0	Active
Caballo	Carter (Exxon) & Western Energy	Peabody Holding Co.	22.7	40.0	Active (Includes Rocky Butte and West Rocky Butte leases)
Cordero Rojo	Kennecott & Drummond	Rio Tinto Energy America[3]	36.1	65.0	Active (Consolidation of former Cordero and Caballo Rojo Mines)
Coal Creek	ARCO	Arch Coal Inc.	0	25.0	Inactive in 2003, operations resumed in 2006
Total			**76.7**	**165.0**	
SUBREGION 3 (Wright)					
Antelope	Kennecott	Rio Tinto Energy America[3]	29.5	32.0	Active
Black Thunder	ARCO	Arch Coal Inc.	62.6	90.0	Active
Jacobs Ranch	Kerr-McGee	Rio Tinto Energy America[3]	36.0	55.0	Active
N. Antelope/ Rochelle	Peabody	Peabody Holding Co.	80.1	85.0-105.0	Active (Consolidation of former North Antelope and Rochelle Mines)
N. Rochelle	SMC (Zeigler)	Arch Coal Inc.	23.9	35.0	Inactive since 2005, leases split between Black Thunder and North Antelope Rochelle Mines
Total			**232.1**	**297.0-317.0**	
TOTAL FOR 3 MINE GROUPS			**363.6**	**584.9-604.9**	

1 Wyoming State Inspector of Mines (Wyoming Department of Employment 2003).
2 WDEQ permitting levels.
3 Kennecott Energy Company changed its name to Rio Tinto Energy America in 2006.

numerous changes in mine ownership since decertification, which have resulted in mine consolidations and mine closings within the PRB.

Recently active surface coal mines in Sheridan County, (the Big Horn Coal Mine) and southern Converse County (the Dave Johnston Mine) have ended mining operations, relinquished their federal coal leases, and are reclaiming areas of disturbance.

There are existing permits for other surface coal mining-related operations in the PRB. These include the Ash Creek and Welch Mine permits in Sheridan County and the IZITA Mine permit in Campbell County. Operations at these sites are completed and disturbed areas have been reclaimed, but monitoring of the reclaimed areas is ongoing. The KFx Mine, located north of Gillette on privately owned coal, is mining coal for processing at the KFx coal enhancement plant, which is discussed in Section 4.1.1.2.4.

The active mines in the Wyoming PRB are geographically grouped into three subregions (Figure 4-1). For purposes of this cumulative impact discussion, these subregions are called the North Gillette, South Gillette, and Wright subregions. Table 4-1 lists the mines included in each subregion. A fourth subregion includes former and proposed mines in Sheridan County, Wyoming, and existing mines just north of Sheridan County, in Montana. There are currently no active mines in the Wyoming portion of the fourth subregion.

The surface coal mines listed in Table 4-1 currently produce over 96 percent of the coal produced in Wyoming each year. Since 1989, coal production in the PRB has increased by an average of six percent per year. The increasing production is primarily due to increasing sales of low-sulfur, low-cost PRB coal to electric utilities who must comply with the Phase I requirements of Title III of the 1990 Clean Air Act Amendments. Electric utilities account for 97 percent of Wyoming's coal sales. In 2003 (the baseline year for the PRB Coal Review), more than 33 percent of the coal mined in the United States came from the Wyoming PRB.

BLM estimates that the surface coal mines listed in Table 4-1 currently have about 122,280 acres of federal coal leased in Campbell and Converse Counties. This represents approximately 3.97 percent of Campbell County, where the majority of the leases are located.

Task 2 of the PRB Coal Review projected coal development into the future for the years 2010, 2015, and 2020. Due to the variables associated with future coal production, two projected coal production scenarios (representing an upper and a lower production level) were developed to bracket the most likely foreseeable regional coal production level. The basis for the projected production levels included:

1) an analysis of historic PRB production levels in comparison to the gross domestic product and national coal demand;

2) an analysis of current PRB coal market forecasts that model the impact of gross domestic product growth, potential regulatory changes affecting coal-fired power plants, and mining and transportation costs on PRB coal demand;

3) the availability, projected production cost, and quality of future mine-specific coal reserves within the PRB region; and

4) the availability of adequate infrastructure for coal transportation.

The projected upper and lower production levels subsequently were allocated to the Wyoming PRB subregions, discussed above, and to individual mines based on past market shares. Individual mine production levels were reviewed relative to potential future production constraints (e.g., loadout capacities), permitted production levels, mining costs, and coal quality. Then the projected future production was aggregated on a subregion basis. The actual 2003 production level and the two projected coal production scenarios for 2010, 2015, and 2020 are shown in Figure 4-3 and Tables 4-2 and 4-3.

Tables 4-2 and 4-3 also show the cumulative coal mining disturbance as of the baseline year and the cumulative coal mine disturbance projected for the future years for the upper and lower production scenarios. In these tables, the baseline year and cumulative projected disturbance areas are broken down into three categories:

- areas that are or are projected to be permanently reclaimed;

- areas that are or are projected to be undergoing active mining or which have been mined but are not yet reclaimed; and

- areas that are or are projected to be occupied by mine facilities, haul roads, stockpiles, and other long-term structures, and which are therefore unavailable for reclamation until mining operations are completed.

The two tables also include estimates of baseline year and projected future coal mining employment, water consumption, and water production.

As discussed in Section 1.2, based upon the current projected annual coal production over the life of the mine, FCW currently estimates that the existing recoverable reserves at the Eagle Butte Mine will be depleted within approximately 13.6 years at an average production rate of approximately 25 mmtpy. If they acquire a lease for the Eagle Butte West LBA Tract, FCW anticipates that the average rate of annual production would not increase, and that the mine would extend its productive life by eight or nine years, depending on whether U.S. Highway 14-16 is moved or not. The existing and projected coal development levels and associated disturbance shown in Tables 4-2 and 4-3 include production at the Eagle Butte Mine during the baseline year (2003) and projected production at the mine for 2010, 2015, and 2020. As discussed

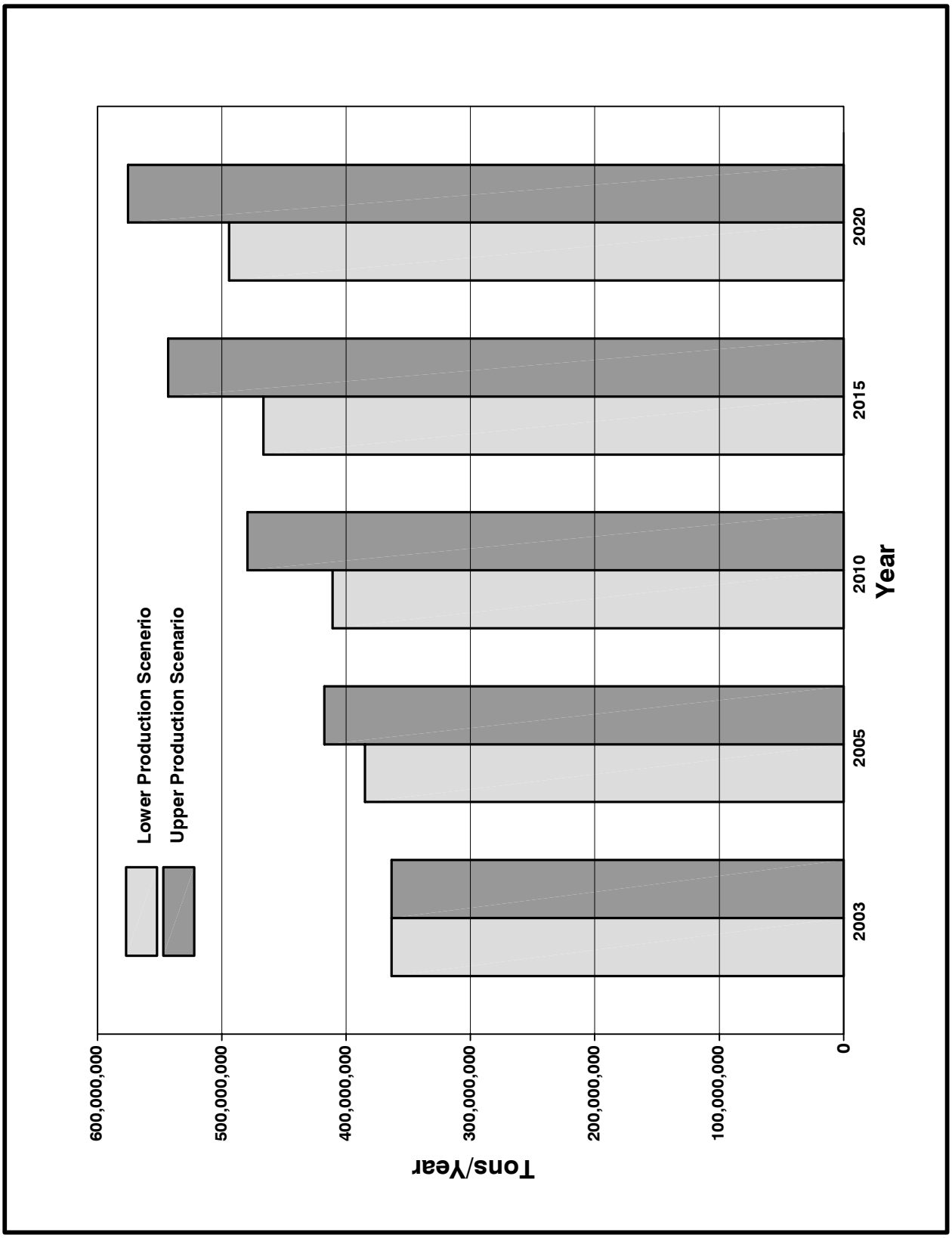


Figure 4-3. Projected Total Coal Production from Campbell and Converse Counties Under the Lower and Upper Production Scenarios.

Table 4-2. Current and Projected Wyoming PRB Coal Mine Development, Lower Production Scenario.

Subregion	Annual Production (million tons)	Cumulative Disturbed Area (acres)	Cumulative Permanently Reclaimed Area (acres)	Cumulative Active Mining Area and Unreclaimed Mined Area (acres)	Cumulative Area Disturbed and Unavailable For Reclamation[1] (acres)	Total Mine Employment	Annual Water Consumption (mmgpy)	Annual Water Production (acre-feet)
Baseline year (2003)								
North Gillette Subregion	55	12,047	3,054	3,360	5,633	746	387	586
South Gillette Subregion	77	21,249	6,783	6,107	8,359	1,174	544	1,373
Wright Subregion	231	35,498	11,401	13,992	10,105	3,090	1,709	2,295
Total for 2003	**363**	**68,794**	**21,238**	**23,459**	**24,097**	**5,010**	**2,640**	**4,254**
Reasonably Foreseeable Development for 2010								
North Gillette Subregion	62	15,231	5,004	3,968	6,260	787	441	505
South Gillette Subregion	95	28,021	12,183	6,830	9,008	1,323	656	2,072
Wright Subregion	254	55,410	27,751	16,588	11,070	3,153	1,874	4,354
Total for 2010	**411**	**98,662**	**44,938**	**27,386**	**26,338**	**5,263**	**2,971**	**6,931**
Reasonably Foreseeable Development for 2015								
North Gillette Subregion	74	17,457	6,654	4,202	6,601	830	543	505
South Gillette Subregion	112	32,356	15,683	7,314	9,359	1,369	764	2,072
Wright Subregion	281	67,423	38,851	16,983	11,589	3,186	2,077	4,354
Total for 2015	**467**	**117,236**	**61,188**	**28,499**	**27,549**	**5,405**	**3,384**	**6,931**
Reasonably Foreseeable Development for 2020								
North Gillette Subregion	78	19,729	8,429	4,350	6,950	840	569	505
South Gillette Subregion	126	36,994	19,683	7,589	9,723	1,476	845	2,072
Wright Subregion	291	80,720	51,351	17,243	12,124	3,215	2,157	4,354
Total for 2020	**495**	**137,443**	**79,463**	**29,182**	**28,797**	**5,531**	**3,571**	**6,931**

[1] Area unavailable for reclamation includes disturbed areas occupied by permanent or long-term facilities such as buildings, roads, topsoil stockpiles, etc.
Source: PRB Coal Review Task 2 Report (BLM 2005d)

Table 4-3. Current and Projected Wyoming PRB Coal Mine Development, Upper Production Scenario.

Subregion	Annual Production (million tons)	Cumulative Disturbed Area (acres)	Cumulative Permanently Reclaimed Area (acres)	Cumulative Active Mining Area and Unreclaimed Mined Area (acres)	Cumulative Area Disturbed and Unavailable For Reclamation[1] (acres)	Total Mine Employment	Annual Water Consumption (mmgpy)	Annual Water Production (acre-feet)
Baseline Year (2003)								
North Gillette Subregion	55	12,047	3,054	3,360	5,633	746	387	586
South Gillette Subregion	77	21,249	6,783	6,107	8,359	1,174	544	1,373
Wright Subregion	232	35,498	11,401	13,992	10,105	3,090	1,709	2,295
Total for 2003	**363**	**68,794**	**21,238**	**23,459**	**24,097**	**5,010**	**2,640**	**4,254**
Reasonably Foreseeable Development for 2010								
North Gillette Subregion	78	15,911	5,404	4,217	6,290	811	570	505
South Gillette Subregion	117	29,279	13,416	7,536	8,328	1,375	807	2,072
Wright Subregion	284	57,258	27,951	18,236	11,070	3,153	2,101	4,354
Total for 2010	**479**	**102,448**	**46,771**	**29,989**	**25,688**	**5,339**	**3,478**	**6,931**
Reasonably Foreseeable Development for 2015								
North Gillette Subregion	104	18,490	7,329	4,500	6,660	905	785	505
South Gillette Subregion	138	35,624	18,616	8,248	8,760	1,431	952	2,072
Wright Subregion	301	70,431	39,451	19,391	11,589	3,186	1,834	4,354
Total for 2015	**543**	**124,545**	**65,396**	**32,139**	**27,009**	**5,522**	**3,571**	**6,931**
Reasonably Foreseeable Development for 2020								
North Gillette Subregion	121	21,311	9,529	4,766	7,013	1,019	935	505
South Gillette Subregion	148	42,981	25,016	8,758	9,206	1,444	1,018	2,072
Wright Subregion	307	84,797	51,651	21,021	12,124	3,215	2,279	4,354
Total for 2020	**576**	**149,089**	**86,196**	**34,545**	**28,345**	**5,678**	**4,232**	**6,931**

[1] Area Unavailable for reclamation includes disturbed areas occupied by permanent or long-term facilities such as buildings, roads, topsoil stockpiles, etc.
Source: PRB Coal Review Task 2 Report (BLM 2005d)

above, the projected development levels shown in Tables 4-2 and 4-3 are based on projected demand and coal market forecasts, which are not affected by a decision to lease or not to lease the Eagle Butte West LBA Tract.

4.1.1.2 Coal-Related Development

Coal-related development as defined for this analysis includes railroads, coal-fired power plants, major (230-kV) transmission lines, and coal technology projects. Table 4-4 summarizes the estimated disturbance associated with coal-related development activities for the baseline year and the projected disturbance through 2020. The subsequent paragraphs summarize the existing coal-related development in the Wyoming PRB and the reasonably foreseeable development considered in the PRB Coal Review.

Table 4-4. Current and Projected Wyoming PRB Coal-Related Development Scenario.

	2003	**2010**	**2015**	**2020**
Coal-Related Disturbance (Acres)	4,891	4,966	5,911	5,911

Source: PRB Coal Review Task 2 Report (BLM 2005d)

4.1.1.2.1 Coal Transportation

As discussed above, electric utilities account for about 97 percent of Wyoming's coal sales. Most of the coal sold to electric utilities is transported to power plants by rail. The coal mines in the Wright and South Gillette subregions are served by a joint BNSF & UP rail line. The existing capacity of the line is estimated at approximately 350 mmtpy. The existing capacity of the BNSF line, which services the North Gillette subregion, including the Eagle Butte Mine, is estimated at 250 mmtpy.

The two projects related to coal transportation that are projected to be developed prior to 2020 are expansion of the BNSF & UP rail facilities south of Gillette and the construction of the DM&E rail line in Wyoming and South Dakota.

UP and BNSF are upgrading sections of their existing joint rail line, including construction of 14 miles of a third main line track completed in Spring 2005, 19 miles of a third main line track scheduled to be fully operational in September 2006, and an additional 40 miles of third and fourth main line track to be constructed by 2009. In 2005, the capacity of the BNSF & UP joint line was 325 million tons per year. The scheduled improvements will enable the joint line to handle more than 400 million tons of coal per year (UP and BNSF press release 2006). These expansion projects are considered highly likely to occur.

The proposed DM&E rail line would include new rail construction in South Dakota and Wyoming (approximately 15 and 265 miles, respectively) and 600 miles of rail line rehabilitation in South Dakota and Minnesota. Approximately 78 miles of the new rail construction would occur in the PRB study area, where

the project would provide new rail spur services to the mines in the South Gillette and Wright subregions. The STB released a final supplemental EIS for this project on December 30, 2005 and granted final approval to construct the rail line on February 15, 2006. The supplemental EIS addresses issues that were successfully appealed after an EIS was initially completed in 2001. Funding for the project is still pending. For the purposes of the PRB Coal Review, it was projected that the DM&E line would be constructed when the total rail haulage requirement from the eastern Wyoming PRB reaches 450 to 500 million tons per year and would potentially be operational by 2015. The construction of this rail line is considered moderately likely to occur.

4.1.1.2.2 Electric Power Generation

Currently, there are four coal-fired power plants in the Wyoming PRB study area for Tasks 1 and 2. Black Hills Power Corporation owns and operates the Neal Simpson Units 1 and 2 (21.7-MW and 80-MW, respectively), WYGEN 1 (80-MW), and Wyodak (330-MW) power plants, all of which are located approximately five miles east of Gillette, Wyoming. Pacific Power and Light's Dave Johnston Power Plant is located near Glenrock, Wyoming, outside of but adjacent to the study area.

There are also three separate interconnected gas-fired power plants (Hartzog, Arvada, and Barber Creek) located near Gillette, Wyoming. Each contains three separate 5-MW-rated turbines that provide electric power to Basin Electric and its customers. In winter, the maximum capacity can reach 22.6-MW from each site. All units are in operating condition, although they do not operate at maximum capacity.

Several additional power plants are projected to be built prior to 2020 (Figure 1-1). Any proposed coal-fired power plant that plans to initiate operation by 2010 currently would have to be undergoing air permit review in order to obtain the required construction permits and complete construction by 2010. The following three identified projects currently are considered likely for development by 2010.

- Black Hills Power Corporation's WYGEN 2 coal-fired unit, located east of Gillette, currently is under construction and scheduled to be completed by the beginning of 2008. As originally permitted, this unit had a planned production capacity of 500-MW, which would consume approximately 2.8 million tons of coal per year. A permit modification has since dropped the initial phase to 90-MW. The facility would cover 60 acres within the existing 200-acre Black Hills Power and Light power plant area. Operation of this facility by 2010 is considered highly likely.

- North American Power Group has been working to permit and build a coal-fired power plant (Two-Elk Unit 1) since 1997 at a 40-acre site located approximately 15 miles southeast of Wright, Wyoming. Currently, the proposal is for a 320-MW coal-fired power plant. The original air

permit was issued in August 2002. The unit would be dry-cooled, requiring very little water. North American Power Group has received approval to receive several hundred million dollars in tax-exempt bonds from the state to help finance the project and is seeking additional funding. Operation of this facility by 2010 is considered moderately likely.

- Basin Electric Power Cooperative obtained a permit to construct and operate the Dry Fork Station Power Plant from the Wyoming Industrial Siting Council in June 2006. As proposed, the Dry Fork Station would be a coal-based, mine-mouth 385-MW power plant located near the Dry Fork Mine, north of Gillette. Basin Electric estimates that the plant will be operational by 2011 (WDEQ/ISC 2006). Construction and operation of this facility as scheduled is considered moderately likely.

The PRB Coal Review assumes that, under the upper development scenario, a maximum of one additional 700-MW coal-fired power plant would be constructed by 2020 in the Gillette area or near one or more of the operating coal mines. North American Power Group submitted an application in September, 2007, for a 750-MW coal-fired power plant, Two Elk 2, to be located at the same site as the proposed Two Elk plant, discussed above. Black Hills Power Corporation has also announced plans to permit the Wygen III power plant, which is planned to be similar in design to the Wygen II plant. The study assumes that all existing power plants in the PRB region would remain operational through 2020.

4.1.1.2.3 Transmission Lines

Major transmission lines in the Wyoming PRB study area that support the regional distribution system are associated with the Dave Johnston power plant located near Glenrock, Wyoming, and the power plants operated by Black Hills Power Corporation, which are located east of Gillette. These 230-kV transmission lines have been in place for several years, and their associated permanent disturbance is minimal. Distribution power lines associated with conventional oil and gas and CBNG development also occur within the study area. For the PRB Coal Review, these lines were included by factoring them in proportionally on a per well basis.

The PRB Coal Review estimates that by 2020, one major transmission line would be constructed running south to Colorado markets and one would be constructed eastward to mid-west markets. Markets would dictate the size and location of such facilities, and these are not known as of this time. Because transmission lines are a necessary supporting infrastructure for power generating facilities to provide connection to the grid, the PRB Coal Review assumes they would be required as part of the overall system development for the proposed power plants discussed in the previous section. However, there was insufficient information to analyze or assign a likelihood of development by 2020 when the PRB Coal Review analysis was conducted because no specific proposals for these transmission lines had been identified at that time. No

specific proposals have since been announced, but the governors of California, Nevada, Utah and Wyoming entered into a Memorandum of Understanding to encourage development of a high voltage power transmission line, the Frontier Line, connecting those states in April 2005. Since that time, no specific plans have been announced as to the location or timing of the Frontier Line.

4.1.1.2.4 Coal Conversion Technology

With rising energy prices, there has been considerable interest in either enhancing the quality of PRB coal and/or converting the coal to other fuels. Test facilities were previously constructed by KFx at the Fort Union Mine (now part of the Dry Fork Mine), by AMAX (predecessor to Foundation Coal West, Inc.) at the Belle Ayr Mine, and by ENCOAL at the Buckskin Mine, but no commercial production occurred and these facilities either have been dismantled or are no longer in use. Although several coal conversion projects have been proposed, as discussed below, only one (the KFx Coal Beneficiation Project) was considered to have a high enough likelihood of proceeding to include in the PRB Coal Review based on current status and available information.

The KFx coal beneficiation plant, located near the Dry Fork Mine north of Gillette, has been constructed but is not running at full capacity. KFx reported making a production run and shipping coal to two customers for test burns in late December, 2005, and reported that a trainload of enhanced coal had been loaded and sent to a customer in Ohio in August 2006. It is expected that the plant would eventually produce approximately 750,000 tons of enhanced coal per year. This operation has a high likelihood of proceeding with production given the technology being used and the forecast market conditions in the PRB. If the process and market prove competitive, the company has suggested that up to five additional units could be built in the PRB, but the likelihood for development of additional units is not known. As a result, the potential development of additional units was not analyzed in the PRB Coal Review.

The following coal conversion projects have been proposed, but were not included in the PRB Coal Review analysis because the likelihood of their occurrence was not known when the coal review analysis was conducted:

- Medicine Bow Fuel and Power, a subsidiary of DKRW Energy LLC, has announced that it plans to build a coal-to-liquids plant in northern Carbon County, Wyoming. GE Energy and Rentech Clean Energy Solutions are also involved in the project, which would obtain coal from Arch Coal's Hanna Mine facility. Both the plant location and mine are located outside of the PRB. As proposed, the plant would produce about 11,000 barrels per day; the primary product would be ultra-low-sulfur diesel fuel. The project is entering the design stage and no construction schedule has been announced.

- KFx has proposed joint ventures with Arch Coal, Inc. and Kiewit Mining Group to develop beneficiation plants at the Coal Creek and Buckskin Mines, respectively. The companies are evaluating these projects.

- Coal gasification development projects are being actively pursued in both Montana and Wyoming. While there appears to be substantial interest in these opportunities, it is unknown whether large-scale operations would be developed within the 2010 to 2020 timeframe, given permitting, engineering, and construction time requirements. A proponent with adequate financing to pursue a project that would utilize PRB coal had not been identified when the PRB Coal Review was prepared and has not been identified since.

A summary of past, present, and reasonably foreseeable coal mines, coal-related facilities, coal production, coal mine employment, and coal and coal-related disturbance in the Wyoming PRB is presented in Table 4-5.

Table 4-5. Past, Present, and Projected Wyoming PRB Coal Mine and Coal-Related Development Scenario.

Year	Coal Production (mmtpy)	Number of Active Coal Mines[1]	Number of Active Power Plants	Number of Active Coal Conversion Facilities[2]	Direct Coal Mine Employment	Total Coal Disturbance (acres)[3]
Past and Present						
1990	163	18	3	1	2,862	na
1995	247	19	4	1	3,177	na
2000	323	12	4	2	3,335	na
2003	363	12	4	0	5,010	73,685
Projected Development - Lower Production Scenario						
2010	411	13[1]	7	1[2]	5,263	103,628
2015	467	13[1]	7	1[2]	5,405	123,147
2020	495	13[1]	7	1[2]	5,531	143,354
Projected Development - Upper Production Scenario						
2010	479	13[1]	7	1[2]	5,339	107,414
2015	543	13[1]	7	1[2]	5,522	130,456
2020	576	13[1]	8	1[2]	5,678	155,000

[1] Mines have consolidated and may in the future. Also, new mines may be permitted to better access the coal reserves projected for mining by 2020.

[2] Several coal conversion facilities currently are being evaluated; however, there is only one for which the likelihood of future development currently can be assessed.

[3] Disturbance area includes coal mine and coal-related disturbance areas.

Source: Annual Report of the Wyoming State Mine Inspector (Wyoming Department of Employment 1990, 1995, 2000, and 2003) and PRB Coal Review Task 2 Report (BLM 2005d)

4.1.2 Oil and Gas Development

4.1.2.1 Conventional Oil and Gas

Conventional oil and gas development includes all non-CBNG development activity. Approximately 1,500 conventional oil and gas wells, including producing, non-producing and injection wells, were drilled between 1990 and 2003 (IHS 2004). Of those, 60 percent were development wells (drilled in established producing areas) and 40 percent were classified as wildcat wells or drilled to evaluate untested prospective zones in producing areas. Approximately 25 percent of the wildcat wells were successful and resulted in the discovery of 61 new fields that provided 719,000 barrels of oil and 1.45 bcf of non-CBNG in the baseline year for the PRB Coal Review (2003) (WOGCC 2004); the remaining 75 percent of the wildcat wells were plugged and abandoned.

As of the end of 2003, there were approximately 3,500 producing conventional oil and gas wells in the Wyoming PRB study area plus 1,386 seasonally active wells (IHS 2004). The WOGCC reported that these wells produced approximately 13 million barrels of oil and 40 bcf of conventional gas in 2003 (WOGCC 2004). The USGS (2002) estimated that the mean undiscovered non-coal bed hydrocarbon resource in the PRB (including Montana) is 1.8 billion BOE.

Most of Wyoming's current oil production is from old oil fields with declining production and the level of exploration drilling to discover new fields has been low (WSGS 2002). This situation is reflected in the PRB where, over the 10-year period from 1992 through 2002, oil production from conventional oil and gas wells in Campbell and Converse Counties decreased approximately 60.4 percent (from 32.8 million barrels in 1992 to 13.0 million barrels in 2002). A recent increase in oil prices is reversing projections of a continuing decline in oil and gas production; production is now expected to increase in the PRB, with a peak around 2010 of approximately 15.7 million barrels (WSO-RMG 2005b). Oil production in the short term may also be bolstered by some planned CO_2 flood projects in the PRB (WSGS 2003b). This projected temporary upward trend in conventional oil and gas development is reflected in the PRB Coal Review projections (Table 4-6). The active wells identified in Table 4-6 include wells that produce year-round, seasonally producing wells, and service wells (mainly injection wells). It is estimated that there are approximately 2,000 idle conventional oil and gas wells in the PRB study area (WOGCC 2005c); however, the number of idle wells gradually would be reduced in the future through plugging programs, and the idle well locations (once the wells are abandoned) would be reclaimed and no longer represent a disturbance.

4.1.2.2 CBNG Development

Natural gas production has been increasing in Wyoming. In the PRB, this is due to the development of shallow CBNG resources. Commercial development of these resources began in limited areas west of and adjacent to the northernmost surface coal mines in the late 1980s. Since that time, CBNG development has

Table 4-6. Current and Projected Wyoming PRB Conventional Oil and Gas Development Scenario.

Category	Existing		Projected for Task 3 Study Area		
	2003 Task 1 Study Area	2003 Task 3 Study Area	2010	2015	2020
Annual Gas Production (bcf)[1]	39.9	36.3	33.8	30.9	28.0
Annual Oil Production (mmbo)	12.9	11.4	13.8	12.5	11.2
Active and Seasonably Active Wells	5,067	3,890	5,603	5,115	4,625

[1] Future gas production per well was estimated based on 2003 production levels per subwatershed. A greater number of future well sites were assumed to occur in locations with historically lower production rates, so the projected future conventional gas production varies within the cumulative effects study area relative to the number of projected producing wells.

Source: PRB Coal Review Task 2 Report (BLM 2005d)

spread south to encompass most of the area west of the surface coal mines and is continuing to spread farther west into other parts of the PRB Coal Review Task 1 and Task 2 study area.

On private and state oil and gas leases, the WOGCC and the Wyoming SEO authorize CBNG drilling. On federal oil and gas leases, BLM must analyze the individual and cumulative environmental impacts of all drilling (federal, state, and private), as required by NEPA, before CBNG drilling can be authorized. BLM does not authorize drilling on state or private leases but must consider the impacts from those wells in their NEPA analyses. In many areas of the PRB, the coal estate is federally owned, but the oil and gas estate is privately owned. A June 7, 1999 Supreme Court decision (98-830) assigned the rights to develop CBNG on a piece of land to the owner of the oil and gas estate.

At the end of 2003 (the baseline year for the PRB Coal Review), there were 14,758 producing CBNG wells in the study area (IHS 2004), and total production for 2003 was 346 bcf, or 88 percent of the total gas production from the basin (WOGCC 2004). From 1987 to 2003, the total cumulative gas production from PRB coals was over 1.2 trillion cubic feet. The total water production for the same time period was approximately 2.3 billion barrels (96,600 million gallons). Annual methane production increased rapidly between 1999 and 2003. In 2003, the average CBNG production was 900 mmcf per day (Holcomb 2003). According to the WOGCC website (http://wogcc.state.wy.us), CBNG production in the PRB has fluctuated from just under 900 mmcf per day to over 1,100 mmcf per day since December 2003. Water production in 2003 amounted to more than 500 mm barrels (21,000 million gallons), or about 1.4 mm barrels per day. According to the WOGCC website, water production in the PRB associated with CBNG production has varied between just over 1.4 mm barrels per day and about 2.2 mm barrels per day since December 2003.

Since the early 1990s, the Wyoming BLM has completed numerous EAs and two EISs analyzing CBNG projects. The most recent of these is the four-volume Final EIS and Proposed Plan Amendment for the PRB Oil and Gas Project, which was completed in January 2003 (BLM 2003b). The level of CBNG development since 2003 appears to be lower than was forecast in that document. New CBNG well numbers fell from a high of slightly more than 4,600 in 2001 to approximately 2,000 in 2004. The PRB Coal Review Task 2 Report discusses the uncertain trends for future CBNG activity in recent years. The methodology used to project future activity is detailed in Appendix E of that report. Table 4-7 shows the current and projected levels of CBNG development levels used to evaluate projected cumulative environmental impacts in the PRB Coal Review.

Table 4-7. Current and Projected CBNG Development Scenario for the Wyoming PRB.

	Existing		Projected to Task 3 Study Area		
Category	**2003 Task 1 Study Area**	**2003 Task 3 Study Area**	**2010**	**2015**	**2020**
Annual Production (bcf)	338	284	480	500	443
Active Wells	14,758	12,152	20,899	21,831	19,366

Source: PRB Coal Review Task 2 Report (BLM 2005d)

4.1.2.3 Oil and Gas Related Development

Oil and gas related development activities considered in the PRB Coal Review include major transportation pipelines and refineries. Table 4-8, summarizes the net disturbance, reclamation, and water production associated with oil and gas activity (conventional oil and gas, CBNG, and major transportation pipelines) for 2003 (baseline year) and projects disturbance, reclamation, and water production for future years.

4.1.2.3.1 Pipelines

The availability of pipeline capacity for the transport of oil and gas to outside markets is a key factor in the development of CBNG and conventional oil and gas resources in the Wyoming PRB. As of the baseline year for the PRB Coal Review (2003), there were 13 major transportation pipeline systems in the PRB that transport gas resources to markets outside of the basin (Flores et al. 2001). The capacity of these pipeline systems was 1.9 bcf per day. The combined natural gas production (CBNG and conventional gas) in the Wyoming PRB Coal Review Task 1 and Task 2 study area was approximately 1.03 bcf per day.

Major transportation pipelines also provide for transport of CO_2 to conventional oil fields for EOR. Increased recovery of crude oil also may depend somewhat on the availability of CO_2 for EOR projects, as well as the availability of pipelines to transport oil to refineries for processing.

Table 4-8. Wyoming PRB Conventional Oil and Gas, CBNG, and Related Development Disturbance and Water Production.

	Existing[1]		Projected for Task 3 Study Area[1]		
Category	**2003 Task 1 Study Area**	**2003 Task 3 Study Area**	**2010**	**2015**	**2020**
Cumulative Disturbed Area (Acres)[2]	187,761	148,602	237,883	304,543	361,331
Cumulative Permanently Reclaimed Area (Acres)	115,045	90,548	160,175	225,426	288,536
Cumulative Unreclaimed Area (Acres)	72,715	58,053	77,707	79,108	72,794
Annual Water Production (mmgpy)	26,405	21,204	39,108	41,484	37,350

[1] Minor discrepancies in total acreages are the result of number rounding.
[2] Inclusive of conventional oil and gas and CBNG activities and major transportation pipelines. Disturbance associated with ancillary facilities (including gathering lines and distribution power lines) has been factored in a per well basis.
Source: PRB Coal Review Task 2 Report (BLM 2005d)

Gathering lines and power lines associated with conventional oil and gas and CBNG development also occur within the study area; disturbance from these ancillary facilities were factored into the PRB Coal Review analysis on a per well basis.

A 315-mile-long pipeline project, the Bison Pipeline Project, was proposed in 2004 to move natural gas northward, directly out of the PRB and into the Northern Border Pipeline system (FERC 2004). Approximately 53 miles of the proposed route is within the Wyoming PRB Coal Review study area. No filing has been made with FERC, and the project is not included as an active project in Wyoming on the FERC website. As a result, the Bison Pipeline project was assumed to have a low likelihood rating for the purposes of the PRB Coal Review.

Several other proposed pipeline projects in the PRB are listed on the Wyoming Pipeline Authority projects website (http://www.wyopipeline.com/projects.asp, accessed 7/6/2007). Information on pipeline projects proposed in Wyoming can be also found in the "For Citizens" section of the Federal Energy Regulatory Commission website (http://www.ferc.gov/for citizens.asp).

The amount of available pipeline capacity could limit the amount of future CBNG development. Based on Holcomb (2003), estimates of the growth of Wyoming PRB CBNG production range from a 2003 level of 900 mmcf per day to 3 to 4 bcf per day around 2007, and it is anticipated that they would remain at or above those levels until 2015. If CBNG production levels reach 3 to 4 bcf per day, it is reasonable to assume that four to five pipeline projects (up to 1.0 bcf

per day total capacity each) could be built in the near future. However, based on the assumptions in Appendix E of the PRB Coal Review Task 2 Report, the 2003 basin-wide CBNG production rate of 927 mmcf per day (IHS 2004) is projected to reach approximately 1.7 bcf per day in 2020. New pipeline construction projects were not considered in the PRB Coal Review analysis because the likelihood for additional new pipeline construction was unknown when the PRB Coal Review was prepared.

The CO_2 pipeline from Bairoil, Wyoming, to Salt Creek, Wyoming, may be extended into the study area to the Sussex Field to support additional EOR activity. Although it took many years for a CO_2 source to reach the Wyoming PRB, it is very likely that several pipelines could be built in the study area in the near future to provide additional gas for EOR projects. However, no pipeline projects were identified that would transport CO_2 beyond Salt Creek, and the likelihood for construction of additional CO_2 pipelines was unknown when the PRB Coal Review analysis was prepared, so they were not considered.

4.1.2.3.2 Refineries

There are no existing petroleum refineries in the Wyoming PRB study area, and no plans for the construction and operation of any petroleum refineries in the Wyoming portion of the PRB have been identified.

4.1.3 Other Development Activity

4.1.3.1 Other Mining

Uranium, sand, gravel, bentonite, and clinker (or scoria) have been and are being mined in the Wyoming PRB study area.

There are three defined uranium districts in the PRB: Pumpkin Buttes, Southern Powder River, and Kaycee (BLM 2003b). Numerous mined out or uneconomic uranium mining sites are present in these districts. Uranium is currently produced in the Southern Powder River District using the in-situ leach method. Until recently, there were two operating in-situ uranium recovery sites in the PRB, but they have been combined into one operation (WSGS 2005c). There has been a recent increase in interest in uranium for power plants here and abroad. Claims have been actively staked, but they have primarily been land position plays with no specifically defined projects. Based on commodity forecasts and uranium activity as of June 2004, the likelihood and potential timing of new uranium mining operations in the PRB was not known, and additional development was not projected in the PRB Coal Review analysis.

Bentonite is weathered volcanic ash that is used in a variety of products, including drilling mud and kitty litter, because of its absorbent properties. There are three major bentonite producing districts in and around the PRB: the Colony District in the Northern Black Hills, the Clay Spur District in the Southern Black Hills, and the Kaycee District west of Kaycee, Wyoming. Within

the PRB Coal Review study area, bentonite is mined at Kaycee (WMA 2006). The PRB Coal Review assumed that bentonite mining would continue throughout the study period and that production would continue at existing active mines, with no new mines developed through 2020.

Aggregate, which is sand, gravel, and stone, is used for construction purposes. In the PRB, the more important aggregate mining localities are in Johnson and Sheridan Counties (WSGS 2004b). The largest identified aggregate operation is located in northern Converse County. It has an associated total disturbance area of approximately 67 acres, of which four acres have been reclaimed.

Scoria or clinker (which is formed when coal beds burn and the adjacent rocks become baked) is used as aggregate where alluvial terrace gravel or in-place granite/igneous rock is not available. Scoria generally is mined in the Converse and Campbell Counties portion of the Wyoming PRB study area.

Increased sand, gravel, and scoria production and associated surface disturbance are anticipated in the Wyoming PRB study area in the future because aggregate would be required for road maintenance and new construction activities as other primary resources, such as coal and oil and gas, continue to be developed. New operations and increased production from existing operations can be expected. These operations would vary in size based on the immediate need from the primary industries, but there is no specific information about these projected operations. As a result, new sand, gravel, or scoria operations were not analyzed in detail in the PRB Coal Review.

4.1.3.2 Industrial Manufacturing

There are a number of existing industrial manufacturing establishments located in the Wyoming PRB Coal Review study area. Most are relatively small with fewer than 25 employees; they predominately serve regional and local markets, and most are directly or indirectly related to energy resource development and production. Over the years, some of these firms have expanded such that they now support activities and serve markets outside of the region, but those operations remain dependent upon the local and regional markets to sustain their existing operations.

The PRB Coal Review anticipates that increased coal production would result in an increased demand for fuels and explosives. This increased demand could result in the need for the development of new off-site chemical feedstock plants in the study area. Project-specific information is not available, however, and the potential development of new chemical feedstock plants was not considered in the PRB Coal Review.

Local economic development organizations, including CCEDC and CANDO, are continually engaged in efforts to recruit or assist new business formation in the PRB study area. For example, CANDO has pursued development of long-term potential projects, however, the outcomes of those projects are uncertain and

little information and detail are available. As a result, they were not considered in the PRB Coal Review.

4.1.3.3 Reservoirs

Currently, there are five key water storage reservoirs in the Wyoming PRB Coal Review study area (Healy, Lake DeSmet, Muddy Guard No. 2, Gillette, and Betty No. 1) (HKM Engineering et al. 2002a and 2002b). The total disturbance associated with these five key water storage areas is 3,263 acres.

Based on the applicable water plans prepared for the Wyoming Water Development Commission for its Basin Planning Program (HKM Engineering et al. 2002a and 2002b), there are long range projections for development of additional reservoirs in the Wyoming PRB study area. However, none of these reservoirs have reached the planning stage; therefore, there was not enough information to analyze them in the PRB Coal Review.

4.1.3.4 Other Non-Energy Development

In addition to the specific projects and developments described above, a network of public and private physical infrastructure, private enterprises, and public activities has been developed in the PRB over time. Examples of infrastructure include the highway and road networks, airports, government offices, hospitals, public schools, municipal water systems, and extensive residential and commercial real estate development. Private enterprises include local retail and service establishments, newspaper publishing, and transportation and distribution firms.

The construction, maintenance, and continuing operations associated with this network of development represent an extensive series of public and private investments, as well as changes in land use, surface disturbances, water consumption, and the factors that characterize local air quality. Those investments and changes have occurred over a period of time and in response to many different influences.

Some of the identified current and anticipated plans or proposals for future investment in public, private, and commercial infrastructure in the PRB are summarized below.

- The WYDOT State Transportation Improvement Program for 2004 includes anticipated 2005 through 2009 construction costs for highway and airport maintenance, reconstruction, and improvement projects in the PRB Coal Review Study area of approximately $215.4 million. No construction of new highways is scheduled and no new airports are proposed between now and 2009.

- A $10.7 million expansion and renovation of the Campbell County courthouse was completed in late 2005.

- Expansion of the CAM-PLEX conference and multi-event center facility in Gillette was approved in a special election in May 2005.

- The 2005 approved master plans for Wyoming public school facilities spending included a total of $72.3 million in new capital construction for the seven school districts that are completely or partially in the Wyoming PRB study area (WSFC 2005).

- Construction and maintenance projects for the City of Gillette include a recently completed project to renovate and expand the waste water treatment plant.

- Commercial development includes recently completed construction of a Home Depot store and expansion of the Wal-Mart store in Gillette.

A capital facilities tax ballot question in Campbell County in the 2004 election asking voters to approve the imposition of a $0.01 sales and use tax [(to be used for updated and expanded diesel mechanic and welding programs at the Gillette Campus of the Northern Wyoming Community College (now Gillette College) and for two community development projects in Wright)] and an increase in the lodging tax were defeated in 2004. A renewed attempt to get the lodging tax on the ballot for the 2006 primary election failed to gain the approval of the Campbell County Board of Commissioners. In their 2007 session, the Wyoming Legislature committed to pay half of the cost of a technical education center at Gillette College that will house diesel technology, welding and industrial electrician programs. The Campbell County Board of Commissioners has approved a tax increase to pay the other half of the cost of the project.

Given the timing, scale, year-to-year variability, relatively short construction timetables associated with such investments, the existence of a relatively large and diversified construction industry in the region and nearby areas, and the limited potential for these projects to alter long-term conditions in the PRB, they are not included in the PRB Coal Review analysis. However, one or more of these and similar projects could warrant consideration in a cumulative analysis for a site-specific project due to proximity or coincidental project schedules and timetables.

4.2 Cumulative Environmental Consequences

Section 4.1 of this chapter discusses current and projected levels of development in the Wyoming PRB, and includes summaries of the results of PRB Coal Review Task 2 studies. This section summarizes the current conditions resulting from baseline year (2003) development and the cumulative environmental consequences of the projected development for 2010, 2015, and 2020 based on the results of the analyses conducted for PRB Coal Review Task 1 and 3 reports, respectively.

As discussed in Section 4.1, the Wyoming portion of the PRB is the primary focus of the PRB Coal Review analyses. For the majority of resources in the Task 1 analysis, the Wyoming PRB Coal Review study area encompasses all of Campbell County, all of Sheridan and Johnson Counties outside of the Bighorn National Forest, and the northern portion of Converse County (Figure 4-1). The study areas for the Task 3 analyses are different. For the majority of the resources considered in the PRB Coal Review, the Task 3 study area is based on watershed boundaries in the PRB and includes the portions of the Upper Powder River, Little Powder River, Upper Belle Fourche River, Upper Cheyenne River, Antelope Creek, and Dry Fork Cheyenne River subwatersheds that lie within Sheridan, Johnson, Campbell and northern Converse Counties (Figure 4-4). This study area includes over 4 million acres. Table 4-9 summarizes the total disturbance and reclamation acreages for the baseline year of 2003 and the total projected disturbance and reclamation acreages for 2010, 2015, and 2020 within the Task 3 study area described above.

A total of approximately 220,688 acres of this land area had been disturbed by development activities as of 2003, which represents about 5.6 percent of the Task 3 study area. This is projected to increase to as much as 514,732 acres in 2020 under the upper coal production scenario. This area would represent approximately 13.1 percent of the Task 3 study area. This disturbance includes projected coal mining, coal-related development, and oil and gas and relate development disturbance in the Task 3 study area. Areas reclaimed during each future time period shown in Table 4-9 reflect how much of the disturbed acreage is projected to be permanently reclaimed by that point in time. The acres of unreclaimed disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. The acres currently not available for reclamation are occupied by long-term facilities that are needed to conduct mining operations or coal-related activities. These areas would be reclaimed near the end of each mine or facility's life.

Adjustments were made to the study area described above and shown in Figure 4-4 for several resources as described below:

- The potential air quality impacts were evaluated over a multi-state area (including most of Wyoming, southeastern Montana, southwestern North Dakota, western South Dakota, and northwestern Nebraska) because they would be expected to extend beyond the Wyoming and Montana PRB study area that was used to identify emissions sources for the air quality analysis.

- The groundwater drawdown was evaluated in the area surrounding and extending west of the surface coal mines, shown in Figure 4-4, because that is the area where groundwater drawdown related to surface coal mining operations and CBNG production operations would overlap.

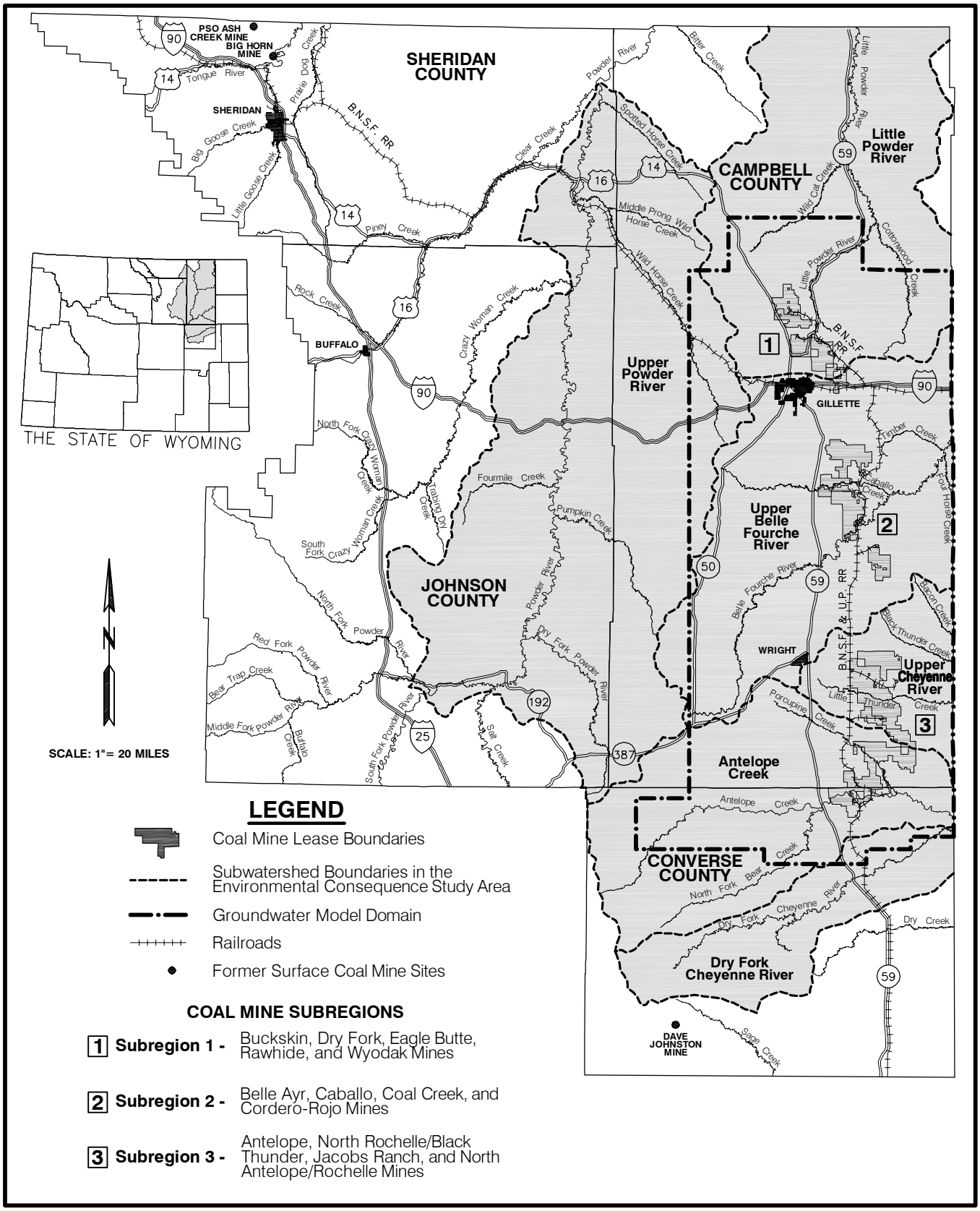


Figure 4-4. Wyoming Task 3 Study Area for PRB Coal Review Studies Evaluating Projected Environmental Consequences.

Table 4-9. Current and Projected Wyoming PRB Total Development Scenario – Task 3 Study Area.

Year	Total Acres Disturbed[1]	Acres Reclaimed[1]	Acres Unreclaimed[1]	Acres Unavailable for Reclamation[2]	Acres Affected by Coal Mining
			Current		
2003	220,688	111,786	108,901	27,073	68,794
			Projected Development - Lower Coal Production Scenario		
2010	339,912	205,113	134,799	29,389	98,662
2015	426,084	286,614	139,472	31,546	117,236
2020	503,085	367,999	135,085	32,794	137,443
			Projected Development - Upper Coal Production Scenario		
2010	343,698	206,946	136,752	28,739	102,448
2015	433,392	290,822	142,570	31,006	124,545
2020	514,732	374,732	139,998	32,342	149,089

[1] Minor discrepancies in total acreages are the result of number rounding.
[2] Includes coal mine and coal-related disturbance.
Source: PRB Coal Review Task 2 Report (BLM 2005d)

- The socioeconomic impact analysis focused on Campbell County, but also considered Converse, Crook, Johnson, Sheridan, and Weston Counties as directly affected and Niobrara and Natrona Counties as indirectly affected.

4.2.1 Topography and Physiography

The PRB is located within the Upper Missouri Basin Broken Lands physiographic subprovince that includes northeastern Wyoming and eastern Montana to the Canadian border. The topography generally is of low to moderate relief with occasional buttes and mesas. The general topographic gradient slopes down gently from southwest to northeast with elevations ranging from 5,000 to 6,000 ft above sea level on the southern and western portions of the basin to less than 4,000 ft above sea level on the north and northeast along the Montana state line. The major drainages in the basin are the Tongue, Powder, Belle Fourche, and Cheyenne rivers. Most of the drainages in the area are intermittent and have flows during high precipitation events or during periods of snowmelt. The drainages are part of the upper Missouri River Valley drainage basin.

The disturbance associated with the majority of the past, present, and projected activities have resulted in or would result in the alteration of the surface topography. Surface coal mining, which is projected to continue in the area of the existing coal mines shown in Figure 4-4, permanently alters the topography by removing the overburden and coal and then replacing the overburden. Recontouring during reclamation to match approximate original contour, as required by regulation, reduces the long-term impact to topography. After mined-out areas are reclaimed, the restored land surfaces are typically gentler, with more uniform slopes and restored basic drainage networks. Oil and gas exploration and development has occurred and is projected to continue

throughout most of the Task 3 study area. It also results in the alteration of topography to accommodate facilities (e.g., well pads, power plants, etc.) and roads, but the disturbance tends to occur in smaller, more discrete areas than coal mining and the development is spread out over a wider area.

The disturbance and reclamation acreages associated with all existing and projected development in the Task 3 study area for the years 2003, 2010, 2015, and 2020 are given in Table 4-9.

4.2.2 Geology, Mineral Resources, and Paleontology

The cumulative effects study area for geology, mineral resources, and paleontology is the PRB Coal Review Task 3 study area (Figure 4-4).

The PRB is one of a number of structural basins in Wyoming and the Rocky Mountain area that were formed during the Laramide Orogeny. The basin is asymmetric with a structural axis that generally trends northwest to southeast along the western side of the basin (Flores et al. 1999). Earthquakes, landsides, and subsidence do not present a hazard in the PRB based on the lack of active faults in the study area (USGS 2004); the low risk of ground shaking in the region if a maximum credible earthquake were to occur (Frankel et al. 1997); and the absence of evidence of subsidence, landslides, or other geologic hazards in association with CBNG production.

4.2.2.1 Coal

Most of the coal resources of the basin are found in the Fort Union and Wasatch Formations. The coals present in the Wasatch Formation are thinner and less continuous than the coals in the Fort Union and, therefore, they are not as economically important as the coals in the Fort Union for either coal mining or CBNG development. Projected levels of coal production and disturbance under the lower and upper coal production scenarios are shown in Tables 4-2 and 4-3.

In the coal mine areas, the overburden and coal would be removed and the overburden replaced, resulting in a permanent change in the geology of the area and a permanent reduction of coal resources.

4.2.2.2 Oil and Gas

Drilling for conventional oil and gas in the Wyoming PRB has declined considerably in the last 15 years. However, there remains potential for finding and developing these resources in the deeper formations of the basin. Conversely, CBNG production increased rapidly from 1999 through 2002 and leveled off in 2003. Projected production rates for conventional oil and gas and CBNG in 2010, 2015, and 2020 are shown in Tables 4-6 and 4-7.

Oil and gas and related development accounts for most of the projected mineral disturbance outside of the coal mining areas. It generally would result in

shallow, discrete areas of surface disturbance, as discussed above. The acreages over which these impacts currently occur (as of 2003) and are projected to occur in the years 2010, 2015, and 2020 are shown in Table 4-9.

4.2.2.3 Other Mineral Resources

As discussed in Section 4.1.3.1, other mineral resources that are being mined in the Wyoming PRB include uranium, bentonite, clinker, and aggregate. Production of uranium and bentonite is not likely to be affected by development of coal or CBNG in the PRB. Aggregate and clinker production levels are more likely to be affected by other mineral development levels because these resources would be used in construction projects related to other mineral development.

4.2.2.4 Paleontology

Scientifically significant paleontological resources, including vertebrate, invertebrate, plant, and trace fossils, are known to occur in many of the geologic formations within the Wyoming PRB. These fossils are documented in the scientific literature, in museum records, and are known by paleontologists and land managers familiar with the area.

The Wasatch Formation is the most geographically widespread unit exposed on the surface over most of the Task 3 study area. It is underlain by the Fort Union Formation. The fossiliferous Morrison and Lance Formations outcrop in the western portion of the basin but occur at depth in the vicinity of the coal mines and CBNG activity in the eastern portion of the basin. Within the Task 3 study area, the highly fossiliferous White River Formation occurs only on Pumpkin Buttes in southwestern Campbell County.

Based on 2003 information, no significant or unique paleontological localities have been recorded on federal lands in the PRB. However, the lack of localities in the PRB does not mean that no scientifically significant fossils are present, as much of the area within and surrounding the PRB has not been adequately explored for paleontological resources. As a result, development activities in the Task 3 study area have the potential to adversely affect scientifically significant fossils, if they are present in or adjacent to disturbance areas. The potential for impacts to scientifically significant fossils would be greatest in areas where Class 4 or 5 formations are present (see Section 3.3.3.1). The Wasatch Formation is classified as a Class 5 formation. The Fort Union Formation is classified as a Class 3 formation, which means that fossil content varies in significance, abundance, and predictable occurrence. The greatest potential impact to surface and subsurface fossils would result from disturbance of surface sediments and shallow bedrock during construction and/or operations, depending on the type of project. Potential subsurface disturbance of paleontological resources (e.g., during drilling operations) would not be visible or verifiable. The areas over which these impacts occurred as of 2003 and are projected to occur as a result of all projected development in the years 2010, 2015, and 2020 are shown in Table 4-9. As only portions of the Task 3 study

area have been evaluated for the occurrence of paleontological resources, and discrete locations for development activities cannot be determined at this time, no accurate estimate can be made as to the number of paleontological sites that may be affected by cumulative development activities.

Development activities which involve federally owned surface and/or minerals are subject to federal guidelines and regulations protecting paleontological resources. Protection measures, permit conditions of approval, and/or mitigation measures would be determined on a project-specific basis at the time of permitting to minimize potential impacts to paleontological resources as a result of these activities.

4.2.3 Air Quality

The Task 1A Report for the PRB Coal Review (BLM 2005a) documents the modeled air quality impacts of operations during a baseline year, 2002, using actual emissions and operations for that year. Emissions from permitted minor sources were estimated, due to unavailability of actual emissions data. The baseline year analysis evaluated impacts both within the PRB itself and at selected sensitive areas surrounding the region. The analysis specifically looked at impacts of coal mines, power plants, CBNG development, and other development activities. Results were provided for both Wyoming and Montana at the individual receptor areas. The Task 2 Report for the PRB Coal Review (BLM 2005d) identifies reasonably foreseeable development activities for the years 2010, 2015, and 2020. The Task 3A Report for the PRB Coal Review (BLM 2006b) evaluates the impacts on air quality and air quality-related values for the year 2010 using the development levels projected for 2010 and the same model and meteorological data that were used for the baseline year study in the Task 1A report. Impacts for 2015 and 2020 were projected qualitatively based on evaluation of anticipated changes in emissions and on modeled impacts for the 2010 lower and upper production scenarios. BLM is now proposing to update the model and conduct an impact analysis for the year 2015. As currently proposed, a revised baseline year emissions inventory would be developed using 2004 actual emissions data or emissions estimates and incorporating recent analyses of emissions in Wyoming and Montana, which were not available when the 2010 modeling study was done.

Existing and projected emissions sources for the baseline year (2002) and 2010 analyses were identified within a study area comprised of the following counties in the PRB in Wyoming and Montana:

- Campbell County, all of Sheridan and Johnson Counties except the Bighorn National Forest lands to the west of the PRB, and the northern portion of Converse County, Wyoming.

- Rosebud, Custer, Powder River, Big Horn, and Treasure Counties, Montana.

A state-of-the-art, guideline dispersion model was used to evaluate impacts of the existing and projected source emissions on several source groups, as follows:

- Near-field receptors in Wyoming and Montana covering the PRB Coal Review Task 1A and 3A study area in each state. Overall, the near-field receptor grid points were spaced at one kilometer intervals over the study area;

- Receptors in nearby federally designated pristine or "Class I" areas; and

- Receptors at other sensitive areas (Class II sensitive areas).

The EPA guideline CALPUFF model system (Scire et al. 1999a) and the same meteorological data set were used for the Task 1A and Task 3A studies. The impacts for the baseline year (2002) and for 2010 lower and upper coal production scenarios were directly modeled. As discussed above, the modeling domain extends over most of Wyoming, southeastern Montana, southwestern North Dakota, western South Dakota, and western Nebraska. An interagency group participated in developing the modeling protocol and related domain that were used for this analysis.

The modeling approach for the Task 3A report used actual emissions from existing sources representative of 2002 operations and adjusted those emissions for the expected level of development in 2010. No specific emissions data were available for the projected levels of development. The baseline year emissions data were gathered from a variety of sources, but mainly relied on data collected by the WDEQ/AQD and the MDEQ. Only actual emission sources inside the study area described above were included in the modeling. Key major sources were included, such as the coal-fired power plants, gas-fired power plants, and sources that were included in the Title V (operating permit) program. The Dave Johnston power plant, which is located outside of but adjacent to the study area in Converse County, was included in the baseline year study and in the projected emissions. Some operational adjustments were made to accommodate small sources with air permits that were presumed to be operating at less than full capacity. Emissions from other sources, including estimated construction-related fugitive dust emissions, were computed based on EPA emission factors and on input data from WDEQ/AQD.

Meteorological data were developed for 1996 for the modeling domain, using the guideline Version V of the CALMET (Scire et al. 1999b) diagnostic model, identical to that used in the PRB Oil and Gas EIS Project (BLM 2003b) and in the Task 1A report. These data provide a four-dimensional depiction that represents actual meteorological conditions for that year. The data baseline was enhanced by using data for specific surface stations and precipitation data. Terrain and land use data from the USGS also were used. Modeling data settings generally were set to default values. Baseline year ozone concentrations also were incorporated into the model using measured concentrations representative of the study area, and were not changed for this study.

The existing regional air quality conditions generally are very good in the PRB Coal Review Task 1A and Task 3A study area. There are limited air pollution emissions sources (few industrial facilities, including the surface coal mines, and few residential emissions in relatively small communities and isolated ranches) and good atmospheric dispersion conditions. The available data show that the region is in compliance with the ambient air quality standards for NO_2 and SO_2. There have been no monitored exceedances of the annual PM_{10} standard in the Wyoming PRB, although, as discussed in Chapter 3 (Section 3.4.2.1.1), monitoring sites at some of the surface coal mines have shown some exceedances of the 24-hour PM_{10} standard since 2000. However, as also discussed in Chapter 3, there have been no monitored exceedances of the annual or 24-hour PM_{10} ambient air standard at the Eagle Butte Mine. Air quality modeling indicates the currently projected mine activities at the Eagle Butte Mine will be in compliance with the PM_{10} ambient air standards for the life of the mine at the permitted mining rate of 35 mmtpy, and the applicant proposes to mine at an average rate of 25 mmtpy during the time the Eagle Butte West LBA Tract would be mined. Visibility data colleted around the region indicate that, although there are some days with notable impacts at Class I areas, the general trend in the region shows little change in visibility impacts at Badlands National Park and at the Bridger Wilderness area over the period from 1989 to 2003 (Figure 3-9).

Predicted impacts from baseline year (2002) and projected 2010 emissions were modeled for three air quality criteria pollutants (NO_2, SO_2, and PM_{10}), along with changes in air quality-related values at Class I areas and at identified sensitive areas. For regulatory purposes, the Class I PSD evaluations are not directly comparable to the air quality permitting requirements, because the modeling effort does not identify or separately evaluate increment consuming sources that would need to be evaluated under the PSD program. The cumulative impact analysis focuses on changes in cumulative impacts instead of on a comparison to PSD-related evaluations, which would apply to specific sources.

Table 4-10 presents the modeled impacts on ambient air quality at the near-field receptors in Montana and Wyoming. Results indicate the maximum impacts at any point in each receptor group, and data are provided for the baseline year (2002) analysis and for both development scenarios for 2010.

Based on the modeling results, the baseline year (2002) maximum impacts on ambient air quality were well below the ambient air quality standards, with an exception for PM_{10} emissions on some receptors near PRB sources. The results indicate the maximum modeled 24-hour PM_{10} levels are greater than the 150 $\mu g/m^3$ ambient air standard some near-field receptors in both Montana and Wyoming. The modeling also showed impacts on visibility in the surrounding Class I areas are above the detectable levels at many receptor areas.

For the Montana near-field receptors, the modeling for the 24-hour PM_{10} levels projects a maximum impact above the NAAQS for both coal development scenarios for 2010 for some receptors. The upper development scenario shows

Table 4-10. Projected Maximum Potential Near-field Impacts (µg/m³).

Pollutant	Averaging Time	Base Year (2002) Impacts	2010 Lower Development Scenario Impacts	2010 Upper Development Scenario Impacts	NAAQS	Wyoming AAQS	Montana AAQS	PSD Class II Increments[2]
Wyoming Near-field								
NO_2	Annual	37.3	42.4	49.0	100	100	--[1]	25
SO_2	Annual	3.9	4.8	5.6	80	60	--[1]	20
	24-hour	14.5	33.5	34.8	365	260	--[1]	91
	3-hour	37.9	148.0	154.2	1,300	1300	--[1]	512
PM_{10}	Annual	42.7	49.0	**56.6**	--[3]	50	--[1]	17
	24-hour	**335.5**	**378.8**	**439.9**	150	150	--[1]	30
Montana Near-field								
NO_2	Annual	8.85	11.3	11.8	100	--[1]	100	25
	1-hour	365.8	415.9	519.5	--	--[1]	564	--
SO_2	Annual	1.3	2.3	2.7	80	--[1]	80	20
	24-hour	18.9	19.5	20.4	365	--[1]	365	91
	3-hour	74.7	76.4	79.8	1,300	--[1]	1,300	512
	1-hour	240.7	246.4	257.3	--	--[1]	1,300	--
PM_{10}	Annual	19.6	22.5	27.7	--[3]	--[1]	50	17
	24-hour	**175.8**	**200.0**	**247.7**	150	--[1]	150	30

1 No standard or increment.

2 All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD Increments Consumption Analysis.

3 On September 21, 2006, the EPA announced final revisions to the NAAQS for particulate matter, which took effect December 18, 2006. The revision revoked the annual PM_{10} standard of 50 µg/m³. The revisions retained the 24-hour PM_{10} standard. The State of Wyoming will enter into rulemaking to revise the Wyoming Ambient Air Quality Standards. See additional discussion in Chapter 3, Section 3.4.2.1.

Bold values indicate projected exceedances of AAQS.

Source: PRB Coal Review Task 3A Report (BLM 2006b)

an increase in the impact of more than 40 percent above the baseline year for this parameter. Impacts at all other receptors show compliance with the NAAQS and the Montana AAQS. Large percentage increases in annual SO_2 impacts are projected, but the impacts themselves are well below the NAAQS.

For the Wyoming near-field receptors, the modeling projects maximum 24-hour PM_{10} levels greater than the 150 µg/m^3 ambient air standard for the 2010 lower and upper coal production scenarios at some receptors. For the 2010 upper development scenario, the modeled levels are above 150 µg/m^3 at seven of the near-field receptors in Wyoming; those receptors are confined in an area of intensive coal development. As shown in Table 4-10, the maximum modeled PM_{10} impacts from all sources are nearly three times the 24-hour standard for the 2010 upper production scenario. As discussed in Section 3.4.1.1.1, modeling tends to over predict the 24-hour impacts of surface coal mining and, as a result, WDEQ/AQD does not consider short-term PM_{10} modeling to be an accurate representation of short-term impacts. In view of this, a Memorandum of Agreement between WDEQ/AQD and EPA Region VIII, dated January 24, 1994, allows WDEQ/AQD to conduct monitoring in lieu of short-term modeling for assessing coal mining-related impacts in the PRB. This agreement also requires Wyoming to implement "Best Available Work Practice" mitigation measures at any mine where an exceedance of the PM_{10} NAAQS has occurred. The monitored exceedances at surface coal mines in the Wyoming PRB and the measures that WDEQ/AQD has implemented or is proposing to implement to prevent future exceedances of the PM_{10} NAAQS are discussed in Chapter 3, Sections 3.4.2.1.1 and 3.4.2.3.

The maximum modeled impacts on the annual PM_{10} levels are also projected to be above the standard (50 µg/m^3) at one near-field receptor in Wyoming for the 2010 upper production scenario. Impacts of NO_2 and SO_2 emissions are predicted to be below the NAAQS and Wyoming AAQS at all Wyoming near-field receptors. A large portion of the impacts for all scenarios would be associated with coal-related sources, although non-coal sources would contribute a notable portion of the impact.

As indicated in Chapter 3:

- There have been no monitored exceedances of the 24-hour PM_{10} ambient air standard at the Eagle Butte Mine.

- Air quality modeling indicates the currently projected mine activities at the Eagle Butte Mine will be in compliance with the annual PM_{10} or NO_x ambient air standards for the life of the mine at the permitted mining rate of 35 mmtpy. The applicant currently proposes to mine at an average rate of 25 mmtpy during the time the Eagle Butte West LBA Tract would be mined.

Table 4-11 lists the three Class I areas and two Class II areas where the modeled impacts are the greatest. Table 4-11 includes a comparison to ambient air

Table 4-11. Maximum Predicted PSD Class I and Sensitive Class II Area Impacts (µg/m^3)[1].

Location	Pollutant	Averaging Period	Base Year (2002) Impacts	2010 Lower Development Scenario	2010 Upper Development Scenario	PSD Class I/II Increments
Class I Areas						
Northern Cheyenne Indian Reservation	NO_2	Annual	2.0	2.3	**2.7**	2.5
	SO_2	Annual	0.6	0.8	0.9	2
		24-hour	**6.1**	**6.5**	**6.9**	5
		3-hour	**26.8**	**27.9**	**29.3**	25
	PM_{10}	Annual	**5.0**	**5.8**	**7.0**	4
		24-hour	**42.0**	**47.8**	**59.4**	8
Washakie Wilderness Area	NO_2	Annual	0.1	0.1	0.1	2.5
	SO_2	Annual	0.0	0.1	0.1	2
		24-hour	1.0	3.0	3.3	5
		3-hour	2.0	5.1	5.6	25
	PM_{10}	Annual	0.3	0.4	0.4	4
		24-hour	**14.5**	**16.5**	**16.9**	8
Wind Cave National Park	NO_2	Annual	1.2	1.5	1.7	2.5
	SO_2	Annual	0.2	0.4	0.5	2
		24-hour	1.2	3.5	3.8	5
		3-hour	3.5	9.9	10.3	25
	PM_{10}	Annual	1.3	1.7	1.9	4
		24-hour	**10.7**	**14.0**	**15.7**	8
Sensitive Class II Areas						
Crow Indian Reservation	NO_2	Annual	5.7	6.2	6.7	25
	SO_2	Annual	0.8	0.9	0.9	20
		24-hour	4.7	5.1	5.3	91
		3-hour	14.7	15.1	15.7	512
	PM_{10}	Annual	3.0	3.7	4.0	17
		24-hour	**30.5**	**35.1**	**36.7**	30
Cloud Peak Wilderness Area	NO_2	Annual	0.5	0.7	0.7	25
	SO_2	Annual	0.1	0.2	0.3	20
		24-hour	1.4	3.3	3.7	91
		3-hour	3.6	6.5	7.9	512
	PM_{10}	Annual	0.8	1.1	1.2	17
		24-hour	13.3	17.1	17.9	30

[1] The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD Increments Consumption Analysis.
Bold values indicate exceedance of PSD Class I or II standards.
Source: PRB Coal Review Task 3A Report (BLM 2006b)

quality standards and PSD increments; however, it must be noted that this modeling analysis did not separate PSD increment-consuming sources from those that do not consume increment. The PSD-increment comparison is provided for informational purposes only and cannot be directly related to a regulatory interpretation of PSD increment consumption. For the Class I Northern Cheyenne Indian Reservation, modeled impacts for the baseline year (2002) and the two production scenarios for 2010 are less than the annual SO_2 PSD Class I increment, slightly above the PSD Class I increment levels for annual PM_{10}, 24-hour SO_2, and 3-hour SO_2, and well above the Class I increments for 24-hour PM_{10}. For annual NO_2, the modeled impacts are less than the annual increment for the baseline year and lower production scenario and slightly above the annual increment for the upper production scenario. In the other two Class I areas, only the 24-hour PM_{10} impacts are higher than the comparison to the PSD increment levels. In the sensitive Class II areas, all modeled impacts are well below the Class II PSD increments, with the exception that the 24-hour PM_{10} impacts are greater than the Class II 24-hour PM_{10} increments at the Crow Indian Reservation.

The projected modeled visibility impacts for the baseline year (2002) and for the lower and upper coal production scenarios for 2010 for all analyzed Class I and sensitive Class II areas are listed in Table 4-12. For the baseline year, the maximum visibility impacts at Class I areas were determined to be at the Northern Cheyenne Indian Reservation in Montana and at Wind Cave and Badlands National Parks in South Dakota. For these locations, modeling showed more than 200 days of impacts with a change of 10 percent or more in extinction. A 10 percent change in extinction corresponds to 1.0 dv.

To provide a basis for discussing the modeled visibility impacts resulting from the projected increased production under the lower and upper coal production scenarios for 2010, the modeled visibility impacts for 2002 were subtracted from the model results for 2010. Table 4-12 shows the number of additional days that the projected impacts were greater than 1.0 dv (10 percent in extinction) for each site for the upper and lower coal production scenarios. Using Badlands Park as an example, the modeling analysis projects 238 days with impacts greater than 1.0 dv in 2002. Under the 2010 lower coal production scenario, the modeling analysis projects an additional 19 days with impacts greater than 1.0 dv, or a total of 257 days with impacts greater than 1.0 dv.

For acid deposition, all predicted impacts are below the deposition threshold values for both nitrogen and sulfur compounds. There are substantial percentage increases in deposition under the lower and upper coal development scenarios for 2010; however, impacts remain well below the threshold values. The acid neutralizing capacity of sensitive lakes also was analyzed, and results are summarized in Table 4-13. The baseline year study indicated that none of the lakes had predicted significant impacts; however, the lower and upper development scenarios for 2010 show an increased impact at Florence Lake, leading to an impact that is above the 10 percent ANC. Impacts also are predicted to be above the 1 μeq/L threshold for Upper Frozen Lake.

Table 4-12. Modeled Change in Visibility Impacts at Class I and Sensitive Class II Areas.

Location	2002 No. of Days >10%	2010 Lower Development Scenario Change in No. of Days > 10%	2010 Upper Development Scenario Change in No. of Days > 10%
Federally and Tribally Designated Class I Areas			
Badlands National Park[1]	238	19	26
Bob Marshall WA	12	2	4
Bridger WA	47	4	7
Fitzpatrick WA	42	3	5
Fort Peck Indian Reservation	69	8	9
Gates of the Mountain WA	14	6	7
Grand Teton National Park	26	2	5
North Absaroka WA	47	6	6
North Cheyenne Indian Reservation	305	5	10
Red Rock Lakes	16	3	5
Scapegoat WA	14	4	4
Teton WA	40	4	5
Theodore Roosevelt National Park	98	15	22
UL Bend WA	49	4	5
Washakie WA	53	2	3
Wind Cave National Park	261	11	15
Yellowstone National Park	42	7	8
Sensitive Class II Areas			
Absaroka Beartooth WA	53	3	5
Agate Fossil Beds National Monument	199	26	30
Big Horn Canyon National Rec. Area	108	7	8
Black Elk WA	263	16	22
Cloud Peak WA	137	8	8
Crow Indian Reservation	284	10	15
Devils Tower National Monument	279	15	21
Fort Belknap Indian Reservation	46	3	4
Fort Laramie National Historic Site	153	27	30
Jedediah Smith WA	23	1	2
Jewel Cave National Monument	267	14	18
Lee Metcalf WA	25	2	4
Mount Naomi WA	8	6	8
Mount Rushmore National Monument	248	19	25
Popo Agie WA	47	7	8
Soldier Creek WA	223	23	29
Wellsville Mountain WA	6	5	7
Wind River Indian Reservation	66	12	15

[1] The U.S. Congress designated the Wilderness Area portion of Badlands National Park as a mandatory Federal PSD Class I area. The remainder of Badlands National Park is a PSD Class II area.

Source: PRB Coal Review Task 3A Report (BLM 2006b)

Table 4-13. Predicted Total Cumulative Change in Acid Neutralizing Capacity of Sensitive Lakes.

Location	Lake	Background ANC (µeq/L)	Area (hectares)	Base Year 2002 Change (percent)	2010 Lower Development Scenario Change (percent)	2010 Upper Development Scenario Change (percent)	Thresholds (percent)
Bridger Wilderness Area	Black Joe	67.0	890	1.3	1.88	1.97	10
	Deep	60.0	205	1.4	2.08	2.18	10
	Hobbs	70.0	293	0.9	1.37	1.43	10
	Upper Frozen	5.0	65	0.7[1]	0.99[1]	1.04[1]	1[1]
Cloud Peak	Emerald	55.3	293	5.3	6.59	6.89	10
	Florence	32.7	417	8.9	11.52	12.03	10
Fitzpatrick Wilderness Area	Ross	53.5	4,455	0.9	1.37	1.43	10
Popo Agie Wilderness Area	Lower Saddlebag	55.5	155	1.9	2.58	2.70	10

[1] Data for Upper Frozen Lake presented in changes in µeq/L rather than percent change. (For lakes with less than 25 µeq/L background ANC.)
Source: PRB Coal Review Task 3A Report (BLM 2006b)

The study also modeled impacts of selected hazardous air pollutant emissions (benzene, ethyl benzene, formaldehyde, n-hexane, toluene, and xylene) on the near-field receptors in Montana and Wyoming. Model results for the 2010 upper development scenario show that impacts were predicted to be above the acute Reference Exposure Level for formaldehyde (94 $\mu g/m^3$) at two receptors in Wyoming but are below all Reference Exposure and Reference Concentrations for Chronic Inhalation levels in Montana and for other compounds in Wyoming. Essentially, the modeled impacts for 2010 showed a continuation of the patterns exhibited for the baseline year analysis.

For 2015 and 2020, the PRB Coal Review Task 3A report includes a qualitative analysis of potential air quality impacts and the impacts from individual source groups, based on the projected changes from 2002 to 2010 for the respective production scenarios. The production from conventional oil and gas and CBNG activities is projected to peak at 2010, with slight declines predicted over the following decade. Therefore, from these sources, expected impacts would decrease slightly from 2010 to 2015 and 2020. The coal mining sources would be the major contributors to PM_{10} impacts in the near-field, and these impacts would result from the proximity of the receptors to the coal mining operations. If coal mines expand or relocate, those impacts likely would follow that development; however, the specific impacts would need to be addressed with a more refined modeling effort, specifically including accurate source parameters. Power plants currently are the major contributors to all SO_2 impacts in the near-field in both states. However, the impacts are well below any ambient standard or PSD increment, and continued expansion should not jeopardize the attainment of those standards. Impacts on NO_2 concentrations are the result of emissions from all the source groups. No one source group dominates the NO_2 impacts in the near-field.

A pattern that is similar to the near-field receptors holds true for the Class I and sensitive Class II receptor groups. Essentially, the mine operations would continue to dominate the PM_{10} impacts, the power plants would continue to dominate the SO_2 impacts (although they would continue to be below the standards), and the overall source groups would continue to contribute to NO_2 impacts, but impacts should remain below the NO_2 standard.

Based on modeling results, none of the acid deposition thresholds were exceeded at Class I areas for either the baseline year or for the lower or upper development scenarios for 2010. In general, the projected increases in coal development (and power plants) are not expected to raise the deposition levels above the threshold, extended into 2020. The only concern relates to the acid deposition into sensitive lakes. The model results showed that the increased deposition, largely from SO_2 emissions from power plants, exceeded the thresholds of significance for the ANC at two sensitive (high alpine) lakes. The results indicate that with increased growth in power plant operations, the reduced ANC of the sensitive lakes would become significant and would need to be addressed carefully for each proposed major development project.

WDEQ/AQD and WDEQ/LQD mitigation and monitoring requirements for coal mine emissions are discussed in Sections 3.4.2.3 and 3.4.3.3. The discussion in these sections includes the operational control measures that are currently in place and would be required for mining operations on LBAs that are issued in the future, as well as measures that may be required to avoid future exceedances of the WAAQS and NAAQS and/or future mine-related impacts to the public.

4.2.4 Water Resources

Surface and groundwater are used extensively throughout the PRB for agricultural water supply, municipal water supply, and both domestic and industrial water supply. Surface water use is limited to major perennial drainages and agricultural areas within the basin are found mainly along these drainages. Municipal water supply comes from a combination of surface and groundwater. Domestic and industrial water supply primarily is from groundwater.

The PRB Coal Review Task 3B (Cumulative Water Effects) report is currently in preparation. This report, which will describe projected effects on ground and surface water as a result of projected development in the PRB, will be incorporated into future EIS analyses when it is complete. The analysis area for groundwater modeling (PRB Coal Review Task 3B report) is shown in Figure 4-4.

The PRB Coal Review used publicly available and accessible data and publications in the surface water and groundwater analyses. The two principal studies used were the Powder/Tongue River Basin study (HKM Engineering et al. 2002a) and the Northeast Wyoming River Basins study (HKM Engineering et al. 2002b). The Powder/Tongue River Basin study includes the area drained by the Little Bighorn, Tongue, and Powder Rivers. The Belle Fourche and Cheyenne Rivers drain the area included in the Northeast Wyoming River Basins study.

4.2.4.1 Groundwater

There are five main aquifers in the Powder/Tongue River Basin study area and in the Wyoming portion of the Northeast Wyoming River Basin study area that can be used for water supply:

- Madison Aquifer System;
- Dakota Aquifer System;
- Fox Hills/Lance Aquifer System;
- Fort Union/Wasatch Aquifer System; and
- Quaternary Alluvial Aquifer System.

The Fort Union/Wasatch Aquifer System includes the coal and overburden aquifers that are directly affected by surface coal mining. It is a major source of local water supply for domestic and stock water use, and it is also the aquifer where the major pumpage from CBNG wells occurs. Table 4-14 shows the

Table 4-14. Recoverable Groundwater in the Fort Union/Wasatch Aquifer System.

Hydrogeologic Unit	Surface Area (acres)	Average Formation Thickness (ft)	Percentage of Sand/Coal	Average Sand/Coal Thickness (ft)	Specific Yield (percent)	Recoverable Groundwater (acre-feet)[1]
Wasatch-Tongue River Aquifer Sandstones	5,615,609	2,035	50.0	1,018	13.0	743,169,695
Wasatch-Tongue River Aquifer Coals	4,988,873	2,035	6.2	126	0.4	2,514,392
Lebo Confining Layer Sandstones	6,992,929	1,009	33.0	250	13.0	227,270,193
Tullock Aquifer Sandstones	7,999,682	1,110	52.0	430	13.0	447,182,224

[1] Calculated by multiplying Surface Area × Average Sand/Coal Thickness × Specific Yield. These numbers vary slightly from the numbers presented in Table 3-5 of the Final Environmental Impact Statement and Proposed Plan Amendment for the PRB Oil and Gas Project (BLM 2003b).
Source: BLM 2003b

estimated recoverable groundwater in the components of the Fort Union/Wasatch Aquifer System. The volumes of recoverable groundwater from the sandstones within the Wasatch/Tongue River Aquifer, the Lebo Confining Layer, and the Tullock Aquifer were determined from the volume of sandstone in each of these unites multiplied by the 13 percent specific yield value for sandstone. Similarly, the volume of recoverable groundwater from the coals within the Wasatch/Tongue River was calculated from the volume of coal multiplied by the 0.4 percent specific yield value for coal.

As a result of statutory requirements and concerns, several studies and a number of modeling analyses have been conducted to help predict the impacts of surface coal mining on groundwater resources in the Wyoming portion of the PRB. Some of these studies and modeling analyses are discussed below.

In 1987, the USGS, in cooperation with the WDEQ and OSM, conducted a study of the hydrology of the eastern PRB. The resulting description of the cumulative hydrologic effects of all current and anticipated surface coal mining (as of 1987) was published in 1988 in the USGS Water-Resources Investigation Report entitled "*Cumulative Potential Hydrologic Impacts of Surface Coal Mining in the Eastern Powder River Structural Basin, Northeastern Wyoming*", also known as the "USGS CHIA" (Martin et al. 1988). This report evaluates the potential cumulative groundwater impacts of surface coal mining in the area and is incorporated by reference into this EIS. The USGS CHIA analysis considered the proposed mining at the Eagle Butte Mine. It did not evaluate potential groundwater impacts related to additional coal leasing in this area and it did not consider the potential for overlapping groundwater impacts from coal mining and CBNG development.

Each mine must assess the probable hydrologic consequences of mining as part of the mine permitting process. The WDEQ/LQD must evaluate the cumulative hydrologic impacts associated with each proposed mining operation before approving the mining and reclamation plan for each mine, and they must find that the cumulative hydrologic impacts of all anticipated mining would not cause material damage to the hydrologic balance outside of the permit area for each mine. As a result of these requirements, each existing approved mining permit includes an analysis of the hydrologic impacts of the surface coal mining proposed at that mine. If revisions to mining and reclamation permits are proposed, then the potential cumulative impacts of the revisions must also be evaluated. If the Eagle Butte West LBA Tract is leased to the applicant, the existing mining and reclamation permit for the Eagle Butte Mine must be revised and approved to include the new lease before it can be mined.

The PRB Oil and Gas Project FEIS (BLM 2003b) includes a modeling analysis of the groundwater impacts if an additional 39,000 new CBNG wells are drilled in the PRB by the end of 2011. The project area for this EIS, which covers all of Campbell, Sheridan, and Johnson Counties, as well as the northern portion of Converse County, is similar to the study area for the PRB Coal Review Task 1 and Task 2 study area.

Another source of data on the impacts of surface coal mining on groundwater is the monitoring that is required by WDEQ/LQD and administered by the mining operators. Each mine is required to monitor groundwater levels and quality in the coal and in the shallower aquifers in the area surrounding their operations. Monitoring wells are also required to record water levels and water quality in reclaimed areas.

The coal mine groundwater monitoring data are published each year by GAGMO, a voluntary group formed in 1980. Members of GAGMO include most of the companies with operating or proposed mines in the Wyoming PRB, WDEQ, the Wyoming SEO, BLM, USGS, and OSM. GAGMO contracts with an independent firm each year to publish the annual monitoring results. GAGMO also periodically publishes reports summarizing the water monitoring data collected since 1980 in the Wyoming PRB (e.g., Hydro-Engineering 1991, 1996, 2001, and 2007).

The major groundwater issues related to surface coal mining that have been identified are:

- the effect of the removal of the coal aquifer and any overburden aquifers within the mine area and replacement of these aquifers with backfill material;

- the extent of the temporary lowering of static water levels in the aquifers around the mine due to dewatering associated with removal of these aquifers within the mine boundaries;

- the effects of the use of water from the subcoal Fort Union Formation by the mines;
- changes in water quality as a result of mining; and
- potential overlapping drawdown due to proximity of coal mining and CBNG development.

The impacts of large scale surface coal mining on a cumulative basis for each of these issues are discussed in the following paragraphs.

The effect of replacing the coal and overburden with backfill is the first major groundwater concern. The following discussion of recharge, movement, and discharge of water in the backfill aquifer is excerpted from the USGS CHIA (Martin et al. 1988):

> Postmining recharge, movement, and discharge of groundwater in the Wasatch aquifer and Wyodak coal aquifer will probably not be substantially different from premining conditions. Recharge rates and mechanisms will not change substantially. Hydraulic conductivity of the spoil aquifer will be approximately the same as in the Wyodak coal aquifer allowing groundwater to move from recharge areas where clinker is present east of mine areas through the spoil aquifer to the undisturbed Wasatch aquifer and Wyodak coal aquifer to the west.

Monitoring data verify that recharge has occurred and is continuing in the backfill (Hydro-Engineering 1991, 1996, 2001, and 2007). The water monitoring summary reports prepared each year by GAGMO list current water levels in the monitoring wells completed in the backfill and compare them with the 1980 water levels, as estimated from the 1980 coal water-level contour maps. In the 1991 GAGMO 10-year report, some recharge had occurred in 88 percent of the 51 backfill wells reported at that time (Hydro-Engineering 1991). In the GAGMO 20-year report, 79 percent of the 82 backfill wells measured contained water (Hydro-Engineering 2001).

Coal companies are required by state and federal law to mitigate any water rights that are interrupted, discontinued, or diminished by mining.

The cumulative size of the backfill area in the PRB and the duration of mining activity would be increased by mining the recently issued leases and the currently proposed LBA tracts, including the Eagle Butte West LBA Tract. Since the mined-out areas are being backfilled and the monitoring data demonstrate that recharge of the backfill is occurring, substantial additional impacts are not anticipated as a result of the pending leasing actions.

Clinker or scoria, the baked and fused rock formed by prehistoric burning of the Wyodak-Anderson coal seam, occurs all along the coal outcrop area (Figure 3-11) and is believed to be the major recharge source for the backfill aquifer, just

as it is for the coal. However, not all clinker is saturated. Some clinker is mined for road-surfacing material, but saturated clinker is not generally mined since abundant clinker exists above the water table and does not present the mining problems that would result from mining saturated clinker. Therefore, the major recharge source for the backfill aquifer is not being disturbed by current mining. Clinker is not present on the Eagle Butte West LBA Tract under the Proposed Action or under BLM's preferred tract configuration under Alternative 1.

The second major groundwater issue is the extent of water level drawdown in the coal and shallower aquifers in the area surrounding the mines. In general, the limited extent of the saturated sand aquifers in the Wasatch Formation overburden dictates that drawdowns in the Wasatch Formation are much smaller and cover much less area than the coal drawdowns. In this EIS, assessment of cumulative impacts to groundwater related to surface coal mining is based on impact predictions made by the Eagle Butte Mine and the other adjacent mines (Buckskin, Rawhide, Dry Fork, and Wyodak mines). Those drawdowns are extrapolated to evaluate the potential impacts of mining of the Eagle Butte West LBA Tract. Figure 4-5 depicts the extrapolated extent of the five-ft cumulative drawdown contour within the Wyodak coal aquifer resulting from the five mines in the North Gillette subregion. The extent of the five-ft drawdown contour is used by WDEQ/LQD to assess the cumulative extent of the impact to the groundwater system caused by mining operations.

The GAGMO 25-year report provides actual groundwater drawdown information after 25 years of mining (Hydro-Engineering 2007). Most of the 530 monitoring wells included in the GAGMO 25-year report are completed in the coal beds, in the overlying sediments, or in sand channels or interburden between the coal beds at 16 active and proposed mine sites. Since 1996, some BLM monitor wells have been included in the GAGMO reports.

The USGS CHIA predicted the approximate area of five feet or more water level decline in the Wyodak coal aquifer which would result from "all anticipated coal mining". "All anticipated coal mining" included 16 surface coal mines operating at the time the report was prepared and six additional mines proposed at that time. All of the currently producing mines, including the Eagle Butte Mine, were considered in the USGS CHIA analysis (Martin et al. 1988). The study predicted that water supply wells completed in the coal may be affected as far away as eight miles from mine pits, although the effects at that distance were predicted to be minimal.

As drawdowns propagate to the west, available drawdown in the coal aquifer increases. Available drawdown is defined as the elevation difference between the potentiometric surface (elevation to which water will rise in a well bore) and the bottom of the aquifer. Proceeding west, the coal depth increases faster than the potentiometric surface declines, so available drawdown in the coal increases. Since the depth to coal increases, most stock and domestic wells are completed in units above the coal. Consequently, with the exception of methane wells, few wells are completed in the coal in the areas west of the mines. Those wells

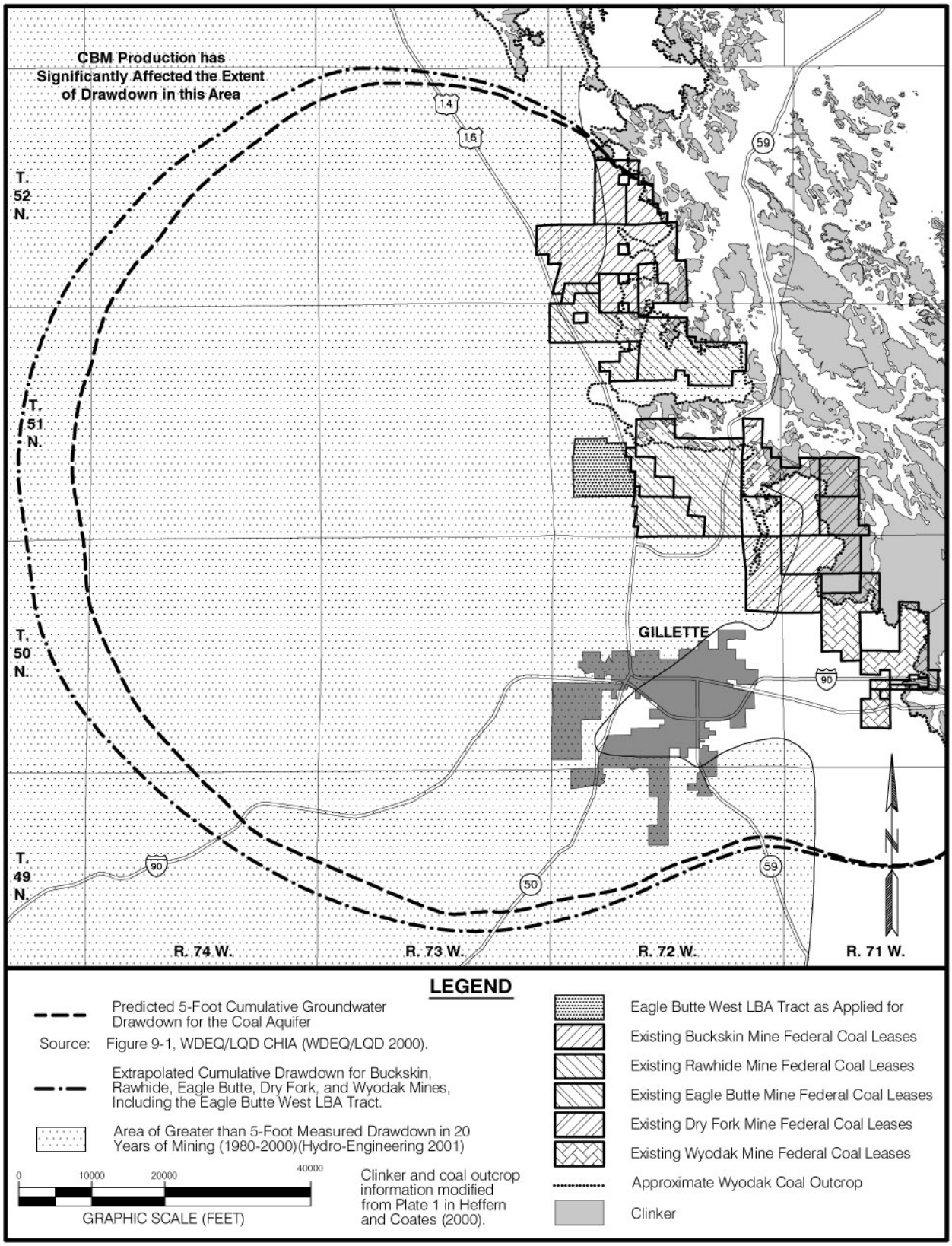


Figure 4-5. Extrapolated Extent of Cumulative Drawdown Within the Wyodak Coal Aquifer in the Coal Mine Subregion 1.

completed in the coal have considerable available drawdown, so it is unlikely that surface coal mining would cause adverse impacts to wells outside the immediate mine area.

Wells in the Wasatch Formation were predicted to be impacted by drawdown only if they were within 2,000 ft of a mine pit (Martin et al. 1988). Drawdowns occur farther from the mine pits in the coal than in the shallower aquifers because the coal is a confined aquifer that is areally extensive. The area in which the shallower aquifers (Wasatch Formation, alluvium, and clinker) experience a five-ft drawdown would be much smaller than the area of drawdown in the coal because the shallower aquifers are generally discontinuous, of limited areal extent, and often unconfined.

When the USGS CHIA was prepared, there were about 1,200 water supply wells within the maximum impact area defined in that study. Of those wells, about 580 were completed in Wasatch aquifers, about 100 in the Wyodak coal aquifer, and about 280 in strata below the coal. There were no completion data available for the remainder of the wells (about 240) at the time the USGS CHIA was prepared.

If the Eagle Butte West LBA Tract is leased and mined, the groundwater drawdown would be extended into the area surrounding the proposed new lease. When a lease is issued to an existing mine for a maintenance tract, the mine must revise its existing mining permit to include the new tract in its mine and reclamation plans. In order to do that, the lessee would be required to conduct a groundwater analysis to predict the extent of drawdown in the coal and overburden aquifers caused by mining the new lease. WDEQ/LQD would use the revised drawdown predictions to update their cumulative hydrologic impact analysis (WDEQ CHIA) for this portion of the PRB. The applicant has installed monitoring wells that would be used to confirm or refute drawdowns predicted by analysis. This analysis would be required as part of the WDEQ mine permitting procedure discussed in Section 1.2.

Potential water-level decline in the subcoal Fort Union Formation is the third major groundwater issue. Water level declines in the Tullock Aquifer have been documented in the Gillette area. According to Crist (1991), these declines are most likely attributable to pumpage for municipal use by Gillette and for use at subdivisions and trailer parks in and near the city of Gillette. Most of the water-level declines in the subcoal Fort Union wells occur within one mile of the pumped wells (Crist 1991, Martin et al. 1988). Many of the mines have water supply wells completed in zones below the coal, but the mine facilities in the PRB are separated by a distance of one mile or more, so little interference between mine supply wells would be expected.

In response to concerns voiced by regulatory personnel, several mines have conducted impact studies of the subcoal Fort Union Formation. The OSM also commissioned a cumulative impact study of the subcoal Fort Union Formation

to address the effects of mine facility wells on this aquifer (OSM 1984). Conclusions from these studies are similar and may be summarized as follows:

- Because of the discontinuous nature of the sands in this formation and because most large-yield wells are completed in several different sands, it is difficult to correlate completion intervals between wells.

- In the Gillette area, water levels in this aquifer have probably declined because the city of Gillette and several subdivisions have utilized water from the formation (Crist 1991). (Note: Gillette is mixing Fort Union Formation water with water from wells completed in the Madison Formation. Also, because drawdowns have occurred, some operators are able to dispose of CBNG water by injecting it into the subcoal Fort Union Formation near the city of Gillette.)

- Because large saturated thicknesses are available (locally) in this aquifer unit, generally 500 ft or more, a drawdown of 100 to 200 ft in the vicinity of a pumped well would not dewater the aquifer.

Most of the existing coal mines have permits from the Wyoming SEO for subcoal Fort Union Formation water supply wells. The Eagle Butte Mine uses two water supply wells completed in the Tullock aquifer below the Roland and Smith coal seams (NSERV1 and NSERV2) to supply water for human consumption and mining operations (Figure 3-10). Extending the life of the Eagle Butte Mine by issuing a new lease would result in additional water being withdrawn from the subcoal Fort Union Formation, but no new sub-coal water supply wells would be required. The additional water withdrawal would not be expected to extend the area of water level drawdown over a substantially larger area due to the discontinuous nature of the sands in the Tullock Member and the fact that drawdown and yield reach equilibrium in a well due to recharge effects. Due to the distances separating subcoal Fort Union Formation wells used for mine water supply, these wells have not experienced interference and are not likely to in the future.

Water requirements and sources for the proposed WYGEN 2 and Basin Electric Power Cooperative power plants, which would be located in the vicinity of the northern group of mines, are not currently known. The Wyoming SEO is discouraging further development of the lower Fort Union Formation aquifers, so the most likely groundwater source for these power plants would be the Lance-Fox Hills Aquifer System. This would reduce the chances that the power plants would add to cumulative hydrologic impacts of mining.

The fourth issue of concern with groundwater is the effect of mining on water quality. Specifically, what effect does mining have on the water quality in the surrounding area, and what are the potential water quality problems in the backfill aquifer following mining?

In a regional study of the cumulative impacts of coal mining, the median concentrations of dissolved solids and sulfates were found to be higher in water from backfill aquifers than in water from either the Wasatch Formation overburden or the Wyodak coal aquifer (Martin et al. 1988). This is expected because blasting and movement of the overburden materials exposes more surface area to water, increasing dissolution of soluble materials, particularly from the overburden materials that were situated above the saturated zone in the premining environment.

One pore volume of water is the volume of water that would be required to saturate the backfill following reclamation. The time required for one pore volume of water to pass through the backfill aquifer is greater than the time required for the postmining groundwater system to reestablish equilibrium. According to the USGS CHIA, estimates of the time required to reestablish equilibrium range from tens to hundreds of years (Martin et al. 1988).

The major current use of water from the aquifers being replaced by the backfill (the Wasatch Formation overburden and Wyodak coal aquifers) is for livestock because these aquifers are typically too high in dissolved solids for domestic use and well yields are typically too low for irrigation (Martin et al. 1988). Chemical analyses of 336 samples collected between 1981 and 1986 from 45 wells completed in backfill aquifers at 10 mines indicated that the quality of water in the backfill will, in general, meet the state standard for livestock use of 5,000 mg/L for TDS when recharge occurs (Martin et al. 1988). The 2000 annual GAGMO report (Hydro-Engineering 2000) evaluated samples from 48 backfill wells in 1999 and found that the TDS in 75 percent were less than 5,000 mg/L, TDS in 23 percent were between 5,000 and 10,000 mg/L, and TDS in one well was above 10,000 mg/L. An analysis of about 2,000 samples collected from 95 backfill monitoring wells between 1986 and 2002 found that the water quality in 75 percent of the wells were within the acceptable range for the Wyoming livestock standard, with 25 percent exceeding that standard (Ogle 2004). Water quality data for the backfill aquifer for the five mines in the North Gillette subregion (Buckskin, Rawhide, Dry Fork, Eagle Butte, and Wyodak) for the period from 1977 to 2004 was compiled by WDEQ/LQD and presented in the most recently prepared WDEQ CHIA for that mine group (Ogle et al. 2006). The median TDS concentration of groundwater from the backfill aquifer in that group of mines was 5,016 mg/L, based on 429 samples. The water type is similar to the pre-mining Wasatch and alluvial aquifers. Water quality data compiled and presented in the 2005 GAGMO Annual Report (Hydro-Engineering 2006) for the backfill aquifer for the northern group of mines for the 2000 through 2004 period of record indicate that the TDS concentrations range between approximately 1,500 mg/L to 8,800 mg/L. Exactly 50 percent of the 169 samples that were collected from 17 backfill monitoring wells during that five-year period had TDS concentrations that were greater than 5,000 mg/L. The median TDS concentration of groundwater from the backfill aquifer in that group of mines during that time was 4,849 mg/L. The incremental effect on groundwater quality due to leasing and mining the Eagle Butte West LBA Tract

would be to increase the total volume of backfill and, thus, the time for equilibrium to reestablish.

The fifth area of concern is the potential for cumulative impacts to groundwater resources due to the proximity of coal mining and CBNG development. The Wyodak coal is being developed by mining and CBNG production in the same general area. Dewatering activities associated with CBNG development have overlapped with and expanded the area of groundwater drawdown in the coal aquifer in the PRB over what would occur due to coal mining development alone, and this would be expected to continue.

Numerical groundwater flow modeling was used to predict the impacts of the cumulative stresses imposed by mining and CBNG development on the Fort Union Formation coal aquifer in the PRB Oil and Gas Project EIS (BLM 2003b). Modeling was necessary because of the large areal extent, variability, and cumulative stresses imposed by mining and CBNG development on the Fort Union coal aquifers. Information from earlier studies was incorporated into the modeling effort for this analysis.

As expected, the modeling has indicated that the groundwater impacts from CBNG development and surface coal mining would be additive in nature and that the addition of CBNG development would extend the area experiencing a loss in hydraulic head to the west of the mining area. The 20-year GAGMO report stated that drawdowns in all areas have greatly increased in the last few years due to the water production from the Wyodak coal aquifer by CBNG producers (Hydro-Engineering 2001).

Drawdowns in the coal caused by CBNG development would be expected to reduce the need for dewatering in advance of mining, which would be beneficial for mining operations. Wells completed in the coal may also experience increased methane emissions in areas of significant aquifer depressurization. There would be a potential for conflicts to occur over who (coal mining or CBNG operators) is responsible for replacing or repairing private wells that are adversely affected by the drawdowns; however, the number of potentially affected wells completed in the coal is not large.

As discussed previously, coal companies are required by state and federal law to mitigate any water rights that are interrupted, discontinued, or diminished by coal mining. In response to concerns about the potential impacts of CBNG development on water rights, a group of CBNG operators and local landowners developed a standard water well monitoring and mitigation agreement that can be used on a case-by-case basis as development proceeds. All CBNG operators on federal oil and gas leases are required to offer this water well agreement to the surface landowners (BLM 2003b).

After CBNG development and coal mining projects are completed, it will take longer for groundwater levels to recover due to the overlapping drawdown

impacts caused by the dewatering and depressuring of the coal aquifer by both operations.

4.2.4.2 Surface Water

The main rivers in the Powder/Tongue River Basin are the Tongue River and the Powder River. The Powder/Tongue River Basin receives substantial surface water runoff from the Big Horn Mountains, leading to major agricultural development along drainages in the Tongue River and Powder River basins. Reservoirs are used throughout the basin for agricultural water supply and for municipal water supply in the Powder/Tongue River Basin. Water use in the Powder/Tongue River Basin as of 2002 is summarized in Table 4-15.

Table 4-15. Water Use as of 2002 in the Powder/Tongue River Basin.

	Dry Year		Normal Year (acre-feet per year)		Wet Year	
Water Use Categories	**Surface Water**	**Ground-water**	**Surface Water**	**Ground-water**	**Surface Water**	**Ground-water**
Agricultural	178,000	200	184,000	200	194,000	300
Municipal	2,700	500	2,700	500	2,700	500
Domestic	---	4,400	---	4,400	---	4,400
Industrial[1]	---	68,000	---	68,000	---	68,000
Recreation			Non-consumptive			
Environmental			Non-consumptive			
Evaporation	11,300	--	11,300	--	11,300	--
Total	**192,000**	**73,100**	**198,000**	**73,100**	**208,000**	**73,200**

[1] Includes conventional oil and gas production water and CBNG production water.
Source: HKM Engineering et al. 2002a

The Little Bighorn River, Tongue River, Powder River, Crazy Woman Creek, and Piney Creek carry the largest natural flows in the Powder/Tongue River Basin. Many of the other major drainages are affected by irrigation practices to the extent that their flows are not natural (HKM Engineering et al. 2002a). Water availability in the major sub-basins of the Powder/Tongue River Basin is summarized in Table 4-16. This table presents the amount of surface water in acre-feet that is physically available above and beyond allocated surface water in these drainages. As a result of the Yellowstone River Compact, Wyoming must share some of the physically available surface water in the Powder/Tongue River Basin with Montana.

Table 4-16. Surface Water Availability in the Powder/Tongue River Basin.

	Surface Water Availability (acre-feet per year)		
Sub-basin	**Wet Years**	**Normal Years**	**Dry Years**
Little Bighorn River	152,000	113,000	81,000
Tongue River	473,000	326,000	218,000
Clear Creek	213,000	124,000	80,000
Crazy Woman Creek	69,000	32,000	16,000
Powder River	547,000	324,000	16,000
Little Powder River	48,000	12,000	3,000
Total	**1,502,000**	**931,000**	**414,000**

Source: HKM Engineering et al. 2002a

The main rivers in the Northeast Wyoming River Basins are the Belle Fourche in Campbell and Crook Counties and the Cheyenne River in Converse, Weston, and Niobrara Counties. Water in these rivers and their tributaries comes from groundwater baseline flow and from precipitation, especially from heavy storms during the summer months.

Water use in the Northeast Wyoming River Basins as of 2002 is summarized in Table 4-17.

Table 4-17. Water Use as of 2002 in the Northeast Wyoming River Basins.

	Dry Year		**Normal Year (acre-feet per year)**		**Wet Year**	
Water Use Categories	**Surface Water**	**Ground-water**	**Surface Water**	**Ground-water**	**Surface Water**	**Ground-water**
Agricultural	65,000	11,000	69,000	17,000	71,000	17,000
Municipal	---	9,100	---	9,100	---	9,100
Domestic	---	3,600	---	3,600	---	3,600
Industrial (Oil and Gas)	---	46,000	---	46,000	---	46,000
Industrial (Other)	---	4,700	---	4,700	---	4,700
Recreation			Non-consumptive			
Environmental			Non-consumptive			
Evaporation (Key Reservoirs)	14,000	---	14,000	---	14,000	---
Evaporation (Stock Ponds)	6,300	---	6,300	---	6,300	---
Total	**85,300**	**74,400**	**89,300**	**80,400**	**91,300**	**80,400**

[1] Includes conventional oil and gas production water and CBNG production water.
[2] Includes electricity generation, coal mining, and oil refining.
Source: HKM Engineering et al. 2002b

Stream flow in the major drainages of the Northeast Wyoming River Basins is much less than in the Powder/Tongue River Basin, due to the absence of a major mountain range to provide snow melt runoff. Water availability in the major sub-basins of the Northeast Wyoming Rivers Basin is summarized in Table 4-18.

Table 4-18. Surface Water Availability in the Northeast Wyoming River Basins.

	Surface Water Availability (acre-feet per year)		
Sub-basin	**Wet Years**	**Normal Years**	**Dry Years**
Redwater Creek	34,000	26,000	17,000
Beaver Creek	30,000	20,000	14,000
Cheyenne River	103,000	31,000	5,000
Belle Fourche River	151,000	71,000	13,000
Total	**318,000**	**148,000**	**49,000**

Source: HKM Engineering et al. 2002b

The surface water resources in the PRB Coal Review Task 3 study area consist primarily of intermittent and ephemeral streams and scattered ponds and reservoirs. The major impact of the projected development activities would be direct surface disturbance of these surface water features. Table 4-9 summarizes the cumulative baseline (2003) and projected (in 2010, 2015, and 2020) acres of surface disturbance and reclamation. The projected activities would result in surface disturbance in each of the six Task 3 study area subwatersheds (Figure 4-4). Discrete locations for development disturbance and reclamation areas cannot be determined based on existing information. However, the projected disturbance would primarily involve the construction of additional linear facilities, product gathering lines, and road systems associated with conventional oil and gas and CBNG activities, plus additional disturbance associated with extending coal mining operations onto lands adjacent to the existing mines.

Future coal mining could remove intermittent or ephemeral streams and stock ponds in the Little Powder River, Upper Belle Fourche River, Upper Cheyenne River, and Antelope Creek subwatersheds. As discussed in Section 3.5.2, the Eagle Butte Mine is in the Little Powder River subwatershed. Coal mine permits provide for removal of first-through fourth-order drainages. During reclamation, third- and fourth-order drainages must be restored; first- and second-order drainages often are not replaced (Martin et al. 1988).

Coal mining-related surface water would be discharged into intermittent and ephemeral streams in these same four subwatersheds (Antelope Creek, Little Powder River, Upper Belle Fourche River, and Upper Cheyenne River). Based on current trends, it is assumed that most, if not all, of the coal mine-produced water would be consumed during operation. As discussed in Section 3.5.2.2, changes in surface runoff would occur as a result of the destruction and reconstruction of drainage channels as mining progresses. Sediment control structures would be used to manage discharges of surface water from the mine permit areas. State and federal regulations require treatment of surface runoff from mined lands to meet effluent standards.

The PRB Coal Review assumes that future permitting would allow a portion of CBNG-produced water to be discharged to intermittent and ephemeral drainages as is currently allowed in the six subwatersheds in the PRB Coal Review Task 3 study area. It is estimated that up to 39,108, 41,899, and 37,390 mmgpy of water would be produced in 2010, 2015, and 2020, respectively. Based on past monitoring in receiving streams, no change in surface flows would be expected beyond approximately two miles from the discharge points (BLM 2003b). For example, water discharged from CBNG wells has supplied the Belle Fourche River and some tributaries, ponds, and playas with water nearly continuously for several years, but this reach of the Belle Fourche River has not become perennial, even with the addition of CBNG discharge water.

Surface disturbing activities can result in sediment input to water bodies, which affects water quality parameters such as turbidity and bottom substrate

composition. Contaminants also can be introduced into water bodies through chemical characteristics of the sediment. Studies have shown that TDS levels in streams near reclaimed coal mine areas have increased from one percent to seven percent (Martin et al. 1988). Typically, sedimentation effects are short-term in duration and localized in terms of the affected area. Suspended sediment concentrations would stabilize and return to typical background concentrations after construction or development activities have been completed. It is anticipated that sediment input associated with development disturbance areas would be minimized by implementation of appropriate erosion control measures, as would be determined during future permitting.

4.2.5 Alluvial Valley Floors

Currently identified AVFs for all coal mines in the PRB Coal Review study area are described in the PRB Coal Review Task 1D Report (BLM 2005c), based on individual mine State Decision Documents. Regulatory determinations of AVF occurrence and location are completed as part of the permitting process for coal mining operations, because their presence can restrict mining activities under SMCRA and Wyoming laws. The WDEQ/LQD administers the AVF regulations for coal mining activities in Wyoming. Coal mine-related impacts to designated AVFs generally are not permitted if the AVF is determined to be significant to agriculture. If an AVF is determined not to be significant to agriculture or if the permit to affect the AVF was approved prior to the effective date of SMCRA, the AVF can be disturbed during mining but must be restored to essential hydrologic function during reclamation. The portions of the PRB Coal Review Task 3 study area that are outside of the mine permit areas have generally not been surveyed for the presence of AVFs; therefore, the locations and extent of the AVFs outside of the mine permit areas have not been determined.

The formal AVF designation and related regulatory programs described above are specific to coal mining operations; however, other development-related activities in the study area would potentially impact AVF resources.

4.2.6 Soils

The PRB Coal Review Task 3D Report (BLM 2005f) discusses potential cumulative impacts to soils as a result of projected development activities in the PRB Coal Review Task 3 study area. The baseline year (2003) area of disturbance and reclamation and the projected cumulative areas of disturbance and reclamation for 2010, 2015, and 2020 related to surface coal mining are shown in Tables 4-2 and 4-3. The baseline year area of disturbance and reclamation and the projected cumulative total areas of disturbance and reclamation for all projected development for 2010, 2015, and 2020 are shown in Table 4-9.

Development activities such as increased vehicle traffic, vegetation removal, soil salvage and redistribution, discharge of CBNG produced groundwater, and construction and maintenance of project-specific components (e.g., roads,

ROWs, well pads, industrial sites, and associated ancillary facilities) would result in cumulative impacts to soils in the study area. In general, soil disturbance and handling from these activities would generate both long-term and short-term impacts to soil resources through accelerated wind or water erosion, other declining soil quality factors, compaction, and the essentially permanent removal of soil resources at industrial sites.

Of the types of development projects in the study area, coal mining activities would create the most concentrated cumulative impacts to soils. This is due to the large acreages involved and the tendency of mining operations to occur in contiguous blocks. These factors would encourage widespread accelerated wind and water erosion; extensive soil handling would reduce soil quality through compaction and corresponding loss of permeability to water and air; declining microbial populations, fertility, and organic matter; potential mixing of saline and/or alkaline soil zones into seedbeds; and the limited availability of suitable soil resources for reclamation uses in some areas.

However, for surface coal mining operations, there are measures that are either routinely required or can be specifically required as necessary to reduce impacts to soil resources and to identify overburden material that may be unsuitable for use in reestablishing vegetation, as discussed in Sections 3.3.1.3, 3.4.2.3, and 3.8.3.

As described in Appendix E of the PRB Coal Review Task 2 Report (BLM 2005d), a variety of CBNG water disposal methods may be employed in the Task 3 study area. The potential impacts to soils would depend on the water treatment method, if any, and the nature of the disposal method. As discussed in the PRB Coal Review Task 3D Report (BLM 2005f), due to elevated SAR levels in water produced from the Wyodak-Anderson coal zone in the Upper Powder River and Little Powder River subwatersheds, land applications of CBNG-produced water in those areas could increase soil alkalinity. Although elevated SARs are also observed in CBNG-produced waters in the Upper Belle Fourche River subwatershed, land application of CBNG-produced water is not anticipated there. The specific approaches to CBNG water discharges, the resource conditions and locations in which they occur, the timing of discharges, and the discharge permit stipulations from regulatory and land management agencies would determine the extent and degree of potential impacts to soils.

4.2.7 Vegetation, Wetlands and Riparian Areas

The PRB Coal Review Task 3D Report (BLM 2005f) discusses potential cumulative impacts to vegetation, wetlands, and riparian areas as a result of projected development activities in the PRB Coal Review Task 3 study area. The baseline year (2003) area of disturbance and reclamation and the projected cumulative areas of disturbance and reclamation for 2010, 2015, and 2020 related to surface coal mining are shown in Tables 4-2 and 4-3. The baseline year area of disturbance and reclamation and the projected cumulative total

areas of disturbance and reclamation for all projected development for 2010, 2015, and 2020 are shown in Table 4-9.

4.2.7.1 Vegetation

The PRB is characterized as a mosaic of general vegetation types, which include prairie grasslands, shrublands, forested areas, and riparian areas. These broad categories often represent several vegetation types that are similar in terms of dominant species and ecological importance. Fourteen vegetation types were identified within the PRB Coal Review Task 1 study area, of which 10 primarily consist of native vegetation and are collectively classified as rangeland. These vegetation types include short-grass prairie, mixed-grass prairie, sagebrush shrubland, other shrubland, coniferous forest, aspen, forested riparian, shrubby riparian, herbaceous riparian, and wet meadow. The remaining vegetation types support limited or non-native vegetation and include cropland, urban/disturbed, barren, and open water. The vegetation types are described in more detail in the Task 1D Report for the PRB Coal Review (BLM 2005c).

Impacts to vegetation can be classified as short-term and long-term. Potential short-term impacts arise from the removal and disturbance of herbaceous species during a project's development and operation (e.g., coal mining, CBNG drilling and production, etc.), which would cease upon project completion and successful reclamation in a given area. Reclaimed mine land is defined by WDEQ/LQD as affected land that has been backfilled, graded, topsoiled, and permanently seeded in accordance with the approved practices specified in the reclamation plan (Christensen 2002). Species composition on the reclaimed lands may be different than on the surrounding undisturbed lands. The removal of woody species would be considered a long-term impact since these species take approximately 25 years or longer to attain a size comparable to woody species present within proposed disturbance areas. Potential long-term impacts would also include permanent loss of vegetation and vegetative productivity in areas that would not be reclaimed in the near term (e.g., power plant sites).

4.2.7.2 Special Status Plant Species

Special status plant species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed and federally proposed species (species that are protected under the ESA), BLM Sensitive Species, USDA-FS Sensitive Species, and WGFD Species of Special Concern in Wyoming. Further discussions of species that are protected under the ESA and BLM Sensitive Species are included in Appendices F and G of this EIS. One federally listed species (Ute ladies'-tresses orchid) and one USDA-FS sensitive species (Barr's milkvetch) are known to occur in the PRB Coal Review Task 3 study area. Three BLM sensitive species [Nelson's milkvetch and Laramie columbine (Casper Field Office) and William's wafer-parsnip (Buffalo Field Office) may occur in the PRB Coal Review Task 3 study area.

Potential direct impacts to special status plant species in the study area could include the incremental loss or alteration of potential or known habitat, associated with past and projected activities. Direct impacts also could include the direct loss of individual plants within the PRB Coal Review Task 3 study area, depending on their location in relation to development activities. Indirect impacts could occur due to increased dispersal and establishment of noxious weeds, which may result in the displacement of special status plant species in the long term.

4.2.7.3 Noxious and Invasive Weed Species

Once established, invasive and non-native plant species can outcompete and eventually replace native species, thereby reducing forage productivity and the overall vigor of existing native plant communities. The State of Wyoming has designated the following 25 plant species as noxious weeds:

- Field bindweed (*Convolvulus arvensis*)
- Canada thistle (*Cirsium arvense*)
- Leafy spurge (*Euphorbia esula*)
- Perennial sowthistle (*Sonchus arvensis*)
- Quackgrass (*Agropyron repens*)
- Hoary cress (*Cardaria draba*)
- Hairy whitetop (*Cardaria pubescens*)
- Perennial pepperweed (giant whitetop) (*Lepidium latifolium*)
- Ox-eye daisy (*Chrysanthemum leucanthemum*)
- Skeletonleaf bursage (*Franseria discolor Nutt.*)
- Russian knapweed (*Centaurea repens L.*)
- Yellow toadflax (*Linaria vulgaris*)
- Dalmatian toadflax (*Linaria dalmatica*)
- Scotch thistle (*Onopordum acanthium*)
- Musk thistle (*Carduus nutans*)
- Common burdock (*Arctium minus*)
- Plumeless thistle (*Carduus acanthoides*)
- Dyers woad (*Isatis tinctoria*)
- Houndstongue (*Cynoglossum officinale*)
- Spotted knapweed (*Centaurea maculosa Lam.*)
- Diffuse knapweed (*Centaurea diffusa Lam.*)
- Purple loosestrife (*Lythrum salicaria L.*)
- Saltcedar (*Tamarix spp.*)
- Common St. Johnswort (*Hypericum perforatum*)
- Common Tansy (*Tanacetum vulgare*)

Campbell County does not have a declared county list of weeds.

Development-related construction and operation activities would potentially result in the dispersal of noxious and invasive weed species within and beyond the surface disturbance boundaries, which would result in the displacement of native species and changes in species composition in the long term. The

potential for these impacts would be higher in relation to the development of linear facilities (e.g., pipeline ROWs, oil- and gas-related road systems, etc.) than for site facilities (e.g., mines, power plants, etc.) due to the potential for dispersal of noxious weeds over a larger area.

Chapter 4, Section 2(d)(xiv) of the WDEQ/LQD rules and regulations requires that surface coal mines address weed control on reclaimed areas as follows:

> The operator must control and minimize the introduction of noxious weeds in accordance with Federal and State requirements until bond release.

Accordingly, the reclamation plans for the existing Eagle Butte Mine and for all other surface coal mines in the Wyoming PRB include steps to control invasion by weedy (invasive nonnative) plant species. As discussed in Chapter 3, Section 3.9.4, Eagle Butte Mine works with the Campbell County Weed and Pest Department and conducts an active noxious weed control program on their existing coal leases. Similar measures to identify and control noxious weeds are used at all of the surface coal mines in the Wyoming PRB as a result of the WDEQ/LQD regulatory requirements.

Mitigation to control invasion by noxious weeds for CBNG developers is determined on a site-specific basis and may include spraying herbicides before entering areas and washing vehicles before leaving infested areas. BLM reviews weed educational material during preconstruction on-site meetings with CBNG operators, subcontractors, and landowners. BLM also attaches this educational information to approved APDs or PODs (BLM 2003b). BLM also participates in a collaborative effort with the South Goshen Cooperative Extension Conservation District, the Natural Resources Conservation Service, private surface owners, WGFD, and the Weed and Pest District in a prevention program that includes a long-term integrated weed management plan, public awareness and prevention programs, and a common inventory (BLM 2003b).

4.2.7.4 Wetland and Riparian Species

Operations associated with development activities in the study area would result in the use of groundwater. Annually, during 2010-2020, from 30,000-35,000 mmgpy of CBNG-produced water would be discharged to impoundments or intermittent and ephemeral streams or reinjected. The discharge of produced water could result in the creation of wetlands in containment ponds, landscape depressions, and riparian areas along segments of drainages that previously supported upland vegetation. In addition, existing wetlands and riparian areas that would receive additional water would become more extensive and potentially support a greater diversity of wetland species in the long term. Alternately, the discharge of abnormally high flows or water with SARs of 13 or more could impact existing vegetation as discussed in the Task 1D Report for the PRB Coal Review (BLM 2005c). For agricultural uses, the current Wyoming water quality standard for SAR is 8.0 (WDEQ/WQD 2005). SARs of 5 to 10 have been

observed in discharge waters in the study area (BLM 2003b). Once water discharges have peaked and subsequently decrease in the long term, the extent of wetlands and riparian areas and species diversity would decrease accordingly. After the complete cessation of water discharges, artificially-created wetland and riparian areas once again would support upland species and previously existing wetland and riparian areas would decrease in areal extent.

4.2.8 Wildlife and Fisheries

The PRB Coal Review Task 3D Report (BLM 2005f) discusses potential cumulative impacts to wildlife as a result of projected development activities in the PRB Coal Review Task 3 study area. The baseline year (2003) area of habitat disturbance and reclamation and the projected cumulative areas of habitat disturbance and reclamation for 2010, 2015, and 2020 related to surface coal mining are shown in Tables 4-2 and 4-3. The baseline year area of total habitat disturbance and reclamation and the projected cumulative total areas of habitat disturbance and reclamation for 2010, 2015, and 2020 are shown in Table 4-9.

Impacts to wildlife can be classified as short-term and long-term. Potential short-term impacts arise from habitat disturbance associated with a project's development and operation (e.g., coal mines, CBNG wells, etc.) and would cease upon project completion and successful reclamation in a given area. Potential long-term impacts consist of long-term changes to habitats and the wildlife populations that depend on those habitats, irrespective of reclamation success, and habitat disturbance related to longer term projects (e.g., power plant facilities, rail lines, etc.). Direct impacts to wildlife populations as a result of development activities in the study area could include direct mortalities, habitat loss or alteration, habitat fragmentation, or animal displacement. Indirect impacts could include increased noise, additional human presence, and the potential for increased vehicle-related mortalities.

Habitat fragmentation from activities such as roads, well pads, mines, pipelines, and electrical power lines also can result in the direct loss of potential wildlife habitat. Other habitat fragmentation effects such as increased noise, elevated human presence, dispersal of noxious and invasive weed species, and dust deposition from unpaved road traffic can extend beyond the surface disturbance boundaries. These effects result in overall changes in habitat quality, habitat loss, increased animal displacement, reductions in local wildlife populations, and changes in species composition. However, the severity of these effects on terrestrial wildlife would depend on factors such as sensitivity of the species, seasonal use, type and timing of project activities, and physical parameters (e.g., topography, cover, forage, and climate).

4.2.8.1 Game Species

Big game species that are present within the Task 3 study area include pronghorn, white-tailed deer, mule deer, and elk. Potential direct impacts to these species would include the incremental loss or alteration of potential forage

and ground cover associated with development construction and operational activities. Development associated with coal mining, drilling for CBNG, ancillary facilities, agricultural operations, urban areas, and transportation and utility corridors result in vegetation removal. Assuming that adjacent habitats would be at or near carrying capacity and considering the variabilities associated with drought conditions and human activities in the study area, displacement of wildlife species (e.g., big game) as a result of development activities would create some unquantifiable reduction in wildlife populations.

A number of big game habitat ranges occur within the PRB Coal Review Task 3 study area. In Wyoming, the WGFD and the BLM have established habitat categories based on seasonal use. Category types include crucial winter, severe winter, winter yearlong, and yearlong. Crucial winter range areas are considered essential in determining a game population's ability to maintain itself at a certain level over the long term. As discussed in the PRB Coal Review Task 2 report, discrete locations for most of the disturbance related to the projected development could not be determined based on the available information. However, identified future coal reserves were used for the Task 3 report to provide some level of quantification of potential future impacts to big game ranges. Tables 4-19 through 4-22 summarize the effects on pronghorn, deer, and elk game ranges as a result of the predicted lower and upper levels of coal production through 2020.

Table 4-19. Potential Cumulative Disturbance to Pronghorn Ranges from Development Activities--Lower and Upper Coal Production Scenarios (acres/percent affected).

	Pronghorn Ranges[1]			
Time Period/Scenario	**Crucial Winter**	**Severe Winter**	**Winter Yearlong**	**Yearlong**
2010/Lower	N/A	1,472 / 3%	33,196 / 2%	32,099 / 1%
2010/Upper	N/A	1,472 / 3%	34,760 / 2%	33,172 / 1%
2015/Lower	N/A	1,460 / 3%	32,649 / 2%	34,828 / 1%
2015/Upper	N/A	1,460 / 3%	34,177 / 2%	36,999 / 1%
2020/Lower	N/A	1,422 / 3%	33,637 / 2%	35,714 / 1%
2020/Upper	N/A	1,422 / 3%	33,580 / 2%	37,437 / 2%

[1] Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the PRB Coal Review Task 3 study area was divided by the sum of the potential disturbance acreage for the time period (based on GIS mapping of coal reserves for the lower production scenario) and existing (2003) disturbance from coal mine development.

Source: PRB Coal Review Task 3D Report (BLM 2005f)

Direct and indirect effects to small game species (i.e., upland game birds, waterfowl, small game mammals) within the Task 3 study area as a result of development activities would be the same as discussed above for big game species. Impacts would result from the incremental surface disturbance of potential wildlife habitat, increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic.

Operations associated with development activities in the Task 3 study area would result in the use of groundwater. Most, if not all, of the coal mine-produced water would be consumed during operation. It is projected that up to

Table 4-20. Potential Cumulative Disturbance to White-tailed Deer Ranges from Development Activities--Lower and Upper Coal Production Scenarios (acres/percent affected).

	White-tailed Deer Ranges[1]			
Time Period/Scenario	**Crucial Winter**	**Severe Winter**	**Winter Yearlong**	**Yearlong**
2010/Lower	N/A	N/A	N/A	1,411 / 0.6%
2010/Upper	N/A	N/A	N/A	1,411 / 0.6%
2015/Lower	N/A	N/A	N/A	1,497 / 0.7%
2015/Upper	N/A	N/A	N/A	1,495 / 0.7%
2020/Lower	N/A	N/A	N/A	1,704 / 0.7%
2020/Upper	N/A	N/A	N/A	1,707 / 0.8%

[1] Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the PRB Coal Review Task 3 study area was divided by the sum of the potential disturbance acreage for the time period (based on GIS mapping of coal reserves for the lower production scenario) and existing (2003) disturbance from coal mine development.

Source: PRB Coal Review Task 3D Report (BLM 2005f)

Table 4-21. Potential Cumulative Disturbance to Mule Deer Ranges from Development Activities--Lower and Upper Coal Production Scenarios (acres/percent affected).

	Mule Deer Ranges[1]			
Time Period/Scenario	**Crucial Winter**	**Severe Winter**	**Winter Yearlong**	**Yearlong**
2010/Lower	N/A	N/A	6,808 / 0.4%	25,390 / 1%
2010/Upper	N/A	N/A	6,924 / 0.4%	26,641 / 1%
2015/Lower	N/A	N/A	6,956 / 0.4%	26,420 / 1%
2015/Upper	N/A	N/A	7,285 / 0.5%	27,205 / 1%
2020/Lower	N/A	N/A	6,958 / 0.4%	27,004 / 1%
2020/Upper	N/A	N/A	7,413 / 0.5%	27,990 / 1%

[1] Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the PRB Coal Review Task 3 study area was divided by the sum of the potential disturbance acreage for the time period (based on GIS mapping of coal reserves for the lower production scenario) and existing (2003) disturbance from coal mine development.

Source: PRB Coal Review Task 3D Report (BLM 2005f)

Table 4-22. Potential Cumulative Disturbance to Elk Ranges from Development Activities--Low and High Development Scenarios (acres/percent affected).

	Elk Ranges[1]			
Time Period/Scenario	**Crucial Winter**	**Severe Winter**	**Winter Yearlong**	**Yearlong**
2010/Lower	24 / 0.4%	N/A	375 / 1%	1,444 / 0.9%
2010/Upper	24 / 0.4%	N/A	375 / 1%	1,444 / 0.9%
2015/Lower	24 / 0.4%	N/A	351 / 1%	1,161 / 0.7%
2015/Upper	24 / 0.4%	N/A	351 / 1%	1,162 / 0.7%
2020/Lower	24 / 0.4%	N/A	351 / 1%	1,121 / 0.7%
2020/Upper	24 / 0.4%	N/A	351 / 1%	1,168 / 0.7%

[1] Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the PRB Coal Review Task 3 study area was divided by the sum of the potential disturbance acreage for the time period (based on GIS mapping of coal reserves for the lower production scenario) and existing (2003) disturbance from coal mine development.

Source: PRB Coal Review Task 3D (BLM 2005f)

approximately 39,108, 41,899, and 37,390 mmgpy of water would be produced in 2010, 2015, and 2020, respectively. The portion of that water that is produced in association with CBNG production would be discharged to impoundments or intermittent and ephemeral streams and would be available for area wildlife (e.g., waterfowl). Although much of the water would evaporate or infiltrate into the ground, it is anticipated that substantial quantities of water would remain on the surface and would result in the expansion of wetlands, stock ponds, and reservoirs, potentially increasing waterfowl breeding and foraging habitats. The median sodium concentration of CBNG-produced water from the Fort Union Formation is 270 mg/L. If sodium concentrations are maintained below 17,000 mg/L in the evaporation ponds, the potential adverse effects to waterfowl would be minimal.

4.2.8.2 Nongame Species

Potential direct impacts to nongame species (e.g., small mammals, raptors, passerines, amphibians, and reptiles) would include the incremental loss or alteration of potential foraging and breeding habitats from construction and operation of activities (e.g., vegetation removal for coal mines and CBNG wells, ancillary facilities, and transportation and utility corridors). Impacts also could result in mortalities of less mobile species (e.g., small mammals, reptiles, amphibians, and invertebrates), nest or burrow abandonment, and loss of eggs or young as a result of crushing from vehicles and equipment. Indirect impacts would include increased noise levels and human presence, dispersal of noxious weeds, and dust effects from unpaved road traffic. Assuming that adjacent habitats would be at or near carrying capacity and considering the variabilities associated with drought conditions and human activities in the study area, displacement of wildlife species from the Task 3 study area would result in an unquantifiable reduction in wildlife populations.

A number of migratory bird species have been documented within the PRB. In the event that development activities were to occur during the breeding season (April 1 through July 31), these activities could result in the abandonment of a nest site or territory or the loss of eggs or young, resulting in the loss of productivity for the breeding season. Loss of an active nest site, incubating adults, eggs, or young would not comply with the intent of the Migratory Bird Treaty Act and potentially could affect populations of important migratory bird species that may occur in the PRB.

Breeding raptor species that occur within the Task 3 study area include bald eagle, golden eagle, red-tailed hawk, Swainson's hawk, rough-legged hawk, American kestrel, prairie falcon, northern harrier, short-eared owl, and great horned owl. Potential direct impacts to raptors would result from the surface disturbance of nesting and foraging habitat in the PRB Coal Review Task 3 study area. In the event that development activities were to occur during the breeding season (February 1 through July 31), these activities could result in the abandonment of a nest site or territory or the loss of eggs or young, resulting in the loss of productivity for the breeding season. As discussed above, loss of an

active nest site, incubating adults, eggs, or young would not comply with the intent of several laws, including the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

New power line segments in the study area incrementally would increase the collision potential for migrating and foraging bird species (e.g., raptors and waterfowl) (APLIC 1994). However, collision potential typically is dependent on variables such as the location in relation to high-use areas (e.g., nesting, foraging, and roosting), line orientation to flight patterns and movement corridors, species composition, visibility, and design. In addition, new power lines could pose an electrocution hazard for raptor species attempting to perch on the structure. Configurations less than 1 kV or greater than 69 kV typically do not present an electrocution potential, based on conductor placement and orientation (APLIC 1996). It is assumed that future permitting for power lines would require the use of appropriate raptor-deterring designs, thereby minimizing potential impacts. For example, SMCRA requires that surface coal mine operators use the best technology currently available to ensure that electric power lines are designed and constructed to minimize electrocution hazards to raptors. In addition, many of the power lines for CBNG development currently are being constructed underground.

4.2.8.3 Fisheries

Potential cumulative effects on fisheries as a result of development activities in the Task 3 study area would be closely related to impacts on ground and surface water resources. In general, development activities could affect fish species in the following ways: 1) alteration or loss of habitat as a result of surface disturbance; 2) changes in water quality as a result of surface disturbance or introduction of contaminants into drainages; and 3) changes in available habitat as a result of water withdrawals or discharge. The potential effects of development activities on aquatic communities are discussed below for each of these impact topics.

The predominant type of aquatic habitat in the study area consists of intermittent and ephemeral streams and scattered ponds and reservoirs. In general, perennial stream habitat in the study area is limited to the Little Powder River. Warm water game fish and nongame species are present in the perennial stream segments and numerous scattered reservoirs and ponds. Due to a lack of water on a consistent basis in most of the potentially affected streams, existing aquatic communities are mainly limited to invertebrates and algae that can persist in these types of habitats. The removal of stock ponds would eliminate habitat for invertebrates and possibly fish species. This loss would be temporary if the stock ponds are replaced during reclamation.

Development activities could result in the loss of aquatic habitat as a result of direct surface disturbance. Table 4-9 summarizes the cumulative current (in 2003) and projected (in 2010, 2015, and 2020) acres of surface disturbance and reclamation. Discrete locations for development disturbance and reclamation

areas cannot be determined based on existing information. However, projected development that could result in the loss of aquatic habitat would involve the construction of additional linear facilities, product gathering lines and road systems associated with conventional oil and gas and CBNG activities and any additional disturbance that would be associated with extending coal mining operations onto lands adjacent to the existing mines.

Projected activities would result in surface disturbance in each of the six Task 3 study area subwatersheds. Information relative to the stream crossing locations for the majority of the linear facilities is not available at this time. The proposed Bison Pipeline project is not currently active. If the project is constructed, it would cross Cottonwood Creek, a tributary of the Little Powder River. Typically, the associated disturbance would consist of a 100-foot-wide construction ROW; however, site-specific stream crossing methods and reclamation would be determined at the time of project permitting. Future coal mining also could remove intermittent or ephemeral streams and stock ponds in the Little Powder River, Upper Belle Fourche River, Upper Cheyenne River, and Antelope Creek subwatersheds. Coal mine permits provide for removal of first- through fourth-order drainages. During reclamation, third- and fourth-order drainages must be restored; first- and second-order drainages often are not replaced (Martin et al. 1988). As discussed in Section 3.5.2, Little Rawhide Creek and its tributary, Prong Draw, drain the existing Eagle Butte Mine permit area and the general analysis area for the entire Eagle Butte West LBA Tract. All streams within and adjacent to the tract are typical for the region, in that flow events are ephemeral. Under natural conditions, aquatic habitat is limited by the ephemeral nature of surface waters in the general analysis area. The results of fish surveys that were conducted in Little Rawhide Creek during baseline studies for the Eagle Butte Mine in between 1977 and 1984 and again in 1985 are discussed in Section 3.10.7.1.

The PRB Coal Review assumes that surface disturbance activities would not be allowed in perennial stream segments or reservoirs on public land that contain game fish species. It also assumes that other types of development activities would not occur within stream channels nor remove ponds or reservoirs as part of construction or operation and, therefore, would not result in the direct loss of fish habitat.

Surface disturbing activities can result in sediment input to water bodies, which affects water quality parameters such as turbidity and bottom substrate composition. Contaminants also can be introduced into water bodies through chemical characteristics of the sediment. Potential related effects on aquatic biota could include physiological stress, movement to avoid the affected area, or alteration of spawning or rearing areas (Waters 1995). Studies have shown that TDS levels in streams near reclaimed coal mine areas have increased from one percent to seven percent (Martin et al. 1988). Typically, sedimentation effects are short-term in duration and localized in terms of the affected area. TSS concentrations would stabilize and return to typical background concentrations after construction or development activities have been completed. It is

anticipated that sediment input associated with development disturbance areas would be minimized by implementation of appropriate erosion control measures, as would be determined during future permitting.

The removal of streamside vegetation and the resultant reduction in shade and potential for increased bank erosion also could degrade aquatic habitats. It is assumed these types of impacts would be limited to intermittent and ephemeral streams, since a buffer protection zone typically is required for development activities near perennial streams. ROW clearing for linear projects could remove riparian vegetation at stream crossings. However, effects on aquatic habitat would be limited to a relatively small portion of the stream (up to 100 ft in width depending on the type of development). It is anticipated that reclamation procedures to restore riparian vegetation would be required during future project permitting, thereby minimizing impacts.

CBNG and coal mining are the primary types of development activities that use or manage water as part of their operations. Based on current trends, it is assumed that most, if not all, of the coal mine-produced water would be consumed during operation. As discussed in Section 3.5.2.2, changes in surface runoff characteristics and sediment discharges would occur during surface coal mining as a result of the destruction and reconstruction of drainage channels as mining progresses and the use of sediment control structures to manage discharges of surface water from the mine permit area. State and federal regulations require treatment of surface runoff from mined lands to meet effluent standards. Coal mining-related surface water would be discharged into intermittent and ephemeral streams in four subwatersheds (Antelope Creek, Little Powder River, Upper Belle Fourche River, and Upper Cheyenne River). It is assumed that future permitting would allow a portion of CBNG-produced water to be discharged to intermittent and ephemeral drainages as is currently allowed in the six subwatersheds in the study area. It is projected that up to approximately 39,108, 41,899, and 37,390 mmgpy of water would be produced in 2010, 2015, and 2020, respectively. The portion of that water that is produced in association with CBNG production would be discharged to impoundments or intermittent and ephemeral streams. Based on past monitoring in receiving streams, no change in surface flows would be expected beyond approximately two miles from the discharge points (BLM 2003b). For example, water discharged from CBNG wells has supplied the Belle Fourche River and some tributaries, ponds, and playas with water nearly continuously for several years, but this reach of the Belle Fourche River has not become perennial, even with the addition of CBNG discharge water.

4.2.8.4 Special Status Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed and federally proposed species (species that are protected under the ESA), BLM Sensitive Species, USDA-FS Sensitive Species, and WGFD Species of Special Concern in Wyoming. Further discussions of

species that are protected under the ESA and BLM Sensitive Species are included in Appendices E and F of this Final EIS. The USFWS also has a list of Migratory Bird Species of Management Concern in Wyoming, which is discussed in Section 3.10.6 and in the Supplementary Information Document for this EIS. Special status species potentially occurring in the Task 1 study area are identified in Section 2.4.3.5 of the PRB Coal Review Task 1D Report (BLM 2005c).

Potential impacts to special status terrestrial species would be similar to those discussed above for nongame wildlife (e.g., small mammals, birds, amphibians, and reptiles). Potential direct impacts would include the incremental loss or alteration of potential habitat (native vegetation and previously disturbed vegetation) from construction and operation of development activities (e.g., vegetation removal for coal mines and CBNG wells, ancillary facilities, and transportation and utility corridors). Impacts also could result in mortalities of less mobile species (e.g., small mammals, reptiles, and amphibians), nest or burrow abandonment, and loss of eggs or young as a result of crushing from vehicles and equipment. Indirect impacts would include increased noise levels and human presence, dispersal of noxious weeds, and dust effects from unpaved road traffic.

In general, direct and indirect impacts to special status species would result in a reduction in habitat suitability and overall carrying capacity in the study area. Development within potential habitat for special status species likely would decrease its overall suitability and potentially would reduce or preclude use of a species habitat due to increased activity and noise. Future use of habitat by a special status species would be strongly influenced by habitat quality, the degree of impact would depend on a number of variables including the location of the nest or den site, the species' relative sensitivity, breeding phenology, and possible topographic shielding.

Bird species that have been identified as occurring within the PRB and are on two or more of the special status species lists include common loon, American bittern, white-faced ibis, trumpeter swan, greater sandhill crane, mountain plover, upland sandpiper, long-billed curlew, black tern, yellow-billed cuckoo, Lewis' woodpecker, pygmy nuthatch, sage thrasher, loggerhead shrike, Baird's sparrow, sage sparrow, Brewers sparrow, and greater sage-grouse. Any development activities (oil and gas and related development, coal mining and related development, or other development) that occur during the breeding season (April 1 through July 31) could result in the abandonment of a nest site or territory or the loss of eggs or young, resulting in the loss of productivity for the breeding season. As discussed previously, loss of an active nest site, incubating adults, eggs, or young as a result of any of these development activities would not comply with the intent of the Migratory Bird Treaty Act and potentially could affect populations of important migratory bird species that may occur in the PRB.

A number of raptor species have been documented in the PRB and are on two or more of the special status species lists including bald eagle, ferruginous hawk, northern goshawk, merlin, peregrine falcon, western burrowing owl, and short-eared owl. Potential direct impacts to raptors would result from the surface disturbance of breeding and foraging habitat. Breeding raptors in or adjacent to development activities could abandon breeding territories, nest sites, or lose eggs or young. As discussed previously, loss of an active nest site, incubating adults, eggs, or young would not comply with the intent of several laws, including the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, and potentially could affect populations of important migratory bird species that may occur within the study area. New power line segments in the study area incrementally would increase the collision potential for migrating and foraging bird species such as raptors.

A total of 239 greater sage-grouse strutting ground (lek) sites were identified in the six subwatersheds in the PRB Coal Review Task 3 study area as of 2003; however, the PRB Coal Review did not evaluate the status of these leks (i.e., active or inactive). Sage-grouse are susceptible to infection with West Nile virus, and the incidence of infection is much higher in northeastern Wyoming than the rest of the state. As discussed in Section 3.10.5 and in the PRB Coal Review Task 1D report, the trend in the sage-grouse population for the Sheridan Region suggests about a 10-year cycle with periodic highs and lows. Subsequent population peaks appear lower than the previous peak, suggesting a steadily declining sage-grouse population within the Sheridan Region (Oedekoven 2001). Direct and indirect effects to greater sage-grouse within the study area as a result of development activities would be the similar to the impacts discussed above for big game species. Impacts would result from the incremental surface disturbance of potential habitat, increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic.

As discussed above for game species, based on existing information, the spatial relationship between projected future disturbance and reclamation areas for the projected coal development scenarios and the resource-specific information in the GIS layers could not be determined for the PRB Coal Review. However, the analysis did use GIS layers for future coal reserves to provide some quantification of potential future coal mining-related impacts. The results of this analysis are summarized in Table 4-23. The difference in the number of lek sites that would occur within two miles of coal mining activities under the lower production scenario verses the upper production scenario is due to slight variations in the projected disturbance areas. An unquantifiable number of the lek sites initially could be impacted by CBNG activity, which would occur in advance of coal mine development. Potential direct impacts to sage-grouse, if present, could include loss of foraging areas, abandonment of a lek site, or loss of eggs or young as a result of development activities.

Table 4-23. Potential Cumulative Impacts to Greater Sage-Grouse Leks from Coal Mine Development--Upper and Lower Coal Production Development Scenarios.

Lek Categories	**2010/ Lower**	**2010/ Upper**	**2015/ Lower**	**2015/ Upper**	**2020/ Lower**	**2020/ Upper**
Number of Directly Affected Leks	10	10	15	15	15	15
Number of Leks within Two Miles of Coal Mining Activity	47	47	47	49	50	49

Source: PRB Coal Review Task 3D Report (BLM 2005f)

Seven special status fish species potentially occur in the PRB Coal Review Task 3 study area subwatersheds: flathead chub (Little Powder River, Antelope Creek, and Upper Cheyenne River subwatersheds), plains topminnow (Upper Cheyenne River subwatershed), goldeye (Little Powder River subwatershed), lake chub (Little Powder River subwatershed), mountain sucker (Little Powder River subwatershed), silvery minnow (Little Powder River subwatershed), and plains minnow (Little Powder River, Upper Cheyenne River, and Upper Belle Fourche River subwatersheds). Potential impacts to special status fish species as a result of development activities would be similar to effects discussed above for fisheries. Surface disturbance in three subwatersheds (Little Powder River, Upper Belle Fourche River, and Upper Cheyenne River) could alter habitat or affect water quality conditions for special status fish species. Erosion control measures, as required by 2003 (PRB Coal Review baseline year) and future permits, and NPDES permit requirements would be implemented for each project. These measures would help decrease disturbance-related sediment input to stream segments that may contain one of more of the special status fish species. Therefore, it is anticipated that impacts to special status fish species would be low.

4.2.9 Land Use and Recreation

The PRB Coal Review Task 3D report (BLM 2005f) discusses potential cumulative impacts to land use and recreation as a result of projected development activities in the PRB Coal Review Task 3 study area (Figure 4-4). The baseline year (2003) area of disturbance and reclamation and the projected cumulative areas of disturbance and reclamation for 2010, 2015, and 2020 related to surface coal mining are shown in Tables 4-2 and 4-3. The baseline year area of total disturbance and reclamation and the projected cumulative total areas of disturbance and reclamation for 2010, 2015, and 2020 are shown in Table 4-9.

The PRB is a predominantly rural, wide open landscape. With little rainfall and limited alternative sources of water, the primary land use is grazing. Nevertheless, there is a range of other land uses. The major categories include agriculture, forested, mixed rangeland, urban, water, wetlands, coal mines, and barren land. The relative amounts of these lands in the PRB Coal Review Task 1 and Task 2 study area (Figure 4-1) is tabulated in Table 4-24.

Table 4-24. Land Use by Surface Ownership.

Use Category	Surface Ownership				Total	
	BLM	**USDA-FS[1]**	**State**	**Private**	**Acres**	**Percent**
Agriculture	2,627	14,197	13,770	472,811	503,405	6.3
Barren	165	205	187	9,396	9,953	0.1
Forested	137,555	14,604	48,645	332,062	532,866	6.7
Mixed Rangeland	732,014	218,156	561,363	5,271,644	6,783,177	86.0
Urban	893	17	1,039	25,469	27,418	0.3
Water	35	73	334	4,773	5,215	<0.1
Wetlands	0	104	559	1,566	2,229	<0.1
Coal Mines	149	7,236	2,805	40,917	51,107	0.6
Total	**873,438**	**254,592**	**628,702**	**6,158,638**	**7,915,370**	**100.0**

[1] Thunder Basin National Grassland, administered by the Medicine Bow – Routt National Forest.
Source: PRB Coal Review Task 1D Report (BLM 2005c)

A large part of the PRB consists of split estate lands (privately owned surface lands underlain by federally owned minerals). This results in conflicts between surface users, which are mainly ranching interests, and mineral developers. There also may be conflicts with some dispersed rural residences, although specific locations cannot be identified until development is proposed.

Much of the study area is also used for dispersed recreational activities such as hunting. The study area includes surface lands that are federally, state, and privately owned. With nearly 80 percent of the area privately owned, public lands provide important open space and recreation resources including both developed recreation facilities and areas to pursue dispersed recreation activities. The private sector contributes the elements of commercial recreation opportunities and tourism services such as motels and restaurants. Some private land owners also allow hunting with specific permission, sometimes for a fee.

4.2.9.1 Grazing and Agriculture

Potential impacts to grazing in the Task 3 study area as a result of development activities can be classified as short-term and long term. Potential short-term impacts arise from:

- the temporary loss of forage as a result of vegetation removal/ disturbance;
- temporary loss of AUMs;
- temporary loss of water-related range improvements, such as improved springs, water pipelines, and stock ponds;
- temporary loss of other range improvements, such as fences and cattle guards; and
- restricted movement of livestock within an allotment due to the development and operation of projects like surface coal mines, which would cease after successful reclamation had been achieved and replacement of water-related and other range improvements had been completed.

The discharge of produced water could increase the availability of water to livestock, which may offset the temporary loss of water-related range improvements. Potential long-term impacts consist of permanent loss of forage and forage productivity in areas, such as power plants, that would not be reclaimed in the near term. Indirect impacts may include dispersal of noxious and invasive weed species within and beyond the surface disturbance boundaries, which decreases the amount of desirable forage available for livestock grazing in the long term.

Development activities could result in short- and long-term impacts to agricultural land, depending on their spatial relationship. Short-term impacts would include the loss of crop production during development and operational phases of the projects. Long-term impacts would result from the permanent loss of agricultural land due the development of permanent facilities such as power plants and railroads.

Table 4-25 contains an estimate of the number of AUMs unavailable on lands disturbed and not yet reclaimed through 2020 for the high and low levels of predicted development activity, along with the acreage of cropland estimated to be affected.

Table 4-25. AUMs and Acres of Cropland Estimated Unavailable on Lands Disturbed and Not Yet Reclaimed as a Result of Development Activities.

Category	**2003/ Baseline**	**2010/ Lower**	**2010/ Upper**	**2015/ Lower**	**2015/ Upper**	**2020/ Lower**	**2020/ Upper**
Unavailable AUMs[1]	18,150	22,467	22,792	23,245	23,761	22,514	23,333
Unavailable Crop Land (acres)	48	59	60	134	139	206	289

[1] Based on an average stocking rate of six acres per AUM.
Source: PRB Coal Review Task 3D Report (BLM 2005f)

4.2.9.2 Urban Use

It is expected that there would be additional expansion of urban residential and commercial development as a result of the projected 48 percent growth in population (between 2003 and 2020) in Campbell County. Section 4.2.12 and the Task 3C Report of the PRB Coal Review (BLM 2005e) contain additional information on employment and population issues in the study area. A majority of the new urban development would be expected to occur adjacent to existing communities, primarily Gillette, which accounts for approximately 60 percent of the Campbell County population and, to a lesser extent, Wright and other small communities. Most of this development would occur on land that is currently in use for grazing or agriculture.

4.2.9.3 Recreation

Accessible public lands provide diverse opportunities for recreation, including hunting, fishing, ORV use, sightseeing, and wildlife observation. Public lands generally provide dispersed recreational uses in the study area. Some developed recreational facilities occur in special management areas, including recreation areas. While opportunities are available on BLM lands throughout the PRB, the majority of dispersed recreational uses occur in the western part of the PRB Coal Review Task 1 and Task 2 study area, including the South Big Horn Mountains area and along the Powder River. BLM lands elsewhere consist mainly of isolated tracts of land that are too small to provide a quality recreational experience. Within the PRB Coal Review Task 1 and Task 2 study area, the larger parcels of federal public lands occur in the southwest part of Johnson County and along the Powder River (administered by BLM) and in the Thunder Basin National Grassland (administered by the Forest Service). Public lands are accessible via public roads or across private land with the landowner's permission.

Hunting is a major recreation use of state and federal lands in the study area. Various big game and upland game bird species are hunted in the region. Fishing is a popular year-round activity for residents of the study area.

Mule deer and pronghorn hunting are by far the most popular hunting activities in the Task 1 study area, accounting for 35,529 and 21,304 hunter days, respectively, in 2003 (Stratham 2005). The next highest were cottontail rabbit (2,348 hunter days) and elk (2,055 hunter days), followed by wild turkey (1,019), sharp-tailed grouse (508), and sage-grouse (38). Consistent trends in hunter activity are not discernible from the WGFD data reviewed for the PRB Coal Review. All of the most prominent species hunted in the study area have had high years and low years. Pronghorn hunting, or example, was greatest from 1993 to 1996, while elk hunting was at its peak in 2001 and 2002. Mule deer hunting has been the most consistent, ranging from a low of 28,311 hunter days in 1996 to a high of 37,307 hunter days in 2002.

ORV use in the Task 1 study area is available on most BLM-managed lands. Most of the public land in Johnson, Sheridan, and Campbell Counties has been inventoried and designated as open, limited, or closed to ORV use. For the baseline year, approximately 20,386 acres were open to unlimited vehicle travel on and off roads. There were 4,680 acres in the area that were closed to all ORV use and approximately 867,534 acres were available for limited use. Limited use typically means ORVs are restricted to existing roads and vehicle routes.

Recreational use of public lands in the Task 1 study area has increased substantially over the past two decades, and is expected to continue to increase by about five percent every five years for most recreational activities (BLM 2003b). Total visitor use by residents and nonresident visitors in Campbell and Converse Counties in 1980 was projected at 1,276,000 visitor days (BLM 1979). The total visitor days of 1,881,763 estimated for 1990 was approximately 47

percent higher than the 1980 visitor days (BLM 2001c). Fewer than three percent of visitor days were estimated to occur on public lands.

Few, if any, of the developed recreation sites in the PRB Coal Review Task 3 study area would be affected by development related disturbance. As most of the projected disturbance area would occur on privately owned surface land, the extent of effects on dispersed recreation activities largely would depend on whether the disturbance areas had been open to public or private lease hunting. It is projected that cumulative development activities, especially the dispersed development of CBNG and, to a lesser extent, conventional oil and gas, would tend to exacerbate the trend toward a reduction in private land available for public hunting, which has been observed by WGFD in recent years (Shorma 2005). A reduction in available private land for dispersed recreation would contrast with the anticipated increase in demand for recreational opportunities and would tend to push more recreationists toward public lands where the BLM has projected a five percent increase in use every five years (BLM 2001a). After coal- and oil and gas-related development activities have been completed and the disturbed areas have been reclaimed, many of the adverse effects on dispersed recreation activities would be reduced.

It is expected that the development activities also would tend to expand and exacerbate the qualitative degradation of the dispersed recreation experience, in general, and of the hunting experience, in particular, as reported by the WGFD (Jahnke 2005). As noted in the Task 1D Report of the PRB Coal Review (BLM 2005c), reductions in land available for hunting also make herd management more difficult for the WGFD and reduce its hunting-derived revenues (Shorma 2005).

No direct effects on wilderness or roadless areas would be expected from the projected development activities. There are no designated wilderness areas in the study area, and mineral development would not be permitted in the Fortification Creek Wilderness Study Area until and unless Congress acts to remove it from Wilderness consideration.

There would be no effects on Wild and Scenic Rivers as the only river segment identified as both “eligible” and “suitable” in the Task 1D Report of the PRB Coal Review is not in the PRB Coal Review Task 3 study area.

4.2.10 Cultural Resources and Native American Concerns

The PRB Coal Review Task 3D report (BLM 2005f) discusses potential cumulative impacts to cultural resources as a result of projected development activities in the PRB Coal Review Task 3 study area. The baseline year (2003) area of disturbance and reclamation and the projected cumulative areas of disturbance and reclamation for 2010, 2015, and 2020 related to surface coal mining are shown in Tables 4-2 and 4-3. The baseline year area of total disturbance and reclamation and the projected cumulative total areas of disturbance and reclamation for 2010, 2015, and 2020 are shown in Table 4-9.

Cultural sites occur throughout the study area. Table 4-26 contains an estimate of the amount of projected disturbance through 2020 for the projected lower and upper levels of coal development activity, along with an estimate of the number of cultural sites that would potentially be affected. The sites fall into two categories; prehistoric sites and historic sites, as described below. A description of Native American traditional cultural places and a summary of the program to protect sites in any of these categories follow.

4.2.10.1 Prehistoric Sites

All recognized prehistoric cultural periods, from Clovis through Protohistoric (about 11,500 to 200 years ago), are represented in the PRB Coal Review study area. (See Section 3.12 for additional discussion about the prehistoric cultural periods.) The earliest prehistoric cultural periods, Paleoindian through Early Plains Archaic, are represented by only a small number of sites. Archaic and later prehistoric period sites (Archaic to Protohistoric) are represented in increasing numbers as a result of higher populations through time and better preservation of more recent sites. Important prehistoric site types in the region include artifact scatters, stone circles, faunal kill and processing sites, rock alignments and cairns, and stone material procurement areas.

Artifact scatters dominate prehistoric sites in the study area. When there is adequate information to evaluate these types of sites, most are not eligible to the NRHP. However, complex sites and sites with buried and dateable material are often field evaluated as eligible. The proportion of unevaluated sites is lower in subwatersheds in which more studies and more follow-up studies have been conducted, such as Antelope Creek, Upper Cheyenne River, and Upper Belle Fourche River. Some portions of some of the subwatersheds which have more varied habitats or conditions more conducive to preservation are very rich in significant prehistoric sites. Within the PRB Coal Review Task 3 study area, these areas include the lower Antelope Creek drainage and eastern portions of the Upper Belle Fourche River. More detailed information on the known cultural sites that are present in the PRB based on the existing surveys is included in the Task 1D Report for the PRB Coal Review (BLM 2005c).

4.2.10.2 Historic Sites

Historic site categories documented for the study area are based on broad historic themes. The site categories are Rural, Urban, Mining, Transportation, Military, Exploration, and Communication. Each of these site categories and the types of sites they include are detailed in the Task 1D Report for the PRB Coal Review (BLM 2005c). Evaluation of the importance of historic sites, districts, and landscapes must consider aspects of both theme and period in assessing the historic character and contributing attributes of the resources.

Table 4-26. Square Miles of Projected Cumulative Disturbance and Number of Potentially Affected Cultural Resource Sites in the PRB Coal Review Task 3 Study Area – Lower and Upper Coal Production Scenarios.

Sub-watershed	Average Number of Sites per Square Mile[1]	Lower Coal Production Scenario						Upper Coal Production Scenario					
		Year 2010		Year 2015		Year 2020		Year 2010		Year 2015		Year 2020	
		Square Miles[2]	Sites[3]	Square Miles[2]	Sites[3]	Square Miles[2]	Sites[3]	Square Miles[2]	Sites[3]	Square Miles[2]	Sites[3]	Square Miles[2]	Sites[3]
Antelope Creek	4.7	74	346	97	484	122	608	75	376	99	496	126	629
Dry Fork Cheyenne River	8.9	8.3	74	12	109	17	151	8.3	74	12	109	17	151
Little Powder River	4.6	90	415	108	495	123	567	91	419	109	502	125	577
Upper Belle Fourche River	4.3	164	704	186	801	209	899	166	713	192	824	219	940
Upper Cheyenne River	5.2	60	314	72	375	83	433	62	321	74	387	85	445
Upper Powder River	5.0	135	674	190	953	232	1,159	135	674	191	953	232	1,159
Total		**531**	**2,527**	**665**	**3,217**	**786**	**3,817**	**537**	**2,577**	**677**	**3,271**	**804**	**3,901**

1 Average number of sites per square mile based on previous surveys in the study area.
2 Calculated, based on database disturbance acreages prepared for the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities (Appendices A and D) (BLM 2005d).
3 The number of sites was calculated by multiplying the average density of known cultural sites per square mile (based on previous surveys) by the number of square miles of projected cumulative disturbance.
Source: Task 3D Report for the Powder River Basin Coal Review Cumulative Environmental Effects (BLM 2005f)

4.2.10.3 Native American Traditional Cultural Places

General ethnographies of the tribes that may have had traditional ties to this region do not provide information on specific resources in the study area that are likely to be traditional cultural concerns because these resources are considered confidential by the tribes. Within this region, there are prominent and identifiable places such as the Medicine Wheel to the west in the Big Horn Mountains and Devils Tower to the east in the Black Hills area. These known sites offer some indication of the types of places valued by the Plains horse cultures in the historic period. Any identification of sacred or traditional localities must be verified in consultation with authorized tribal representatives.

4.2.10.4 Site Protection

At the time an individual project is permitted, the development activities considered in this study would be subject to the following regulations relative to cultural resources. Section 106 of the National Historic Preservation Act of 1966 as amended, its implementing regulations, including but not limited to 36 CFR 800, 36 CFR 61, Executive Order 11593, and NEPA and its implementing regulations, including 40 CFR 1500 - 1508, provide the legal environment for documentation, evaluation, and protection of historic properties (i.e., cultural resources eligible for inclusion on the NRHP) that may be affected by development activities. In cases of split estate (where surface ownership and mineral ownership differ), surface resources, such as cultural sites, belong to the surface owner. The surface owner must be consulted about investigation, mitigation, or monitoring.

4.2.11 Transportation and Utilities

The PRB Coal Review Task 3D report (BLM 2005f) discusses potential cumulative impacts to transportation and utilities systems as a result of projected development activities in the PRB Coal Review Task 3 study area. The baseline year (2003) area of disturbance and reclamation and the projected cumulative areas of disturbance and reclamation for 2010, 2015, and 2020 related to surface coal mining are shown in Tables 4-2 and 4-3. The baseline year area of total disturbance and reclamation and the projected cumulative total areas of disturbance and reclamation for 2010, 2015, and 2020 are shown in Table 4-9.

Generally, transportation systems in the study area would not be directly affected by the disturbance associated with projected development. Site-specific instances of disturbance may require that segments of highways, pipelines, transmission lines, or railroads be moved to accommodate expansion of certain coal mines. In such cases, the agencies authorized to regulate such actions would have to approve any proposal to move any segments of any transportation systems and construction of alternative routing would be required prior to closing existing links so that any disruptive effects on transportation systems would be minimized.

The coal mines in the North Gillette subregion currently ship most of their coal via the east-west BNSF rail line through Gillette. That subregion produced 55 mmtpy in the baseline year (2003), which was just 22 percent of the estimated 250 mmtpy capacity of the BNSF rail line (BLM 2005f). The coal mines in the South Gillette and Wright subregions produced approximately 308 mmtpy in 2003, which was 88 percent of the estimated 350 mmtpy capacity of the joint BNSF & UP line serving those areas in the baseline year.

Potential effects of development activities on transportation and utilities may be either short- or long-term in nature, varying with the type of development. A power plant or an urban community development would be considered long-term, and the demand for transmission line capacity would be virtually permanent, lasting for the economic life of the activity. The effects of coal production and the related demand for rail capacity would vary with market changes. In recent years, coal production has been increasing and the PRB Coal Review projects that the trend would continue, as shown in Tables 4-2 and 4-3. Similarly, the demand for pipeline capacity would vary with market conditions as well as with the rate of depletion of the oil or gas resource.

Potential direct effects of projected development on roads and highways would include increased vehicular traffic and risk of traffic accidents on existing roadways in the PRB Coal Review Task 3 study area from daily travel by workers and their families. Indirect effects would include increased wear and tear on existing roads, additional air emissions from vehicles, additional fugitive dust from roads, noise, increased potential access to remote areas, and an increased risk of vehicle collisions with livestock and wildlife. Direct effects on railroads, pipelines, and transmission lines primarily would include increased demand for capacity to move coal, oil and gas, and electricity from production locations in the study area to markets outside the area.

The socioeconomic analysis conducted as a part of Task 3C of the PRB Coal Review projects a population increase of approximately 48 percent between 2003 and 2020 in Campbell County under the upper coal production scenario (BLM 2005e). Campbell County accounts for most of the population in the PRB Coal Review Task 3 study area. Based on traffic studies conducted independently of the PRB Coal Review, vehicle miles traveled tend to increase at or above the rate of population growth. Consequently, highway traffic would be expected to increase by at least 48 percent by 2020. Approximately 60 percent of the population growth would occur in or near Gillette, which would indicate that the same proportion of traffic would originate in the Gillette area. The remainder of the traffic growth would be dispersed throughout the study area. Under this scenario, the greatest impact on traffic would occur in the Gillette area, where existing traffic volume to capacity ratios are highest. The increased traffic would be expected to cause delays in the Gillette area and might require widening of some streets and roads or other measures to increase traffic capacity. It is anticipated that there would be an increase in the risk of traffic accidents approximately proportional to the increase in traffic. Highway capacity on major

routes away from Gillette would be expected to be sufficient to accommodate the growth without substantial constraints.

Existing rail lines, together with upgrades currently under way on the joint BNSF & UP line would be expected to accommodate the projected coal transportation traffic through 2015 (Table 4-27). The PRB Coal Review Task 2 Report (BLM 2005d) projects that the proposed DM&E line would be built and operational by 2015 (pending availability of funding), which would add 100 mmtpy in additional shipping capacity for the South Gillette and Wright subregions.

Table 4-27. PRB Rail Lines Coal Hauling Capacity and Projected Use.

Rail Line	2010 Projected 2010 Capacity mmtpy	2010 Projected Rail Use Increase[1] mmtpy	2010 Projected Rail Use Increase[1] %	2015 Projected 2015 Capacity mmtpy	2015 Projected Rail Use Increase[1] mmtpy	2015 Projected Rail Use Increase[1] %	2020 Projected 2020 Capacity mmtpy	2020 Projected Rail Use Increase[1] mmtpy	2020 Projected Rail Use Increase[1] %
North BNSF	250	62-78	25-31	250	74-104	30-42	250	78-121	31-48
South BNSF & UP	400	349-401	87-100	500	393-439[2]	79-88[2]	500	417-455[2]	83-91[2]
DM&E	0	0	0	-[2]	-[3]	-[3]	-[2]	-[3]	-[3]

[1] The range of increases in use shown for each year reflects the increases that are projected for the Lower and Upper Production Scenarios, respectively.
[2] The DM&E is assumed to be built and operational by 2015, adding 100 mmtpy of capacity for the mines served by the BNSF & UP South line.
[3] The BNSF & UP South figures represent the projected combined traffic and percent capacity on the BNSF & UP South line and the projected DM&E line.
Source: PRB Coal Review Task 3D Report (BLM 2005f)

Gas pipeline capacity out of the PRB for the PRB Coal Review baseline year (2003) was approximately 1.9 bcf per day; while total conventional natural gas and CBNG production was slightly below 1.1 bcf per day. The Task 2 Report for the PRB Coal Review projected that basin-wide production of CBNG would increase by about 54 percent by 2020. This potential is pipeline-capacity limited, suggesting additional pipelines could be built. One potential additional pipeline (Bison Project) was identified in the PRB Task 2 Report for completion by 2010, but no filing for the project has been made with FERC. Several other proposed projects are listed on the Wyoming Pipeline Authority projects website (http://www.wyopipeline.com/projects.asp, accessed 7/6/2007).

An estimated 1,700 MW of new power production capacity is anticipated in the cumulative effects area by 2020. This level of production would require construction of additional transmission line capacity. It is assumed that new transmission lines would be constructed to connect new power plants to the grid. However, no specific projects have been identified so the location(s), capacities, and effects on the existing system cannot be determined at this time.

4.2.12 Socioeconomics

The socioeconomic impact analysis focuses on Campbell County, but also considers Converse, Crook, Johnson, Sheridan, and Weston Counties as directly affected and Niobrara and Natrona Counties as indirectly affected. Current and projected socioeconomic conditions are described in more detail in the Task 1C and 3C reports for the PRB Coal Review (BLM 2005b and 2005e).

REMI Policy Insight (REMI), a regional economic model, was used to develop the cumulative employment and population projections presented below. The version of the REMI model for this study was calibrated to represent two economic regions: the first consisting of Campbell County alone, and the second composed of the counties in Wyoming that border Campbell County and are linked to its economy by established industrial and consumer trade linkages and by work force commuting patterns. Results for the second region were then analyzed to focus on the five counties, Converse, Crook, Johnson, Sheridan, and Weston, that are the most directly linked. Collectively, these five counties are referred to in the PRB Coal Review Task 3C report (BLM 2005e) as the surrounding counties. Additional analysis was undertaken to "disaggregate" REMI's population and employment forecasts for each of the surrounding counties and to derive housing requirements and project future school enrollment.

During the 1970s and early 1980s, the PRB emerged as a major coal producing region. Federal coal leasing has been a high profile activity since over 90 percent of the coal resources in the PRB are federally owned. The surface coal mines that were developed during the 1970s and early 1980s are now mature operations, providing a stable economic and social foundation for the region. While energy development has produced periodic surges in population, followed occasionally by population loss in some communities, the growth in domestic energy consumption, coupled with the PRB's vast energy resource base, has resulted in a 50-year growth trend in the region without the absolute economic busts that have characterized some other western U.S. resource booms. This period of extended energy development has been accompanied by substantial benefits, including economic growth, employment opportunity, tax revenue growth, and infrastructure development for local governments in the region and across Wyoming as tax revenues generated by production of coal and other energy resources have funded infrastructure development programs statewide. At the same time, periods of rapid growth have stressed communities and their social structures, housing resources, and public infrastructure and service systems.

The emergence of the coal and other energy resource development industries in the PRB has had a long-term cumulative influence on social and economic conditions in the region. In general, Campbell County and the entire PRB region have developed a greater capacity to respond to and accommodate growth. The regional coal industry also provides a measure of insulation from

dramatic economic and social dislocations. Key current cumulative social and economic conditions are described below.

4.2.12.1 Employment and the Economic Base

Energy resource development since 1970 has resulted in substantial economic expansion across the PRB. Total employment expanded by 156 percent as 38,948 net new jobs were added between 1970 and 2002. The most rapid expansion occurred between 1975 and 1980. After modest growth and slight decline in the 1980s and early 1990s, employment growth resumed in the late 1990s, led by increases in coal mine employment, including subcontractors, and CBNG development. Across the six-county area, total employment was 63,871 in 2002. Nearly half of the net job gain occurred in Campbell County, where total employment increased from 6,026 jobs in 1970 to 25,453 jobs in 2002. Strong gains also were posted in Sheridan County (9,052 jobs) and Converse County (4,323 jobs).

The economic stimuli associated with the gains in mining and CBNG employment and the long-term population growth triggered secondary job gains in construction, trade, services, and government. In 2002, business and consumer services accounted for 55.5 percent of all jobs in the region, while mining and government accounted for 10.7 percent and 14.5 percent of all jobs, respectively. Farm employment in the region, as a share of total employment, declined from 14.3 percent in 1970 to 5.0 percent in 2002. However, that shift is primarily due to growth in non-farm employment rather than declines in farming, as total farm employment in the PRB recorded a net decline of only 333 jobs, from 3,571 to 3,238.

The largest impetus to future growth over the PRB Coal Review study period (2003 to 2020) is expected to occur by 2010. Under the lower coal production scenario, employment in 2010 related to coal mining, oil and gas production, and oil field services is projected to increase by one-third, or more than 2,300 jobs, as compared to 2003 levels. A large portion of the jobs gained would be the result of increased oil and gas development. While the number of coal mining jobs would increase, the projected coal mine-related productivity gains would limit increases in the number of mine employees required for operations.

Beyond 2010, as major infrastructure development (e.g., additional CBNG compression capacity) is completed and the pace of conventional oil and gas drilling decreases, total employment related to coal mining, oil and gas production, and oil field services would decline. Increases in CBNG production and coal mining employment would occur thereafter, such that total mining employment would approach pre-2010 levels by the end of the forecast period (2020). Under the development scenarios, construction of the three new power plants, having a combined capacity of 1,000 MW, is assumed to occur concurrently with the increases in mining employment, with a peak work force of approximately 1,550 workers in 2007-2008. Under the upper coal production scenario, a second temporary construction work force impact would occur

between 2016 and 2020 in conjunction with the construction of an additional 700-MW power plant.

The net effects of these activities, including secondary effects on suppliers, retail merchants, service firms, and state agencies and local government in the region, would be the creation of more than 8,700 new jobs in the region between 2003 and 2010. Of those, more than 5,600 jobs (a 22 percent increase over 2003 employment) would be based in Campbell County. The pace of economic expansion, at least in terms of jobs, would moderate after 2010. Total employment growth of 2,017 additional jobs is projected in Campbell County between 2010 and 2020, with 1,741 additional jobs projected in the surrounding counties.

Several important issues arise in the context of the rapid economic expansion implied by the growth projections through 2010. One issue is that achieving the projected levels of energy and mineral development activity assumes that industry has access to the necessary equipment, materials, labor, and other vital inputs. Current oil and gas exploration and development interest across the Rocky Mountain region has absorbed the available inventory of drilling rigs and crews. A lack of additional resources could delay or limit the job gains below the levels projected, even though prospects for such growth remain. Secondly, the competition for equipment could combine with tight labor markets to negate the productivity gains that underlie the projections, such that the employment and associated impacts do materialize, but are associated with lower levels of activity (e.g., a lengthier construction period for a power plant or fewer new wells drilled each year).

Employment effects associated with the upper coal production scenario, assuming productivity gains in coal mining equivalent to those in the lower coal production scenario, would result in total employment gains of 11,563 jobs by 2010 in the six-county study area, with an additional 3,667 jobs by 2020. (Projected coal mining employment under the upper production scenario was estimated assuming future productivity gains comparable to those under the lower production scenario. This assumption reflects a departure from the assumptions established for the upper production scenario in the Task 2 report, whereby a 16 percent higher production rate would be achieved with a 2.5 percent increase in workforce. Those assumptions, although based on a continuation of historic productivity gains, may underestimate population and employment growth and related socioeconomic effects if the production is achieved but the productivity gains lag. Using the productivity gains from the lower production scenario thus provides a more conservative perspective on potential long-term population growth for the purposes of the cumulative analysis). As compared to the employment projections under the lower coal production scenario, those gains would include 2,821 additional jobs in 2010 and 3,214 additional jobs in 2020. Most of the incremental gains would be based in Campbell County, further stressing labor markets, housing, and other community resources. Such pressures could delay or affect the development plans of individual firms and operators, such that the projected employment

levels would not be realized in the time frames shown. Nonetheless, substantial growth in employment is expected to occur, and even if the projected total employment levels are not realized, substantial social and economic impacts still would be anticipated.

The economic stimuli associated with the projected development also would stimulate increases in employment in other nearby counties beyond the five surrounding counties identified above. However, the potential effects in these areas are not addressed in the PRB Coal Review Task 3C Report because most of the effects would comprise indirect or induced growth that would be limited in scale relative to the size of the respective economies. Furthermore, the economic outlook for those areas is influenced by factors that are beyond the scope of this study, such as the role of the oil and gas support services industry based in Natrona County in supporting energy development in the south-central and southwestern portions of Wyoming.

4.2.12.2 Labor Market Conditions

Labor market conditions in the PRB reflect a generally healthy economy, with average annual county unemployment rates between 3.2 percent and 4.8 percent in 2003. Johnson County recorded the lowest unemployment (3.2 percent) and Converse County registered the highest (4.8 percent). Statewide and national unemployment rates for the period were 4.4 percent and 6.0 percent, respectively.

Over time, local unemployment levels and rates have reflected the influences of the large, relatively stable employment baseline associated with the coal mining industry and the more transitory and variable influences of natural gas development and other industries. Prior to the beginning of CBNG development in 1989, unemployment in Campbell County fluctuated between 4.8 and 5.35 percent, slightly above the corresponding statewide averages. Labor demand associated with CBNG development contributed to a decline in unemployment to below 3.0 percent in 2001. As the pace of CBNG development has stabilized, labor demand eased and unemployment rates climbed to 5.2 percent in 2003, before abating.

The employment effects identified above from 2003-2020 imply substantial pressures on local labor markets. Strong demand for labor would lower local unemployment, creating upward pressure on wages and salaries. Those influences would stimulate substantial economic migration into Campbell County, causing impacts to population, housing demand, and other economic and social conditions. Similar influences would occur in the surrounding counties, although the implications are less severe because the scale of the effects would be smaller and would be distributed over multiple communities and service providers.

4.2.12.3 Personal Income

A benefit associated with energy resource development, whether it is mineral mining or oil and gas development, is wages and salaries that are among the highest in the state. Personal income registered strong gains across the region, but especially in Campbell County, during the late 1970s and early 1980s. In 1981, per capita personal income in Campbell County was $17,520, compared to the national average of $11,280 and the statewide average of $12,879. Personal income growth was tempered by several years of economic stagnation during the late 1980s. Renewed economic vitality since then resulted in per capita personal income in Campbell County reaching $30,253 in 2002. Those gains notwithstanding, per capita income among Campbell County's residents was below statewide and national norms, as well as that for Sheridan ($32,563) and Weston ($31,388) Counties. When measured on a median household or family income basis in the 2000 census, Campbell County led statewide, national, and other counties in the PRB by considerable margins.

In terms of total personal income, Campbell County leads the six-county region with $1.093 billion in 2002. Sheridan County residents recorded aggregate personal income of $878 million in 2002. Total personal income in the other counties was substantially lower, ranging from $177.8 million in Crook County to $347.8 million in Converse County.

Personal incomes in the region would increase over the time period 2003-2020, both in aggregate and on a per capita basis, in conjunction with the economic outlooks foreshadowed by the projected development scenarios. In 2003, total personal income was $1.12 billion in Campbell County and approximately $1.88 billion in the surrounding counties. Under the lower coal production scenario, total personal income would more than triple to $3.34 billion in 2020, and personal income in the surrounding counties would increase by approximately 136 percent to $4.43 billion (all in nominal dollars). The upper coal production scenario would generate an additional $266 million per year in Campbell County and an additional $35 to $40 million per year in the surrounding counties by 2020. Annual per capita incomes are projected to increase by approximately 27 percent (in real terms) across the region between 2003 and 2020. Households with one or more workers employed directly in the energy industry, associated key suppliers, and the construction industry likely would realize larger shares of the overall gains.

4.2.12.4 Population and Demographics

Population change over time is perhaps the single best indicator of cumulative social and economic change in the PRB. Campbell County was not among the original 13 counties when Wyoming was admitted to statehood, but it was carved from Weston and Crook Counties in 1911. Campbell County's population of 5,233 in the 1920 census ranked it seventeenth among Wyoming's counties. Forty years later and prior to the onset of coal development in the region, Campbell County, with a population of 5,861,

ranked eighteenth among Wyoming's counties in terms of population, with neighboring Converse, Sheridan, and Weston Counties each having a larger population.

By 1980, Campbell County's population had increased by more than 300 percent, to 24,367, seventh among Wyoming's counties. Energy development also contributed to population growth in Sheridan, Converse, Johnson, and Crook Counties during that period. Weston County recorded a population decline during the period; however, the combined population of the PRB climbed from 49,311 in 1960 to 82,598 in 1980.

Annual coal production in the PRB has increased by nearly 500 percent since 1980, accompanied by expanded mine service and rail transportation capacity, stimulating further growth. The impetus for growth was tempered by substantial productivity increases in the mining industry, coupled with declining production of other energy resources. Consequently, the region's population gained a relatively modest 11 percent, 9,318 residents, between 1980 and 2000, reaching 91,916. Campbell County registered a net gain of 9,331 residents during that period, raising its total population to 33,698 in 2000, fourth highest in the state. Across the rest of the PRB, the loss of about 2,000 residents in Converse County was offset by modest gains in the other four counties (U.S. Census Bureau 2001).

More recently, the PRB has seen renewed population growth, primarily linked to CBNG development. Population estimates for 2003 indicate a total regional population of 96,078, a 4.4 percent increase over the 2000 census population. Gains were reported for all six counties, ranging from 29 persons in Weston County to 2,740 persons in Campbell County (Table 4-28). City officials estimate that Gillette's populations grew by almost 2,000 people (6.2 percent) in 2006 (Gillette News-Record 2007).

The magnitude and timing of projected employment changes from 2003-2020 under either coal production scenario would trigger corresponding effects to population across the PRB, particularly in Campbell County (Figure 4-6).

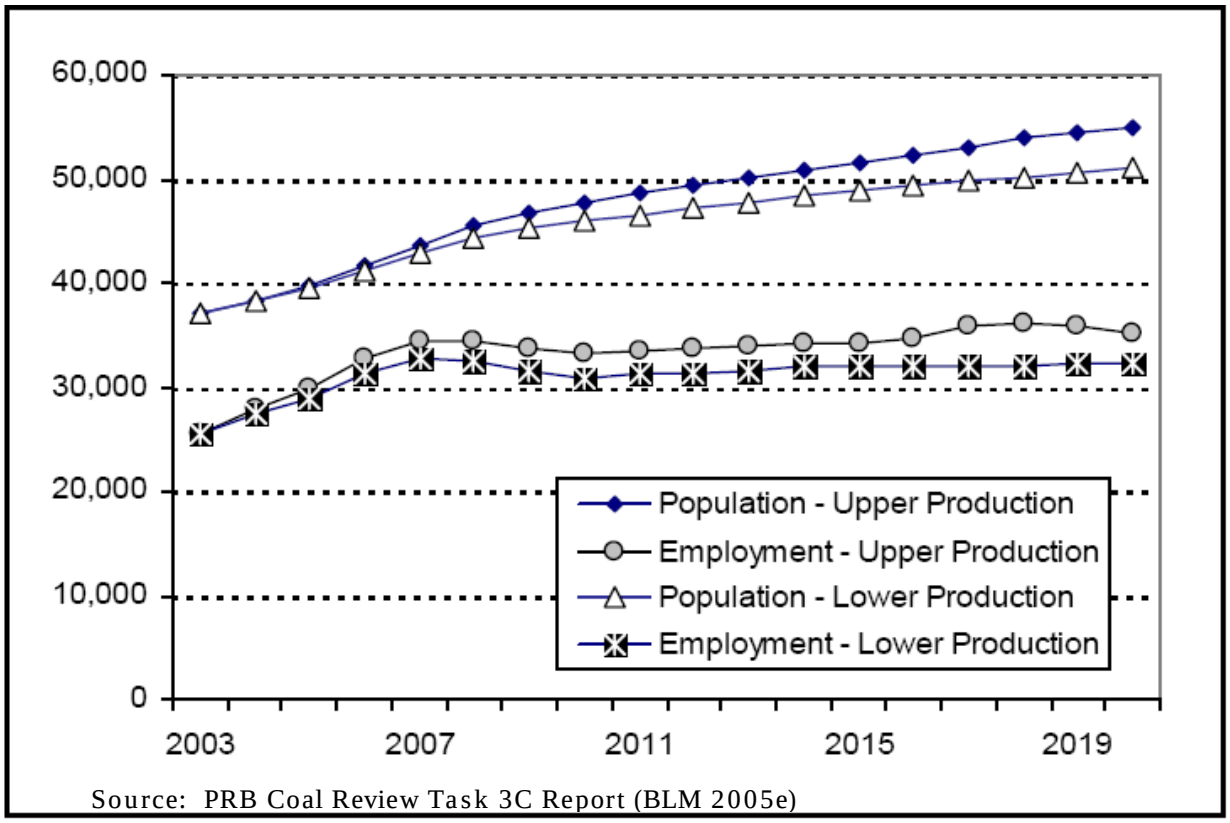
Under the lower coal production scenario, Campbell County's population is projected to increase by more than 14,550 residents between 2003 and 2020, of which nearly 9,500 additional residents are anticipated by 2010. Growth over the next five to six years would result in substantial pressures on housing and other community resources. The projected energy and mineral development in the lower coal production scenario would also result in substantial population growth elsewhere in the PRB, with Sheridan, Johnson, and Converse Counties all projected to gain substantial population. Population growth, like employment growth, would moderate after 2010.

Projected population growth between 2003 and 2020 ranges from 0.5 percent CAGR in Weston County to 2.0 percent CAGR in Campbell County. In absolute terms, the net change ranges from 537 additional residents in Weston County to

Table 4-28. Recent and Projected PRB Population.

Year	Campbell County	Converse County	Crook County	Johnson County	Sheridan County	Weston County	Total Study Area
Census							
2000	33,698	12,104	5,895	7,108	26,606	6,642	92,053
2003	36,438	12,314	5,986	7,554	27,115	6,671	96,078
Lower Coal Production Scenario							
2010	45,925	13,103	6,542	8,389	28,459	7,108	109,526
2015	48,905	13,671	6,759	8,867	30,016	7,174	115,392
2020	50,995	14,193	6,989	9,326	31,467	7,208	120,178
Upper Coal Production Scenario							
2010	47,662	13,160	6,570	8,424	28,579	7,137	111,532
2015	51,558	13,763	6,802	8,924	30,214	7,219	118,480
2020	54,943	14,313	7,045	9,403	31,733	7,266	124,703

Source: U.S. Census Bureau 2005 (2000 and 2003 data)



Source: PRB Coal Review Task 3C Report (BLM 2005e)

Figure 4-6. Projected Campbell County Population and Employment to 2020.

a gain of 14,557 residents in Campbell County. The combined population of the six-county study area is projected to climb from 96,078 in 2003 to 120,178 in 2020, a 1.3 percent CAGR.

As with employment, changing development conditions could result in actual population growth varying from projected population growth. If project schedules or levels of development vary from the projected levels, there could be corresponding effects on population growth (e.g., delays could result in lower growth). Another possibility is that population demographics could change in response to migration and commuting, with relatively more immigrating construction workers being single-status, rather than being accompanied by families. Another alternative is that the spatial distribution of population growth could shift as a result of housing or labor constraints, such that less growth would occur in Gillette and Campbell County, and more growth would occur elsewhere.

Projected population growth through 2020 under the upper coal production scenario is approximately 19 percent higher than under the lower coal production scenario (28,625 compared to 24,100, with the six- county population reaching 124,703 by 2020). Much of the incremental population growth would occur by 2010 in Campbell County, and in particular in and near Gillette.

Community population growth under the upper coal production scenario generally would mirror growth under the lower coal production scenario but with higher growth in Wright, Douglas, and Newcastle due to the effects of higher coal production, coal transportation, and power generation concentrated in the southern portion of Campbell County.

Demographic characteristics from the 2000 census reveal many similarities to the statewide population, but also many minor differences across the PRB as shown in Table 4-29.

Table 4-29. Demographic Characteristics.

Characteristic	Wyoming	Campbell County	Other PRB Counties
Median Age	36.2	32.2	37.5 – 43.0
Percent Residents < 18 Years Old	26.1	31.0	24.1 – 28.5
Average Household Size	2.48	2.73	2.31 – 2.55
Percent Minority Residents	7.9	3.9	3.0 - 5.3

Source: PRB Coal Review Task1C Report (BLM 2005b)

4.2.12.5 Housing

While the population grew by 55 percent in the 1970s, the housing stock in the study area grew by almost 78 percent. Housing growth was especially rapid during the 1970s in Campbell County, where population grew by 88 percent and the housing stock grew by 140 percent. In 2000, the housing inventory in the six-county study area was 41,203 units (Table 4-30).

Table 4-30. Total Housing Stock in 2000.

Campbell County	Converse County	Crook County	Johnson County	Sheridan County	Weston County	Six-county PRB Region
13,288	5,669	2,935	3,503	12,577	3,231	41,203

Source: U.S. Census Bureau (2001)

This expansion in housing supply, combined with the slowdown in the rate of population growth produced double-digit vacancy rates for rental housing in the late 1980s and early 1990s. At the same time, vacancy rates among ownership housing remained tight. After growth resumed in the mid-1990s, most county-level vacancy rates for ownership units were at or below the state levels in 2000. Vacancy rates for rental units declined even more sharply. By 2000, rental vacancy rates in Campbell County were below the state average and were well below the average in Johnson County and Sheridan County. Monthly costs for rental housing in the PRB, measured in the fourth quarter of 2003, generally were highest in Campbell County (Table 4-31).

Table 4-31. Monthly Housing Rents in 2003[1] in the PRB Study Area.

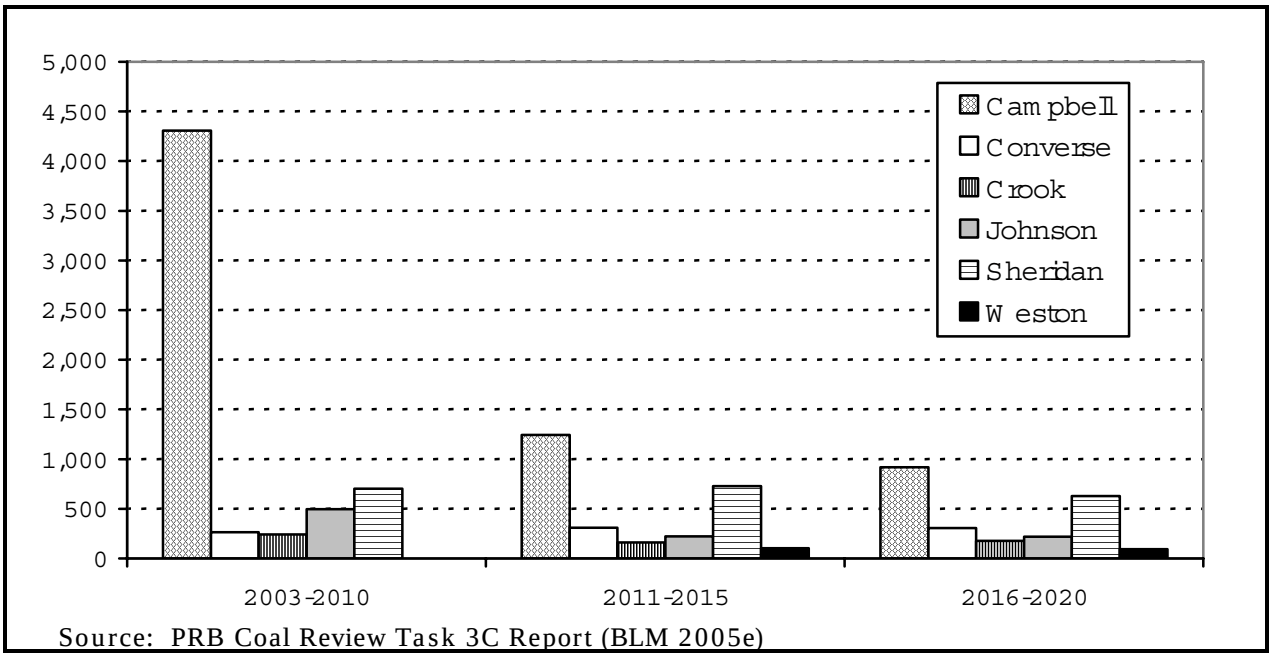
County	Apartments	Mobile Home Lots	Houses	Mobile Homes on a Lot
Campbell	$563	$228	$707	$590
Converse	$385	$150	$488	$374
Crook	$345	$120	-	-
Johnson	$443	$208	$606	$414
Sheridan	$465	$273	$667	$502
Weston	$333	$99	$380	$365
Wyoming	$466	$195	$658	$484

[1] 2003 data are for the fourth quarter.
Source: Wyoming Department of Administration and Information, Division of Economic Analysis (2004)

In 2002, the average sale price of homes in the study area varied from $70,674 in Weston County to $142,565 in Sheridan County. The average home price statewide in 2002 was $120,314. In addition to Sheridan County, Campbell ($133,482) and Johnson ($131,782) Counties also had average home sale prices above the statewide average in 2002. A combined total of 1,242 new housing units were issued permits from 1998 through 2002 in the PRB, including permits for 400 housing units in Campbell County and 509 units in Sheridan County. Although not all local governments in the study area issue permits, these data are general indicators of residential construction activity.

Temporary housing resources are available in the PRB in the form of hotel-motel rooms, private and public campgrounds, two large special event facilities, and vacant spaces in mobile home parks. In all, there are an estimated 71 lodging establishments with a total of more than 2,500 rooms. These housing resources, supplemented by pockets of persistently vacant apartments, townhouses, and mobile home spaces in Gillette and Wright, have accommodated temporary housing needs associated with natural resource and energy projects in the past.

Both projected coal development scenarios suggest a strong demand for housing across the six-county study area in the period 2003-2020. Net new housing requirements under the lower coal production scenario would include approximately 11,270 units through 2020, a 26 percent increase above the total existing inventory in 2003 (Figure 4-7). New housing requirements under the upper coal production scenario are estimated at 13,060 units, a 31 percent increase compared to the 2003 inventory and 1,790 units more than under the lower coal production scenario. From 2003 to 2010, the demand for new housing under the lower coal production scenario would concentrate in Campbell County, as approximately 60 percent of the overall demand for additional housing under either projected coal development scenario would occur in Campbell County, and approximately two-thirds of that (between 4,300 and 5,000 additional units) would be needed within the next three to five years.



Source: PRB Coal Review Task 3C Report (BLM 2005e)

Figure 4-7. Projected Housing Demand in the PRB Study Area Under the Lower Production Scenario.

A substantial portion of the near-term housing demand in Campbell County would be associated with the assumed concurrent construction of three power plants. If that occurs, one or more project sponsors may be required by the Wyoming Industrial Siting Administration to pro-actively provide housing (e.g., a construction camp for single-status workers). Such actions could temper the needs for additional housing; however, the remaining needs would nonetheless be substantial, straining public and private sector residential development capacity. Although smaller in scale than those in Campbell County, housing demands in the surrounding counties also could strain the capabilities of the residential construction sector to respond. Furthermore, residential contractors would be competing for available labor, contributing to the population growth and housing demand, and fueling increases in construction costs and housing prices.

The relative scale of the housing needs may be evaluated in comparison to past growth in the study area. One benchmark for comparison is the rapid growth that occurred in the PRB in the 1970s. During that decade, the number of housing units in the six-county study area grew by approximately 14,900 units, approximately 1,500 units per year on average compared to the 850 to 975 new units per year projected under these scenarios through 2010. The rapid pace of development in the 1970s also coincided with a period of economic expansion and strained the region's construction trade and building supplier industries. Although the underlying economies of the region are larger now, the projected needs would tax the ability of communities to respond. Signs of strain are apparent in Gillette and could surface elsewhere as relatively more housing need would arise in the remaining counties of the six-county study area during the second five-year period under the low scenario.

Projected housing demands under either scenario, although lower than what Campbell County and the region experienced in the "boom" years of the 1970s, would exert substantial pressure on housing markets, prices, and the real estate development and construction industries, all at a time when demand for labor and other resources would be high overall.

4.2.12.6 Public Education

There are 10 school districts in the six-county PRB study area, ranging in size from CCSD No. 1 with 7,368 students in the 2003 school year to SCSD No. 3 (based in Clearmont, Wyoming) with fewer than 100 students. CCSD No. 1, based in Gillette, serves the primary energy and resource development region.

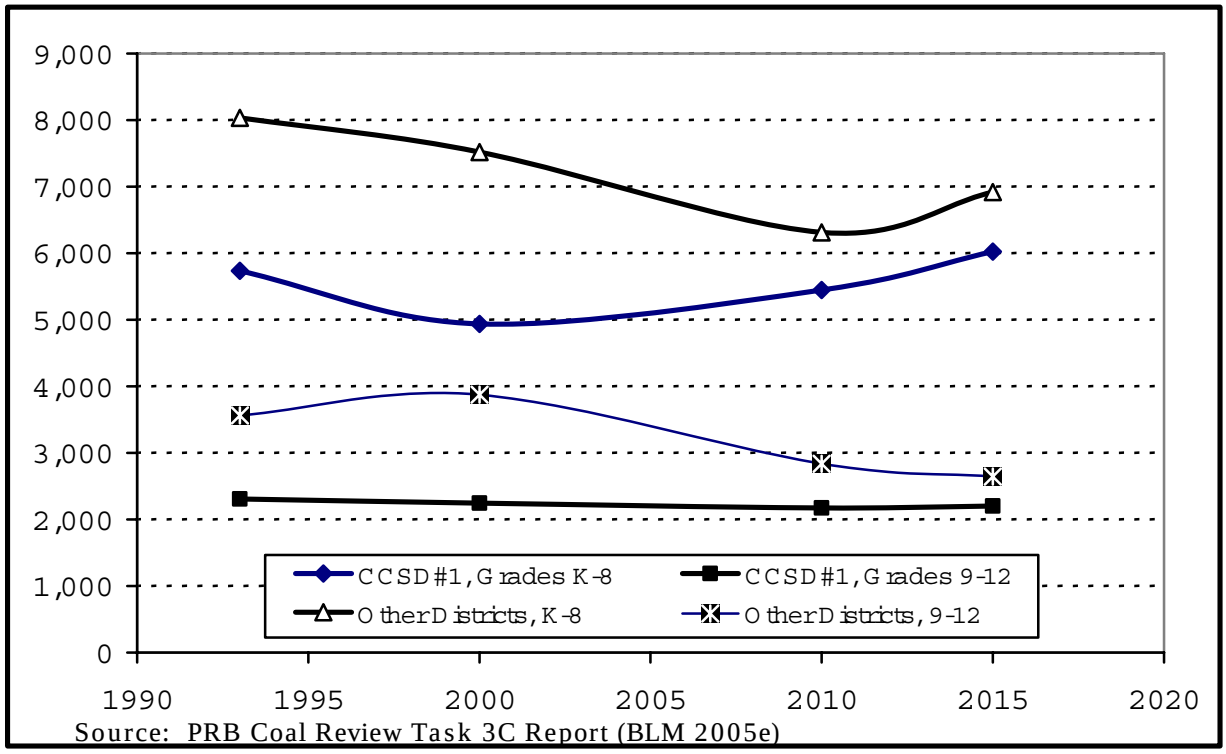
Trends in public school enrollment generally mirrored population trends during the period of rapid population growth. District-wide enrollment in Campbell County grew by more than 4,600 students (131 percent) between 1975 and 1985. Enrollment increased in all districts in Converse and Sheridan Counties as well. Enrollment in CCSD No. 1 subsequently peaked, but remained near the record high level for nearly a decade. Elsewhere in the region, enrollments generally have declined, and the combined enrollments in the study area's other districts are now below 10,000, its lowest level since 1975. Recent CBNG development has tempered, but not reversed, the trend of declining school enrollments across the region.

Communities across the PRB study area would see population growth due to economic migration from 2003 to 2020; however, the effect on public school enrollments would vary. As the demographic structure of the population changes, school districts in the PRB would be affected by new trends. In some counties, the size of that population (generally aged five to 17 years) may even trend in the opposite direction of total population in the short-term due to underlying demographics of the established resident population.

The demographic forecasts developed from the development scenarios project growth in the elementary school enrollments in Campbell County through 2010

and after 2010 for almost all PRB school districts. Projected enrollments in CCSD No. 1 would be approximately 10 percent higher by 2020 under the upper production scenario, with those in the surrounding districts only about one percent higher. However, several districts still may have enrollments in 2020 that would be below current levels, as growth from 2010 to 2020 would not offset recent declines or those projected to occur before 2010.

Under the lower coal production scenario, Campbell County would experience a substantial increase in school enrollment through 2020 (an added 1,587 students or 22 percent above recent levels). However, the impact on CCSD No. 1 would be composed of two trends, with a substantial increase in grades K-8 and small increases in grades 9-12 (Figure 4-8). School districts in the surrounding counties are projected to experience declining elementary and middle school enrollments through 2010 and declining high school enrollments through 2015. Thereafter, growth and the associated influences on demographics would generate renewed enrollment growth, particularly in the elementary grades in Johnson, Sheridan, and Converse Counties.



Source: PRB Coal Review Task 3C Report (BLM 2005e)

Figure 4-8. Projected School Enrollment Trends to 2020 Under the Lower Production Scenario.

Under either scenario, projected enrollments may cause short-term school capacity shortages, depending on the specific grade-levels and residential locations of the additional students. Under the Wyoming School Facilities Commission planning guidelines, impacted school districts generally would be asked to accommodate minor capacity shortages through the use of temporary facilities, such as portable classrooms. For larger and more long-term increases, the Commission's policy is to fund capital expansion where

warranted by projections developed during annual updates of school districts' five-year plans.

4.2.12.7 Facilities and Services

The types and levels of facilities and services provided by local governments reflect service demand, revenue availability, and community values regarding appropriate services and service levels. As with most socioeconomic characteristics, the level and availability of local government facilities and services varies by county and community across the PRB. There are literally several hundred different service providers in the region. Although all local government facilities and services are affected by energy development, the critical facilities and services include municipal water and sewer systems, law enforcement at the county level, and hospitals. A comprehensive inventory and assessment of facilities and services is beyond the scope of the PRB Coal Review socioeconomic analysis. However, an initial screening revealed no critical needs or shortfalls and indicated that most providers are engaged in an ongoing long-term process to maintain and improve facilities and services to meet community needs and to comply with various regulations and standards.

The PRB Coal Review socioeconomic analysis focuses on water supply and wastewater systems (two essential services that are costly and have the longest lead times to develop) and law enforcement, emergency response, and road maintenance (three services that typically are most affected by energy development).

Water supply and wastewater systems in all communities would have the capacity to accommodate the cumulative population growth associated with either projected coal development scenario through 2020, assuming ongoing or currently planned improvements are completed. In Gillette, there may be a timing issue with the water supply system, as completion of planned improvements in the 2005 to 2009 period would occur when substantial growth is anticipated to occur under both projected coal development scenarios. Consequently, Gillette may experience water shortages in the summer months during the 2003 to 2010 period, particularly under the upper coal development scenario.

The ability to provide desired levels of services to the anticipated energy-related population and development is less clear in Campbell County, Gillette, Wright, and outlying rural communities. Campbell County and its communities would experience a 25 percent increase in population between 2003 and 2010 under the lower coal production scenario and 30 percent under the upper coal production scenario.

Growth rates and the resultant facility and service demand in other counties within the study area would be substantially less during the 2003 to 2010 period under either scenario; all communities other than Johnson County and Buffalo would grow substantially less than 10 percent during the period. The

populations of Johnson County and Buffalo would increase 10 percent by 2010, driven primarily by CBNG development.

Growth rates and resultant increases in service demands would slow substantially during both the 2011 to 2015 and 2016 to 2020 periods under either projected coal development scenario. In most communities except Sheridan County and the city of Sheridan, there would be little difference in population growth and service demand between the two development scenarios.

4.2.12.8 Fiscal Conditions

Federal mineral royalties and state and local taxes levied on coal and other mineral production are major sources of public revenue in Wyoming. Taxes, fees, and charges levied on real estate improvements, retail trade, and other economic activity supported by energy development provide additional revenues to support public facilities and services. These revenues benefit not only those jurisdictions within which the production or activity occurs, but also the federal treasury, state coffers, school districts, and local governments across the state through revenue-sharing and intergovernmental transfer mechanisms.

Coal and other minerals produced in Wyoming, regardless of ownership, are subject to ad valorum taxation by local taxing entities and a statewide levy to support public education. Statewide ad valorum taxable valuation on coal production in 2003 was $1,760.3 million. Of that total, 91 percent was based on production in the PRB.

The total assessed valuation of Campbell County, boosted by increases in CBNG production, was $2,687 million in 2003. Valuations on aggregate mineral production accounted for 82 percent of that total. Because Campbell County has been the primary beneficiary of mineral production gains over the past three decades and the more recent gains tied to CBNG, the county's assessed valuation of $2,687 million in 2003 was nearly 35 times that of Weston County ($77.7 million) and 29 times that of Crook County ($92.1 million). The 2004 valuation of 2003 coal production in Campbell County was $1,561.2 million (Wyoming Business Council 2004).

Wyoming levies a severance tax on coal and many other minerals produced in the state. The severance tax rate, levied on the value of production, has varied from 1.0 percent to 10.5 percent over time. The rate has been 7.0 percent since 1992. Cumulative statewide severance tax proceeds total $2.22 billion since 1970. Cumulative severance tax revenues on coal produced in Campbell County total $1.42 billion. Cumulative severance tax revenues for the corresponding period total $67.4 million from Converse County, $60.5 million from Sheridan County, and $675.9 million from the remainder of the state.

Producers pay a 12.5 percent royalty to the federal treasury on the value of all surface coal production from federal leases. Half of this royalty is returned to the state. Cumulative royalty receipts on coal produced in Wyoming exceeded

$2.76 billion between 1970 and 2003. Estimated 2004 mineral royalties from federal coal in Campbell County were about $268.3 million, based on an average sale price of $6.10 per ton of coal (WSGS 2005b).

At the foundation of the mineral development revenue projections for the period 2003 to 2020 are projected levels of future energy and mineral resource production. The projected total value of annual mineral production under the lower coal production scenario will climb by $3.49 billion (2004 dollars) over 2003 levels, reaching $8.54 billion by 2020, a 69 percent increase over the current (2003) value. The aggregate value of energy and mineral resource production under the upper coal production scenario would increase to $9.21 billion in 2020. The incremental difference, compared to the value under the lower production scenario, would be $670 million per year, all of which represents the value of higher annual coal output.

Presently, the overwhelming majority of future mineral production value is anticipated to be in Campbell County. Over time, the future value of production in Sheridan and Johnson Counties would climb. Total annual mineral production value by 2020 is projected to reach $6.37 billion in Campbell County and $2.17 billion in the surrounding counties.

Between 2005 and 2020, total royalty and tax receipts derived from the key selected sources range between $21.1 and $22.6 billion for the lower and upper coal production scenarios, respectively. Receipts derived from coal production would account for the majority of the totals under either scenario, with federal mineral royalties on coal at $4.9 to $5.7 billion being the single largest source. Severance taxes, ranging from $6.3 to $6.7 billion, also would accrue to the state (Tables 4-32 and 4-33).

Table 4-32. Summary of Mineral Development Tax Revenues Associated with Energy Resource Production Under the Lower Production Scenario (million $).

Industry and Taxes	2005-2010	2011-2015	2016-2020	Total
Coal[1]	$3,164.8	$3,178.9	$3,756.3	$10,100.0
CBNG	$2,915.2	$3,076.4	$3,288.7	$9,280.3
Conventional Oil and Gas	$568.5	$576.4	$614.0	$1,759.0
Totals	**$6,648.5**	**$6,831.7**	**$7,659.0**	**$21,139.3**
Severance Tax	$1,995.9	$2,012.4	$2,249.3	$6,257.6
Federal Mineral Royalties	$2,754.1	$2,839.4	$3,166.3	$8,759.8
State Mineral Royalties	$233.5	$225.8	$251.4	$710.7
Ad Valorum Tax (Counties)	$417.6	$443.0	$502.8	$1,363.3
Ad Valorum Tax (Schools)	$1,247.5	$1,311.1	$1,489.3	$4,047.9
Totals	**$6,648.6**	**$6,831.7**	**$7,659.1**	**$21,139.3**

[1] Does not include coal lease bonus bids due to the uncertainty regarding timing.
Source: PRB Coal Review Task 3C Report (BLM 2005e)

Table 4-33. Summary of Mineral Development Tax Revenues Associated with Energy Resource Production Under the Upper Production Scenario (million $).

Industry and Taxes	2005-2010	2011-2015	2016-2020	Total[1]
Coal[1]	$3,538.0	$3,703.0	$4,350.0	$11,591.0
CBNG	$2,915.2	$3,076.4	$3,288.7	$9,280.3
Conventional Oil and Gas	$568.5	$576.4	$614.0	$1,759.0
Totals	**$7,021.7**	**$7,355.8**	**$8,252.7**	**$22,630.3**
Severance Tax	$2,104.1	$2,159.0	$2,415.4	$6,678.5
Federal Mineral Royalties	$2,946.3	$3,099.9	$3,461.4	$9,507.6
State Mineral Royalties	$233.5	$225.8	$251.4	$710.7
Ad Valorum Tax (Counties)	$435.8	$472.0	$535.0	$1,442.8
Ad Valorum Tax (Schools)	$1,302.3	$1,398.9	$1,589.8	$4,291.0
Totals	**$7,022.0**	**$7,355.6**	**$8,253.0**	**$22,630.6**

[1] Does not include coal lease bonus bids due to the uncertainty regarding timing.
Source: PRB Coal Review Task 3C Report (BLM 2005e)

The federal and state governments also would benefit from coal lease bonus bids derived from future coal leasing. Bonus bids have risen over time, with one recent bid of almost $1.00 per ton range. There is no guarantee of that trend continuing. Considerable uncertainty also exists with respect to the timing and scale of future leases, although BLM currently has pending applications for more than four billion tons of federal coal (Table 1-2). The state also receives 50 percent of the bonus bid revenue.

Taxes and mineral royalties levied on energy and mineral resource production accruing to the state are disbursed to the Permanent Water Development Trust Fund, Wyoming School Foundation and Capital Facilities funds, capital construction fund for state and local government facilities, and other programs according to a legislatively-approved formula. Through these funds, the revenues derived from resource development benefit the entire state, not just agencies, businesses, and residents of the PRB.

County governments and school districts also would realize benefits from future energy and mineral resource development in the form of additional property taxes. Such taxes, estimated on the basis of future coal, oil, and natural gas production, are estimated to range between $5.4 billion and $5.7 billion through 2020. Those sums do not include future property taxes levied on the new power plants, expanded rail facilities, or new residential and commercial development associated with future growth, or sales and use taxes levied on consumer and some industrial purchases. These latter revenues are not estimated in this study, but would be substantially lower than those on resource production.

Local governments would benefit from property taxes on new development, as well as from sales and use taxes on taxable sales within their boundaries. Such revenues are not estimated for this study due to the large number of jurisdictions and other analytical considerations.

4.2.12.9 Social Setting

The past 30 years have seen sweeping social change in the U.S. and throughout much of the world. But in addition to the broad forces that have driven social change in the U.S. as a whole, social conditions in some PRB communities have been substantially influenced by energy development. Factors that have affected social conditions in the PRB include industrial and natural resource development, economic and demographic change, housing and public infrastructure development, and institutional change at the local and state government levels.

One of the key drivers of social change in the PRB has been energy-related population growth. When the first oil boom occurred in the late 1950s, Campbell County was a relatively stable, sparsely-populated rural county. Like many places in Wyoming and throughout the rural west, Campbell County was a small, relatively homogeneous ranching community (ROMCOE 1982). The oil booms of the 1950s and 1960s brought an influx of new people. Development of coal mines, continued oil and gas drilling, and power plant construction precipitated another round of growth. In all, Campbell County population grew by almost 600 percent between 1950 and 2000.

On the one hand, this population growth, combined with a robust economy, generated a variety of positive social effects. Financial and technical resources poured into the community as it mobilized to accommodate the new population. Job opportunities were created in the construction industry, as the community responded to demands for housing, public facilities, and retail goods and services. The large and rapid influx of new residents, eager to take advantage of the employment opportunities, created energy, vitality, and sense of economic optimism about the community. Where economic advancement had been limited before the boom, there was now opportunity (Gardiner 1985).

On the other hand, it is likely that many residents had mixed feelings about these changes (Heinecke 1985). New residents brought new ideas, new ways of doing things, new preferences for goods and services, and new demands for government services. Some long-time residents, particularly those who were not directly participating in the economic benefits of energy development, viewed these changes as negative.

Today, almost any organization, committee, or government body is made up of a cross-section of energy employees, ranchers, and other community members whose tenure in the community may be long or short (Bigelow 2004, Spencer 2004). Moreover, because of the turnover in the energy companies, the community has become accustomed to newcomers.

Cumulative energy development in the PRB through the year 2020 has the potential to generate both beneficial and adverse effects on community social conditions. Social effects of development activities in the PRB would vary from county to county and community to community under the coal production

scenarios developed for this study, based on the existing social setting and the type of development that would occur.

Beneficial social effects would be associated with an expanding economy and employment opportunities associated with energy development and resulting improvements in living standards for those employed in energy-related industries. Adverse social effects could occur as a result of conflicts over land use and environmental values. Negative social effects also could occur if the pace of growth exceeds the abilities of affected communities to accommodate energy-related employees and their families with housing and community services.

In the PRB, social conditions in Campbell County, the city of Gillette, and the town of Wright are most likely to be affected because the county would host much of the cumulative energy development workforce, and the county and its municipalities would receive the largest increments in population growth. Campbell County and its municipalities have a long history of energy development, and they have developed infrastructure and management systems to plan for and manage growth; consequently, major adverse social effects would not be anticipated. However, under either coal production scenario, the county and the two municipalities may face challenges in providing adequate housing and expanding community services in anticipation of population growth through 2010, particularly if several power plant and coal mine construction projects occur simultaneously. As municipalities receive only sales and use tax revenues directly from development and purchases made within their boundaries, Gillette and Wright could face challenges in securing the necessary funding to improve municipal facilities and services. Housing shortages and limitations in public services could contribute to adverse community social effects in these communities.

Many of the people who would immigrate to Campbell County for energy-related jobs are likely to share characteristics with much of the current population; therefore, few barriers to social integration are anticipated.

Social effects on other communities in the PRB are likely to be minimal to moderate. Energy-related population growth is anticipated to be moderate in other communities. Sheridan County, also familiar with coal mining, is the only other county anticipated to host a major construction project under the development assumptions used for either projected development scenario. Converse, Weston, and Crook Counties could experience spillover growth from projects in Campbell County.

Johnson, Sheridan, and Campbell Counties could experience continued conflict over split estate and water issues associated with CBNG development, and the pace and scale of energy development across the PRB is likely to continue to generate social and political conflict over environmental issues under either coal production scenario.

5.0 CONSULTATION AND COORDINATION

In addition to this EIS[1], other factors and consultations are considered and play a major role in determining the decision on this proposed lease application. These include the following.

Regional Coal Team Consultation

The Eagle Butte West coal lease application was reviewed and discussed at public meetings held on May 30, 2002, in Casper, Wyoming and on April 27, 2005, in Gillette, Wyoming. FCW presented information about the existing Eagle Butte Mine and the pending lease application to the PRRCT at those meetings. Voting and nonvoting members of the PRRCT include the governors of Wyoming and Montana, the Northern Cheyenne Tribe, the Crow Tribal Council, the USDA-FS, OSM, USFWS, NPS, and USGS. The PRRCT determined that the lands in the application met the qualifications for processing as a production maintenance tract. The PRRCT recommended that the BLM continue to process the Eagle Butte West lease application.

Governor's Consultation

The BLM Wyoming State Director notified the Governor of Wyoming prior to the May 30, 2002 PRRCT public meeting that the Eagle Butte West lease application would be reviewed at the public meeting.

Public Notice

A notice announcing the receipt of the Eagle Butte West coal lease application was published in the *Federal Register* on March 8, 2005. This notice also announced the date, time, and place of the PRRCT meeting to be held on April 27, 2005 to discuss this application. BLM published a Notice of Intent to Prepare an Environmental Impact Statement and Notice of Scoping in the *Federal Register* on May 2, 2005. The publication served as public notice that the Eagle Butte West coal lease application had been received, announced the time and location of a public scoping meeting, and requested public comment on the lease application.

Parties on the distribution list were sent letters in April 2005 announcing the time and location of a public scoping meeting. The public scoping meeting was held on May 17, 2005 in Gillette, Wyoming. At the public meeting, the applicant orally presented information about the Eagle Butte Mine and their need for the coal. The presentation was followed by a question and answer period, during which 22 oral comments were made. The scoping period extended from May 2 through August 1, 2005, during which time BLM received comments from 16 entities.

[1] Refer to page xv for a list of abbreviations and acronyms used in this document.

The EPA published a Notice of Availability for the DEIS in the *Federal Register* on October 20, 2006. The BLM published a Notice of Availability and Notice of Public Hearing for the DEIS in the *Federal Register* on October 20, 2006. The 60-day comment period on the DEIS ended on December 19, 2006. A formal public hearing was held on November 14, 2006, at 7:00 pm at the Clarion Hotel in Gillette, Wyoming to solicit public comments on the DEIS and on the fair market value, the maximum economic recovery, and the proposed competitive sale of coal from the Eagle Butte West LBA Tract. The applicant and one member of the public made statements during the public hearing, and the BLM received eight written comments on the DEIS. The written comments are included, with agency responses, as Appendix I in this FEIS.

Parties on the distribution list will be sent copies of the FEIS when it is completed, and the EPA and BLM will publish a Notice of Availability for the FEIS. After a 30-day availability period, BLM will make a decision to hold or not to hold a competitive lease sale for the federal coal in this LBA tract and a ROD will be signed. Copies of the ROD will be mailed to parties on the mailing list and others who commented on this LBA during the NEPA process. After the ROD is signed, there will be a 30-day appeal period before the ROD is implemented.

Department of Justice Consultation

After a competitive coal lease sale, but prior to issuance of a lease, BLM will solicit the opinion of the Department of Justice on whether the planned lease issuance creates a situation inconsistent with federal anti-trust laws. The Department of Justice is allowed 30 days to make this determination. If the Department of Justice has not responded in writing within the 30 days, BLM can proceed with issuance of the lease

Other Consultations

Other federal, state, and local governmental agencies that were consulted in preparation of this EIS are listed in Table 5-1.

List of Preparers

This EIS was prepared by WWC Engineering, a third-party contractor, under the direction of the BLM. Representatives from cooperating agencies reviewed and contributed to the EIS. Tables 5-2 and 5-3 provide listings of the BLM, OSM, and WDEQ interdisciplinary team and the third-party consultant personnel who prepared and reviewed this EIS.

Distribution List

This EIS was distributed to Congressional offices, federal agencies, state governments, local governments, industry representatives, interest groups, and individuals for their review and comment (Tables 5-4a and 5-4b).

Table 5-1. Federal, State, Tribal, and Local Governmental Agencies.

Agency or Organization	Individual	Position
Powder River Regional Coal Team	5 Voting Members and 21 Nonvoting Members	
Wyoming Game and Fish Department	Lynn Jahnke	Wildlife & Fish Supervisor
	Bill Wichers	Deputy Director (DEIS)
	John Emmerich	Deputy Director (FEIS)
	Vern Stelter	Wildlife Biologist
Wyoming Department of Environmental Quality/		
Air Quality Division	Bernard Daily	Program Manager for New Source Review Program (DEIS)
	Chad Schlichtemeier	Program Manager for New Source Review Program (FEIS)
	Judy Shamley	Senior Analyst (DEIS)
		Engineering Consultant (FEIS)
		Program Manager for New Source Review Program (DEIS)
	Darla Potter	NEPA & Policy Program Supervisor (DEIS)
	Kelly Bott	NEPA & Policy Program Supervisor (FEIS)
	Cara Keslar	Monitoring Section Manager
Land Quality Division	Kurt King	Senior Analyst

Tribal Governments	
Apache Tribe of Oklahoma	Lower Brule Sioux
Cheyenne River Sioux	Northern Arapaho
Comanche Tribe	Northern Cheyenne
Crow	Oglala Sioux
Crow Creek Sioux	Rosebud Sioux
Eastern Shoshone	Santee Sioux
Flandreau Santee Sioux	Southern Cheyenne/Southern Arapahoe
Kiowa Tribe	Standing Rock Sioux

Table 5-2. List of Contributors and Reviewers.

Name	Project Responsibility
BLM Casper Field Office	
Mike Karbs	Project Supervisor
BLM Wyoming State Office	
Bob Janssen	Coal Program Coordination
Janet Kurman	NEPA Coordination
Julie Weaver	Land Adjudication
Susan Caplan	Air Quality and Climate
Rick Schuler	Water Resources
BLM Wyoming Reservoir Management Group	
Dwain McGarry	CBNG Geology
Lee Almasy	CBNG Reservoir Engineering
BLM Buffalo Field Office	
B.J. Earle	Cultural Resources
Larry Gerard	Wildlife Resources
BLM National Science and Technology Center	
Craig Nicholls	Air Quality and Climate
Paul Summers	Water Resources
Campbell County Board of Commissioners	
Marilyn Mackey	DEIS Cooperating Agency Representative
Office of Surface Mining Reclamation and Enforcement Western Region	
Floyd McMullen	DEIS Project Coordinator
Heather Erickson	FEIS Project Coordinator
Wyoming Department of Transportation	
Tim Stark, Cheyenne	Environmental Services/Cooperating Agency Representative
Mark Gillet, Sheridan	District Engineer/Cooperating Agency Representative
Wyoming State Planning Office	
Ben Brandes	DEIS Coal Issues Coordination/Cooperating Agency Representative
Steve Furtney	FEIS Coal Issues Coordination/Cooperating Agency Representative

Table 5-2. List of Contributors and Reviewers (Continued).

Name	Project Responsibility
Wyoming Department of Environmental Quality	
Kathy Muller Ogle – Land Quality Division	CHIA Program Supervisor/Cooperating Agency Representative
Darla Potter – Air Quality Division	DEIS NEPA & Policy Program Supervisor/Cooperating Agency Representative
Kelly Bott	FEIS NEPA & Policy Program Supervisor/Cooperating Agency Representative
ENSR International (Powder River Basin Coal Review)	
Valerie Randall	Project Manager
Dolora Koontz	Assistant Project Manager and Task 2 Manager (Existing Development and Reasonably Foreseeable Development)
Eldon Strid, Matt Reilly	Existing and Projected Coal Development and Coal Transportation Scenarios
Doree Dufresne	Database Development
Bruce MacDonald, PhD	Air Quality
Robert Berry, PhD	Water Resources
James Rumbaugh	Ground Water Modeling
Brad Anderson	Surface Water
Ron Dutton, George Blankenship	Socioeconomics
Bernhard Strom	Land Use, Transportation, and Utilities
William Berg	Topography, Geology, and Minerals
James Burrell, James Nyenhuis	Soils and Alluvial Valley Floors
Jon Alstad	Vegetation, Wetlands, and Grazing
Charles Johnson	Wildlife
Rollin Daggett	Fisheries
Kim Munson	Native American Concerns, and Paleontological Resources

Table 5-3. List of Preparers.

Name	Education/Experience	Responsibility
	BLM Casper Field Office	
Nancy Doelger	M.S., B.S. Geology, 31 years professional experience	EIS Project Leader/Editor
	WWC Engineering **Third-Party Contractor**	
Ken Collier	B.S. Geology, 29 years professional experience (Licensed Wyoming Geologist)	Project Management Report Preparation
John Berry	B.S. Wildlife Biology, 28 years professional experience	Report Preparation
Heidi Robinson	15 years professional experience	Document Production
Mal McGill	7 years professional experience	CADD/Figure Preparation

Subcontractors for FCW	Responsibility
Habitat Management, Inc.	Vegetation Survey T&E Vegetation Survey Preliminary Wetland Survey
Environmental Solutions, Inc.	Land Use Study
Thunderbird Wildlife Consulting, Inc.	Wildlife Survey T&E Animal Survey
James Nyenhuis	Soil Survey
McVehil-Monnett Associates, Inc.	Air Quality Assessment
ACR Consultants, Inc.	Class III Cultural Resource Survey
Planera, Inc.	Socioeconomic Study
WWC Engineering	Water Resources Study Preliminary AVF Assessment

Table 5-4a. BLM Distribution List for Coal Leasing.

Federal and State Officials

Governor of Montana
Governor of Wyoming
US Rep Barbara Cubin
US Senator John Barrasso
US Senator Mike Enzi
Wyoming Representative Timothy Hallinan
Wyoming Representative Erin Mercer
Wyoming Representative Sue Wallis
Wyoming Representative Thomas Lubnau
Wyoming Representative Dave Edwards
Wyoming Senator Jim Anderson
Wyoming Senator John Hines
Wyoming Senator Michael Von Flatern

Federal Agencies

BLM, Billings MT
BLM, Buffalo WY
BLM, Casper WY
BLM, Cheyenne WY
BLM, Miles City MT
BLM, Washington DC
Bureau of Indian Affairs, Billings MT
Bureau of Indian Affairs, Washington DC
Bureau of Reclamation, Denver CO
Department of Energy, Casper WY
Department of Energy, Washington DC
Dept. of Interior Natural Resources Library
Department of Interior, Denver CO
Devils Tower National Monument
EPA Region VIII, Denver CO
MMS, Denver CO
MMS, Herndon VA
NPS, Denver CO
NPS, Washington DC
NRCS, Douglas, WY
OSM, Casper WY
OSM, Denver CO
OSM Library, Denver CO
OSM, Washington DC
Rocky Mountain Regional Solicitor
US Air Force
US Army Corps of Engineers, Cheyenne WY
US Fish & Wildlife Service, Arlington VA
US Fish & Wildlife Service, Cheyenne WY
US Geological Survey, Cheyenne WY
US Geological Survey, Denver CO
US Geological Survey, Reston VA
USDA-FS Douglas Ranger District
USDA-FS Medicine Bow Forest, Laramie WY
USDA-FS Rocky Mountain Region, Denver CO

State Agencies

Montana Office of the Governor
WY Office of the State Treasurer
WDEQ Air Quality Division
WDEQ Land Quality Division, Cheyenne WY
WDEQ Land Quality Division, Sheridan WY
WDEQ Water Quality Division
WY Business Council/NE Region
WY Department of Education
WY Dept of Employment Research & Planning
WY Dept of Environmental Quality, Director
WY Dept of Transportation
WY Division of Economic Analysis
WY O&G Conservation Commission
WY Office of State Lands & Investments
WY Parks & Cultural Resources Dept
WY State Engineer's Office
WY State Geological Survey
WY State Historic Preservation Office
WY State Inspector of Mines
WY State Planning Office
WY Dept of Agriculture
WY Game & Fish Dept, Cheyenne WY
WY Game & Fish Dept, Sheridan WY
WY Game & Fish Dept, Lander WY
WY Industrial Siting Division
WY Water Development Commission

Local Government and Agencies

Big Horn County Commission, MT
Campbell County Conservation District, WY
Campbell County Commission, WY
Campbell County School District, WY
City of Douglas, WY
City of Gillette, WY
Converse County Commission, WY
Converse County Planning Office, WY
Converse County School District, WY
Gillette Dept of Community Development, WY
Powder River County, MT
Rosebud County Commission, MT
Town of Wright, WY
Weston County Commission, WY

Tribal Organizations and Individuals

Apache Tribe of Oklahoma
Arapahoe Business Council
Cheyenne River Sioux Tribe
Comanche Business Committee
Crow Creek Sioux Tribe
Crow Tribal Council
Flandreau Santee Sioux Tribe
Kiowa Business Committee
Lower Brule Sioux Tribal Council
Northern Cheyenne Tribal Council
Oglala Sioux Tribal Council
Rosebud Sioux Tribal Council
Cheyenne-Arapaho Tribe of Oklahoma
Santee Sioux Tribal Council
Shoshone Business Council
Standing Rock Sioux Tribal Council

Table 5-4a. BLM Distribution List for Coal Leasing (Continued).

Organizations

Advisory Council on Historic Preservation
Biodiversity Conservation Alliance
Campbell County Econ Development
CANDO
Fdn for North American Wild Sheep
Izaak Walton League of America
Medicine Wheel Coalition
National Mining Association
National Wildlife Federation
Natural Resources Defense Council
Petroleum Association of Wyoming
Powder River Basin Resource Council
Sierra Club
Thunder Basin Coalition
WY Assoc of Professional Archeologists
Wyoming Bankers Association
Wyoming Business Alliance
Wyoming Mining Association
Wyoming Outdoor Council
Wyoming Stock Growers Association
Wyoming Wildlife Federation
Wyoming Wool Growers Association

Companies/Businesses

Jacobs Ranch Coal Company
All American Equipment
American Colloid Co
Antelope Coal Company
Ark Land Company
Arnjac
Bjork Lindley Little PC
BKS Environmental
BNSF Railway Company
Bridgeview Coal Co
Buckskin Mine
Burns & McDonnell
CE&MT Inc
CH Snyder Company
CONSOL Inc Expl & Land
Cordero Rojo Mine
Decker Coal Co
Dry Fork Coal Company
Ducker Montgomery et al
Environmental Solutions Inc
EOG Resources
Evergreen Enterprises
Foster-Wheeler Environmental
Foundation Coal West Inc
Great Points Energy
Hardin & Associates
Intermountain Resources
Interwest Mining
JIREH Exploration & Consulting
Kenneth R Paulsen Consultants
Kiewit Mining Company
Kiewit Mining Group Inc
Kiewit Mining Properties Inc
KN Energy
LE Peabody & Associates
M&K Oil Company Inc
Marston & Marston
McGraw-Hill
McVehil-Monnett Assoc Inc
Meineadair Consultants
Mine Engineers Inc
Mining Associates of Wyoming
Nerco Coal Company
Norwest Mine Services
P&M Coal Mining Co
Peabody Energy
Powder River Coal Co
Powder River Energy Corp
Rio Tinto Energy America
Riverside Technology Inc
Royal Gold Inc
San Juan Coal Company
Thunder Basin Coal Co
Thunderbird-Jones & Stokes
TRC Environmental
Union Pacific Railroad
URS Greiner Woodward
US West Communications
Western Energy Company
Western Fuels Association
WWC Engineering

Press

Associated Press
Casper Star Tribune
Cheyenne-Wyoming Eagle
Douglas Budget
Gillette News-Record
Rocky Mountain Oil Journal
Western Coal Newsletter

Educational Institutions

CSU Libraries
NWU Policy Research Institute
UW Libraries

Individuals

Barbero, Ralph
Benson, Scott
Bierman, Sheldon
Cundy, Cecil
Daub, Jerry
Glustrom, Leslie
Nyenhuis, Jim
Papp, Alex
Saulcy, Bill
Williams, John
Winland, Mark

Table 5-4b. Eagle Butte Mine Distribution List for Final EIS, Eagle Butte West Coal Lease Application.

Individuals

Abbott, Susan D Kutz
Allen, Lem B and L F
Anderson, Marsha
Andresen, Roxanne
Armstrong, Kathryn
Baalman, Lynne M & Mark E
Ballard, Lexi
Barbour, Margaret L, Trustee,
Barbour, Steven R & Georgia L
Batzer, Patricia
Bender, Margaret L & Alfred J
Bergner, Elizabeth S & William S
Beulah Marylander Estate
Blum, Adam D
Boldt, Jay James
Borlz, John
Bostick, Victoria E
Brewer, Shari Ann Yates
Bricker, Mark C
Brown, Geraldine
Brown, H Kirk III
Carl, Warren L & Joanne
Carlisle, Rochelle L
Carlson, Norris A & Jane T, Trustees
Carroll, John
Carter, Wilma McGee
Chotvacs, Wade R & Margie R
Clark, Gloria L
Cole, Helen
Cole, Raymond D
Coltrane, Mary K Wagensen
Coulter, Milton L
Craig, Darrel E
Croskey, Lois J
Dabney, Eva L
Dale, George J & Dawn S
Daly, John
Davidhizar, Elizabeth A
Davis, Richard M
Davis, Robert A & Amy L
Dickerson, Lucy H
Dillinger, Lawrence & Shirley A
Drew, Jack A
Dunlap, Charles M
Dunlap, Larry E/ Virginia/ Katherine, Trustees
Edwards, Glenn Robert & Jean
Edwards, Rosemary I
Erickson, Arnold F & Dixie D
Falotico, Anne L & John
Fisher, Leslie Jan Wagensen
Foote, Alvin Dale
Franklin, Irving Lee & Walter W
Fulkerson, James T & Rachel
Fulkerson, Richard L
Fulton, William M III
Geer, Tracey Marie
Geer, Willis Blaine II
Gillett, Mark
Gilsdorf, Joseph M
Goodman, Kelli R
Grams, Allen R
Grams, Howard L
Grams, Marilyn F
Grams, Norman E
Grams, Raymond
Gray, Kenn
Gulley, Steven & Candace
Guthrie, Michael T & Gillette Ptnrship
Haines, Thomas D and Joyce M
Hanslip, Richard
Hanson, Bert C & Betty
Hanson, Bert, Trustee
Hanson, Daniel P & Kathleen M
Hardy, Dorothy D
Hart, Sharlene K
Helsper, Kathleen M
Hewit, Betty R
Hladky, Delano B & Margaret A
Hladky, Robert G & Shirley
Hoffman, Stan
Hogue, Barbara & Charles, Co-Trustees
Hottell, Skeeter
Hoy, Philip L
Hurm, Dennis D
Hutchinson, Wendy
Ilsley, John P and Helen L
Isenberger, Peg
Jevas, Mary M
Johnson, Edith B, Trustee
Jones, Richard A
Jones, Terry
Jordan, Christine S
Jundt, Josh
Kauvar, A J
Keck, Mary V & Cletus J
Kehr, Tom
Kirlough, Marcia A & Thomas A
Klein, Blair, Trustee
Kline, Robert E & Heather
Kutz, Albert G
Kutz, Robert M
Lasley, Catherine H & James M
Lawson, Wayne H & Deanette A
Lynch, Edward P
Lynde, Judy K
Maki, Rodney & Alberta
Marshall, Daniel L
Marshall, Debra S
Marshall, Joseph L & Betty M
Martin, Francis S Waslee

Table 5-4b. Eagle Butte Mine Distribution List for Final EIS, Eagle Butte West Coal Lease Application (Continued).

McGee, Carl & Ola Birdsong
McGee, John E
Merritt, Gloria
Michelena, Marilyn K & Santiago N
Middleswart, Freda M & Milton
Miller, Charles H
Miller, Douglas D, et al.
Miller, Duane R
Miller, Faustine
Miller, Herbert D & Danene R
Miller, Kenneth
Miller, Kenneth L & Kelli M
Miller, Mary, Trustee
Miller, Mike W
Mills, Don & Jasmine
Mines, David L
Morgan, Jack B, Augusta, & Thomas K
Morrissey, Marge
Morrow, Margaret L & Robert E
Nanneman, Gayle & Ginny
Nanneman, Virginia
Nichols, Anita Mae
Nichols, Leonard
Nichols, Leonard L & Nattie Mae
Nickerson, Albert A., Jr.
O'Loughlin, Christopher M
O'Brien, William E
Ochs, Anne
Oedekoven, Edna F
Oksanen Karla J
Oswald, Louis A III, Trustee
Page, Betty J & Charles
Patenaude, Jeanelle F
Pearson, Robert L
Persson, Marguerite
Podenski, Raymond & Shirley
Puckett, Debbie Elder
Reeves, Antoinette R
Rehbein, Kevin M & Shelly R
Richards, William B & Karen S
Ritter, Donald A & Eva N
Roe, Douglas R & Carol M
Rolando, Linda K
Rosenberry, Ann M
Rourke, Paul
Sachau, B
Scheeler, James R & Anita R
Schlenker, Kenneth A
Schlidt, Grant G & Shiloh D
Scott, Walter & Brownie, Co-Trustees
Smith, Jessica
Smith, Raymond M, Trustee
Stech, Margaret S
Sterck, Elizabeth
Stone, Randy
Stroup, Nancy R
Sullivan, LaMoine C & James F
Swearngin, Virginia N
Taylor, William R & Elaine S
Thrall, Mark
Tolar, Jack L and Ada R
Van Sant, Alta Mae W
VanDegrift, L E
Vandekoppel, Clarabel
Vincent, Jeannie J
Vines, W H
Voight, Anne
Wakefield, W W
Wall, Ray Lee
Ward, Linda G
Watts, Gerald & Wendy
Weakly, Alan
Weber, Jeffrey L
Whitacre, Bette E & Robert W, Trustees
Wright, Ty C & Gwen H
Yates, Scott Martin
Youngberg, Randall M
Zarlengo, Richard A & Vincent A

Agencies/Businesses/Organizations

Anderman Oils Wyoming, et al.
Anderson Minerals Ltd
Apache Corp
AVTAX Inc
Babit Limited Partnership
Banque Paribas
Basic Earth Science Systems Inc
Belle Fourche Pipeline Co
Blakeman Propane, Inc
BP Amoco
Campbell County Airport Board
Gillette-Campbell County Airport
Citation 1994 Investment Ltd Partnership
Collister Co
Conley P Smith Operating Co
ConocoPhillips
Continental Industries LLC
Continental Oil Co
Countrywide Home Loans Inc
Devon Energy Corp (Nevada)
EDP Operating Ltd
Energy Development Partners Ltd
Eureka Oil Co
Express Acquisition Co
Fancher Resources LLC
Federal Aviation Administration
First Interstate Bank of Commerce Trust Dept
First National Bank of Gillette
Fuller 1999 Family Partnership Ltd
Garland Brothers
Gene F Lang & Co
Glacier Park Co.
Guanxi LLC

Table 5-4b. Eagle Butte Mine Distribution List for Final EIS, Eagle Butte West Coal Lease Application (Continued).

Habitat Management Inc
Headington Oil Co LP
High Plains Associates Inc.
Hi-Pro Production LLC
Jim's Water Service Inc
K P Kauffman Co Inc
Karlton Terry Oil Co
Kerr McGee Corp
Key Production Co Inc
Koch Exploration
KPK Inc
Lance Oil & Gas Co Inc
Lario Oil & Gas Co
Madison Co
Marlin Oil Co LLC
Marquiss Minerals Inc
MidCon Exploration Co-Exeter
MIGC Inc/MGTC Inc
Miller Properties LLC
Nationsbanc Leasing Corp of North Carolina
NLB Minerals LLC
Norwest Bank Colorado N.A.
P&L Receivables Co LLC
PAMCO Investments Corp
PD Inc
Peabody Coal Co
Presidio of San Francisco
Puma Petroleum Co
R & E Thompson & Co
Ranchers Energy Corp
Samedan Oil Corp
Sharbro Oil Ltd Co
Shell Mining Co
Southwest Bank of Texas NA
St. Mary Land & Exploration Co
St. Paul Bank for Cooperatives
Star Acquisition III LLC
Star Investment Corp
TEAI Oil & Gas Co
The Daube Co
Tongue River Royalties
Twenty Mile Land Co
U S West Communications Inc
UBS AG Stamford Branch
Veterans Administration
WDEQ, Air Quality Division, Sheridan
Wenron Inc
Western Co of North America
Western Fuels
Westport Oil & Gas Co LP
Wrangler Estates Inc

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7.0 GLOSSARY

aboriginal - Related to early or primitive cultures in a region.

ad valorem tax - A tax paid as a percentage of the assessed value of property.

adverse impact - An apparent direct or indirect detrimental effect.

aliquot - An exact portion.

alkalinity - The degree to which the pH of a substance is greater than 7.

alluvial deposit - Deposits of clay, silt, sand, gravel, and/or other materials carried by moving surface water, such as streams, and deposited at points of weak water flow; alluvium.

alluvial valley floor (AVF) - An area of unconsolidated stream-laid deposits holding streams with water availability sufficient for subirrigation or flood irrigation agricultural activities (see 30 CFR 701.5).

alluvium - Sorted or semi-sorted sediment consisting of clay, silt, sand, gravel, or other unconsolidated rock material deposited in comparatively recent geologic time by a stream or other body of running water in the bed of that stream or on its flood plain or delta.

alternative - In terms of the National Environmental Policy Act, one of several substitute or alternate proposals that a federal agency is considering in an environmental analysis.

ambient - Surrounding conditions (or environment) in a given place and time.

annual precipitation - The quantity of water that falls yearly in the form of rain, hail, sleet, and snow.

approximate original contour - Post-mining surface configuration achieved by backfilling and grading of mined-out areas so that the reclaimed land surface resembles the general surface configuration of the land prior to mining (see 30 CFR 701.5).

aquatic - Living or growing in or on the water.

aquifer - A layer of permeable rock, sand, or gravel that stores and transmits water in sufficient quantities for a specific use.

aquitard - A confining bed that retards but does not totally prevent the flow of water to or from an adjacent aquifer; a leaky confining bed.

area source – A plant site that does not emit any single HAP at a rate of 10 tons or greater per year, or any combination of HAPs at a rate of 25 tons or greater per year.

arithmetic mean - The sum of the values of n numbers divided by n. It is usually referred to as simply the "mean" or "average".

ash - The residual non-combustible matter in coal that comes from included silt, clay, silica, or other substances. The lower the ash content, the better the quality of the coal.

avian - Of, relating to, or derived from birds.

backfill - The operation of refilling an excavation. Also, the material placed in an excavation when it is refilled.

baseline - Conditions, including trends, existing in the human environment before a proposed action is begun; a benchmark state from which the environmental consequences of an action are forecast; the no-action alternative.

beneficial impact - An apparent direct or indirect advantageous effect.

bentonite - A clay formed by the decomposition of volcanic ash which has the ability to absorb large amounts of water and to expand to several times its normal volume; used in adhesives, cements and ceramic fillers.

bonus - That value in excess of the rentals and royalties that is paid to the United States as part of the consideration for receiving a lease for publicly owned minerals [see 43 CFR 3400.0-5(c)].

braided stream - A stream flowing in several dividing and reuniting channels resembling the strands of a braid.

buffer zone - An area between two different land uses that is intended to resist, absorb, or otherwise preclude development or intrusion between the two use areas.

bypass coal - An isolated part of a coal deposit that is not leased and that can only be economically mined in an environmentally sound manner as a part of continued mining by an existing adjacent operation [see 43 CFR 3400.0.5(d)].

clinker (scoria) - Baked and fused rock resulting from in-place burning of coal deposits.

coal bed natural gas (CBNG) - Natural gas (methane) that is generated during the coal-forming process.

colluvium - Rock fragments, sand, or soil material that accumulates at the base of slopes; slope wash.

confluence - The point at which two or more streams meet.

conglomerate - A rock that contains rounded rock fragments or pebbles cemented together by another mineral substance.

contiguous - Lands or legal subdivisions having a common boundary, lands having only a common corner are not contiguous.

cooperating agency - An agency which has jurisdiction by law in an action being analyzed in an environmental document and who is requested to participate in the NEPA process by the agency that is responsible for preparing the environmental document [see 40 CFR 1501.6 and 1508.5].

crucial wildlife habitat - Parts of the habitat necessary to sustain a wildlife population during periods of their life cycle. It may be a limiting factor on the population, such as nesting habitat or winter habitat.

cultural resources - The remains of human activity, occupation, or endeavor reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that reveal the nature of historic and prehistoric human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred, and (3) the environment immediately surrounding the resource.

cumulative impact - The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

decibel - A unit of sound measurement. In general, a sound doubles in loudness for every increase of 10 decibels.

deciview (dv) - A general measure of view impairment (13 deciview equals a view of approximately 60 miles) caused by pollution. A 10 percent change in extinction corresponds to 1.0 dv.

dip - The angle at which a rock layer is inclined from the horizontal.

direct (or primary) impact - An impact caused by an action that occurs at the same time and place as the action (see 40 CFR 1508.8).

discharge - Any of the ways that ground water comes out of the surface, including through springs, creeks, or being pumped from a well.

dissected upland - An upland or high area in which a large part of the original surface has been deeply cut into by streams.

dragline - A type of excavating crane that casts a rope- or cable-hung bucket a considerable distance, collects the dug material by pulling the bucket toward itself on the ground with a second rope or cable, elevates the bucket, and dumps the material on a backfill bank or pile.

eolian deposit - Sediment carried, formed, or deposited by the wind, as sand dunes.

ephemeral stream - A stream that flows occasionally because of surface runoff, and is not influenced by permanent ground water.

erosion - The wearing away of the land surface by running water, wind, ice or other geologic agents.

evapotranspiration - The sum total of water lost from the land by evaporation and plant transpiration.

excavation (archeological) - The scientifically controlled recovery of subsurface materials and information from a cultural site. Recovery techniques are relevant to research problems and are designed to produce maximum knowledge about the site's use, its relation to other sites and the natural environment, and its significance in the maintenance of the cultural system.

fair market value - The amount in cash, or in terms reasonably equivalent to cash, for which in all probability a coal deposit would be sold or leased by a knowledgeable owner willing but not obligated to sell or lease to a knowledgeable purchaser who desires but is not obligated to buy or lease.

fixed carbon - In coal, the solid combustible material remaining after removal of moisture, ash, and volatile matter. It is expressed as a percentage.

floodplain - The relatively flat area or lowland adjoining a body of flowing water, such as a river or stream, that is covered with water when the river or stream overflows its banks.

forage - Vegetation used for food by wildlife, particularly big game wildlife, and domestic livestock.

formation (geologic) - A rock body distinguishable from other rock bodies and useful for mapping or description. Formations may be combined into groups or subdivided into members.

fossil - The remains or traces of an organism or assemblage of organisms that have been preserved by natural processes in the earth's crust. Many minerals

that may be of biologic origin are not considered to be fossils (e.g. oil, gas, asphalt, limestone).

geometric mean - The nth root of the product of the values of n positive numbers.

ground water - Subsurface water that fills available openings in rock or soil materials to the extent that they are considered water saturated.

habitat - A place where a plant or animal naturally or normally lives and grows.

habituation - The process of becoming accustomed to, or used to, something; acclimation.

hazardous materials - Substance which, because of its potential for corrosivity, toxicity, ignitability, chemical reactivity, or explosiveness, may cause injury to persons or damage to property.

hazardous waste - Those materials defined in Section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, and listed in 40 CFR § 261.

heterogenous - Made up of dissimilar constituents.

human environment - The natural and physical environment and the relationship of people with that environment (see 30 CFR 1508.14).

hydraulic conductivity - The capacity of a medium to transmit water; permeability coefficient. Expressed as the volume of water at the prevailing temperature that will move in unit time under a unit hydraulic gradient through a unit area. Units include gallons per day per square foot, centimeters per second.

hydraulic - Pertaining to fluid in motion, or to movement or action caused by water.

hydric soil - A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic (water-loving) vegetation. Hydric soils that occur in areas having positive indicators of hydrophytic vegetation and wetland hydrology are wetland soils.

hydrocarbon - Any organic compound, gaseous, liquid, or solid, consisting solely of carbon and hydrogen.

hydrogeology - The science that deals with subsurface waters and with related geologic aspects of surface waters.

hydrology - The science dealing with the behavior of water as it occurs in the atmosphere, on the surface of the ground, and underground.

hydrophytic vegetation - The plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. When hydrophytic vegetation comprises a community where indicators of hydric soils and wetland hydrology also occur, the area has wetland vegetation.

impermeable - Not capable of transmitting fluids or gasses in appreciable quantities.

incised - Having a margin that is deeply and sharply notched.

indirect (or secondary) impact - A reasonably foreseeable impact resulting from an action but occurring later in time than or removed in distance from that action (see 40 CFR 1508.8).

in-place coal reserves - The estimated volume of all of the coal reserves in a lease without considering economic or technological factors that might restrict mining.

in-situ leach mining - Removal of the valuable components of a mineral deposit through chemical leaching without physical extraction of the rock.

interbedded - Layers of one type of rock, typically thin, that are laid between or that alternate with layers of another type of rock.

interburden - A layer of sedimentary rock that separates two mineable coal beds.

interdisciplinary - Characterized by participation or cooperation among two or more disciplines or fields of study.

intermittent stream - A stream that does not flow year-round but has some association with ground water for surface or subsurface flow.

laminated - Consolidated or unconsolidated sediment that is characterized by thin (less than 1 cm thick) layers.

land and resource management plan (LRMP) - A land use plan that directs the use and allocation of U.S. Forest Service lands and resources.

lead agency - The agency or agencies preparing or having taken primary responsibility for preparing an environmental document (see 40 CFR 1508.16).

lease (mineral) - A legal document executed between a mineral owner or lessor and another party or lessee which grants the lessee the right to extract

minerals from the tract of land for which the lease has been obtained [see 43 CFR 3400.0-5(r)].

lek - A traditional breeding area for grouse species where territorial males display and establish dominance.

lenticular - Term describing a body of rock or earth that thins out in all directions from the center like a double convex optical lens.

limb (geologic) - One side of a fold (syncline or anticline).

limestone - A sedimentary rock consisting chiefly of calcium carbonate.

lineament - A linear topographic feature of regional extent that is believed to reflect crustal structure.

loadout facilities - The mine facilities used to load the mined coal for transport out of the mine.

loam - A rich, permeable soil composed of a mixture of clay, silt, sand, and organic matter.

maintenance tract - A federal coal tract that would continue or extend the life of an existing coal mine.

major federal action - An action with effects that may be major and which is potentially subject to federal control and responsibility (see 40 CFR 1508.18).

major sources – Those sources that emit more than 10 tons per year of any single hazardous air pollutant, or 25 tons of all hazardous air pollutants combined. The determination of major is based on all sources of hazardous air pollutants at the site, and not just the equipment affected by the MACT standard.

maximum economic recovery (MER) - The requirement that, based on standard industry operating practices, all profitable portions of a leased federal coal deposit must be mined. MER determinations will consider existing proven technology; commercially available and economically feasible equipment; coal quality, quantity, and marketability; safety, exploration, operating, processing, and transportation costs; and compliance with applicable laws and regulations [see 43 CFR 3480.0-5(a)(24)].

meteorological - Related to the science dealing with the atmosphere and its phenomena, especially as relating to weather.

methane - A colorless, odorless, and inflammable gas; the simplest hydrocarbon; chemical formula = CH_4. It is the principal constituent of natural gas and is also found associated with crude oil and coal.

mineable coal - Coal that can be economically mined using present day mining technology.

mineral rights - The rights of one who owns the mineral estate (subsurface).

mining permit - A permit to conduct surface coal mining and reclamation operations issued by the state regulatory authority pursuant to a state program or by the Secretary pursuant to a federal program (see 30 CFR 701.5).

mitigation - An action to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

mudstone - A hardened sedimentary rock consisting of clay. It is similar to shale but lacks distinct layers.

National Register of Historic Places (NRHP) - A list of districts, sites, buildings, structures and objects significant in American history, architecture, archeology and culture maintained by the Secretary of the Interior. Expanded as authorized by Section 2(b) of the Historic Sites Act of 1935 (16 U.S.C. 462) and Section 101(a)(1) (A) of the National Historic Preservation Act.

natural gas - Combustible gases (such as hydrocarbons) or mixtures of combustible gases and non-combustible gases (such as helium) that are in a gaseous phase at atmospheric conditions of temperature and pressure.

NEPA process - All measures necessary for compliance with the National Environmental Policy Act of 1969 (see 40 CFR 1508.21).

No Action Alternative - An alternative where no activity would occur. The development of a no action alternative is required by regulations implementing the National Environmental Policy Act (40 CFR 1502.14). The No Action Alternative provides a baseline for estimating the effects of other alternatives.

outcrop - A rock formation that appears at or near the surface; the intersection of a rock formation with the surface.

overburden - Material of any nature, consolidated or unconsolidated, that overlies a coal or other useful mineral deposit, excluding topsoil.

paleontological resource - A site containing evidence of plant or non-human animal life of past geological periods, usually in the form of fossil remains.

peak discharge or flow - The highest discharge of water recorded over a specified period of time at a given stream location; also called maximum flow. Often thought of in terms of spring snowmelt, summer, fall or winter rainy season flows.

perennial species (vegetation) - Vegetation that lives over from season to season.

perennial stream - A stream or part of a stream that flows continuously during the calendar year as a result of groundwater discharge or surface runoff.

permeability - The ability of rock or soil to transmit a fluid.

permit application package - A proposal to conduct surface coal mining and reclamation operations on federal lands, including an application for a permit, permit revision, or permit renewal and all the information required by SMCRA, the applicable state program, any applicable cooperative agreement, and all other applicable laws and regulations including, with respect to federal leased coal, the Mineral Leasing Act and its implementing regulations.

permit area - The area of land, indicated on the approved map submitted by the operator with his or her application, required to be covered by the operator's performance bond under the regulations at 30 CFR Part 800 and which shall include the area of land upon which the operator proposes to conduct surface coal mining and reclamation operations under the permit, including all disturbed areas (see 30 CFR 701.5).

physiography - Physical geography.

piezometer - A well, generally of small diameter, that is used to measure the elevation of the water table.

playa - The sandy, salty, or mud-caked flat floor of a basin with interior drainage, usually occupied by a shallow ephemeral lake during or after rain or snow storms.

point source (pollution) - A point at which pollution is added to a system, either instantaneously or continuously. An example is a smokestack.

pore volume - The amount of fluid necessary to fill the void space in an unsaturated porus medium (i.e., mine backfill).

porosity - The percentage of the bulk volume of rock, sediment or soil that is not occupied by sediment or soil particles; the void space in rock or sediment. It may be isolated or connected.

postmining topography - The relief and contour of the land that remains after mining has been completed.

potentiometric surface - The surface that coincides with the static level of water in an aquifer. The surface is represented by the levels to which water from a given aquifer will rise under its full hydraulic head.

predator - An animal that obtains food by killing and consuming other animals.

prime or unique farmland - Those lands which are defined by the Secretary of Agriculture in 7 CFR part 657 (*Federal Register* Vol. 4 No. 21) and which have historically been used for cropland (see 30 CFR 701.5).

proposed action - In terms of National Environmental Policy Act, the project, activity, or action that a federal agency proposes to implement or undertake and which is the subject of an environmental analysis.

qualified surface owner - The natural person or persons (or corporation, the majority stock of which is held by a person or persons otherwise meeting the requirements of this section) who:

(1) hold legal or equitable title to the surface of split estate lands;

(2) have their principal place of residence on the land, or personally conduct farming or ranching operations upon a farm or ranch unit to be affected by surface mining operations; or received directly a significant portion of their income, if any, from such farming and ranching operations; and

(3) have met the conditions of (1) and (2) above for a period of at least three years, except for persons who gave written consent less than three years after they met the requirements of both (1) and (2) above [see 43 CFR 3400.0-5(gg)].

raptor - Bird of prey, such as an eagle, falcon, hawk, owl, or vulture.

recharge - The processes by which groundwater is absorbed into a zone of saturation.

reclamation - Rehabilitation of a disturbed area to make it acceptable for designated uses. This normally involves regrading, replacement of topsoil, revegetation and other work necessary to restore the disturbed area for post-mining use.

record of decision (ROD) - A document separate from, but associated with, an environmental impact statement that publicly and officially discloses the responsible official's decision on the proposed action (see 40 CFR 1505.2).

recoverable coal - The amount of coal that can actually be recovered for sale from the demonstrated coal reserve base.

rental payment - Annual payment from a lessee to a lessor to maintain the lessee's mineral lease rights.

resource management plan (RMP) - A land use plan, as prescribed by FLPMA, that directs the use and allocation of public lands and resources managed by BLM. Prior to selection of the RMP, different alternative management plans are

compared and evaluated in an environmental impact statement (EIS) to determine which plan will best direct the management of the public lands and resources.

revegetation - The reestablishment and development of self-sustaining plant cover following land disturbance. This may occur through natural processes, or the natural processes may be enhanced by human assistance through seedbed preparation, reseeding, and mulching.

right of way (ROW) - The right to pass over property owned by another. The strip of land over which facilities such as roadways, railroads, or power lines are built.

riparian - The area adjacent to rivers and streams that lies between the stream channel and upland terrain and that supports specific vegetation influenced by perennial and/or intermittent water.

royalty (mineral) - A share of production that is free of the expense of production. It is generally paid by a lessee to a lessor of a mineral lease as part of the terms of the lease.

runoff - That portion of rainfall that is not absorbed; it may be used by vegetation, lost by evaporation, or it may find its way into streams as surface flow.

salinity - Refers to the solids, such as sodium chloride (table salt) and alkali metals, that are dissolved in water. Often in non-saltwater areas, total dissolved solids is used as an equivalent term.

sandstone - A common sedimentary rock primarily composed of sand grains, mainly quartz, that are cemented together by other mineral material.

scoping - A public informational process required by the National Environmental Policy Act to determine private and public concerns, scope of issues, and/or questions regarding a proposed action to be evaluated in an environmental impact analysis.

scoria (clinker) - Baked and fused rock resulting from in-place burning of coal deposits.

sedimentation pond - An impoundment used to remove solids from water in order to meet water quality standards or effluent limitations before the water leaves the permit area (see 30 CFR 701.5).

semi-arid - A climate or region characterized by little yearly rainfall and by the growth of a number of short grasses and shrubs.

severance tax - A tax on the removal of minerals from the ground.

shale - A very fine-grained clastic rock or sediment consisting predominately of clay-sized particles that is laminated; lithified, layered mud.

significant impact - A qualitative term used to describe the anticipated importance of impacts to the human environment as a result of an action.

siltstone - A fine-grained clastic rock consisting predominately of silt-sized particles.

socioeconomics - The social and economic situation that might be affected by a proposed action.

soil survey - The systematic examination, description, classification, and mapping of soils in an area, usually a county. Soil surveys are classified according to the level of detail of field examination. Order I is the most detailed and Order V is the least detailed.

spontaneous combustion - The heating and slow combustion of coal and coaly material initiated by the absorption of oxygen.

stipulations - Requirements that are part of the terms of a mineral lease. Some stipulations are standard on all Federal leases. Other stipulations may be applied to specific leases at the discretion of the surface management agency to protect valuable surface resources or uses existing on those leases.

storage coefficient - The volume of water that can be released from storage per unit surface area of a saturated confined aquifer, per unit decline in the component of hydraulic head normal to the surface. It is calculated by taking the product of the specific storage and the aquifer thickness.

stratigraphic - Of, relating to, or determined by stratigraphy, which is the branch of geology dealing with the study of the nature, distribution, and relations of layered rocks in the earth's crust.

stripping ratio - The unit amount of overburden that must be removed to gain access to a similar unit amount of coal.

subirrigation - In alluvial valley floors, the supplying of water to plants from underneath, or from a semi-saturated or saturated subsurface zone where water is available for use by vegetation (see 30 CFR 701.5).

subbituminous - A lower rank of coal (35-45 percent carbon) with a heating value between that of bituminous and lignite, usually 8,300-11,500 Btu per pound. Subbituminous coal contains a high percentage of volatile matter and moisture.

surface disturbance - Any disturbance by mechanical actions that alters the soil surface.

surface rights - Rights to the surface of the land, does not include rights to oil, gas, or other subsurface minerals or subsurface rights.

suspended solids - The very fine soil particles that remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom.

tectonic fracture - Fractures caused by deformation of the earth's crust.

threatened and endangered (T&E) species - These species of plants or animals classified as threatened or endangered pursuant to Section 4 of the Endangered Species Act. Any species which is in danger of extinction, or is likely to become so within the foreseeable future.

> ***Category 1*** - Substantial biological information on file to support the appropriateness of proposing to list as endangered or threatened.
>
> ***Category 2*** - Current information indicates that proposing to list as endangered or threatened is possibly appropriate, but substantial biological information is not on file to support an immediate ruling (U.S. Fish and Wildlife Service).

topography - Physical shape of the ground surface; the configuration of land surface including its relief, elevation, and the position of its natural and manmade features.

topsoil - The surface layer of a soil.

total dissolved solids (TDS) - The total quantity in milligrams per liter of dissolved materials in water.

transmissivity - The rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient. Equals the hydraulic conductivity multiplied by the aquifer thickness. Values are given in units of gallons per day per foot.

transpiration - The discharge of water vapor by plants.

truck & shovel - A mining method used to remove overburden and coal in a strip mining operation. Truck and shovel operations use large bucket-equipped digging and loading machines (shovels) and large dump trucks to remove overburden instead of using a dragline for overburden removal.

typic - Typical.

unconfined aquifer - An aquifer where the water table is exposed to the atmosphere through openings in the overlying materials.

unsuitability criteria - The 20 criteria described in 43 CFR 3461, the application of which results in an assessment of federal coal lands as suitable or unsuitable for surface coal mining.

uranium - A very hard, heavy, metallic element that is crucial to development of atomic energy.

vegetation type - A kind of existing plant community with distinguishable characteristics described in terms of the present vegetation that dominates an area.

vertebrate fossils - The remains of animals that possessed a backbone; examples are fish, amphibians, reptiles, dinosaurs, birds, and mammals.

vesicular - Rock containing many small cavities that were formed by the expansion of a bubble of gas or steam during the solidification of the rock.

visual resources - The physical features of a landscape that can be seen (e.g., land, water, vegetation, structures, and other features).

Visual Resource Management (VRM) - The systematic means to identify visual values, establish objectives which provide the standards for managing those values, and evaluate the visual impacts of proposed projects to ensure that objectives are met.

volatile matter - In coal, those substances, other than moisture, that are given off as gas or vapor during combustion.

waterfowl - A bird that frequents water, especially a swimming bird.

wetlands - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient, under normal circumstances, to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands include marshes, bogs, sloughs, potholes, river overflows, mud flats, wet meadows, seeps, and springs [see 33 CFR 328.3(a)(7)(b)].

wild and scenic river - Rivers or sections of rivers designated by Congressional actions under the 1968 Wild and Scenic Rivers Act as wild, scenic, or recreational by an act of the Legislature of the state or states through which they flow. Wild and scenic rivers may be classified and administered under one or more of the following categories:

> **wild river areas** - Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
>
> **scenic river areas** - Rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines

largely undeveloped, but accessible in places by roads.

recreational river areas - Rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

wilderness - An area of undeveloped Federal land designated wilderness by Congress, retaining its primeval character and influence, without permanent improvements or human habitation, protected and managed to preserve its natural conditions and that (1) generally appears to have been affected primarily by the forces of nature with the imprint of man's work substantially unnoticeable, (2) has outstanding opportunities for solitude or primitive and unconfined recreation, (3) has at least 5,000 acres or is of sufficient size to make practical its preservation and use in an unimpaired condition, and (4) also may contain features that are of ecological, geological, scientific, educational, scenic, or historical value. These characteristics were identified by Congress in the Wilderness Act of 1964.

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APPENDIX A

FEDERAL AND STATE AGENCIES AND PERMITTING REQUIREMENTS

APPENDIX A: FEDERAL AND STATE AGENCIES & PERMITTING REQUIREMENTS	
Agency	**Lease/Permit/Action**
FEDERAL	
Bureau of Land Management	Coal Lease Resource Recovery & Protection Plan Scoria Sales Contract Exploration Drilling Permit
Office of Surface Mining Reclamation and Enforcement	Preparation of MLA Mining Plan Approval Document SMCRA Oversight
Office of the Secretary of the Interior	Approval of MLA Mining Plan
Mine Safety and Health Administration	Safety Permit and Legal ID Ground Control Plan Major Impoundments Explosives Use and Storage Permit
Bureau of Alcohol, Tobacco, and Firearms	Explosive's Manufacturer's License Explosives Use and Storage Permit
Federal Communication Commission	Radio Permit: Ambulance Mobile Relay System Radio License
Nuclear Regulatory Commission	Radioactive By-Products Material License
Army Corps of Engineers	Authorization of Impacts to Wetlands and Other Waters of the U.S.
Department of Transportation	Hazardous Waste Shipment Notification
Federal Aviation Administration	Radio Tower Permits
STATE	
State Land Commission	Coal Lease Scoria Lease
Department of Environmental Quality-Land Quality Division	Permit and License to Mine
Department of Environmental Quality-Air Quality Division	Air Quality Permit to Operate Air Quality Permit to Construct Air Quality Permit to Modify
Department of Environmental Quality-Water Quality Division	National Pollutant Discharge Elimination System Water Discharge Permit Permit to Construct Sedimentation Pond Authorization to Construct Septic Tank & Leach Field Authorization to Construct and Install a Public Water Supply and Sewage Treatment System
Department of Environmental Quality-Solid Waste Management Program	Solid Waste Disposal Permit-Permanent and Construction
State Engineer's Office	Appropriation of Surface Water Permits Appropriation of Ground Water Permits
Industrial Siting Council	Industrial Siting Certificate of Non-Jurisdiction
Department of Health	Radioactive Material Certificate of Registration

APPENDIX B

UNSUITABILITY CRITERIA
FOR THE EAGLE BUTTE WEST LBA TRACT

APPENDIX B. UNSUITABILITY CRITERIA FOR THE EAGLE BUTTE WEST LBA TRACT

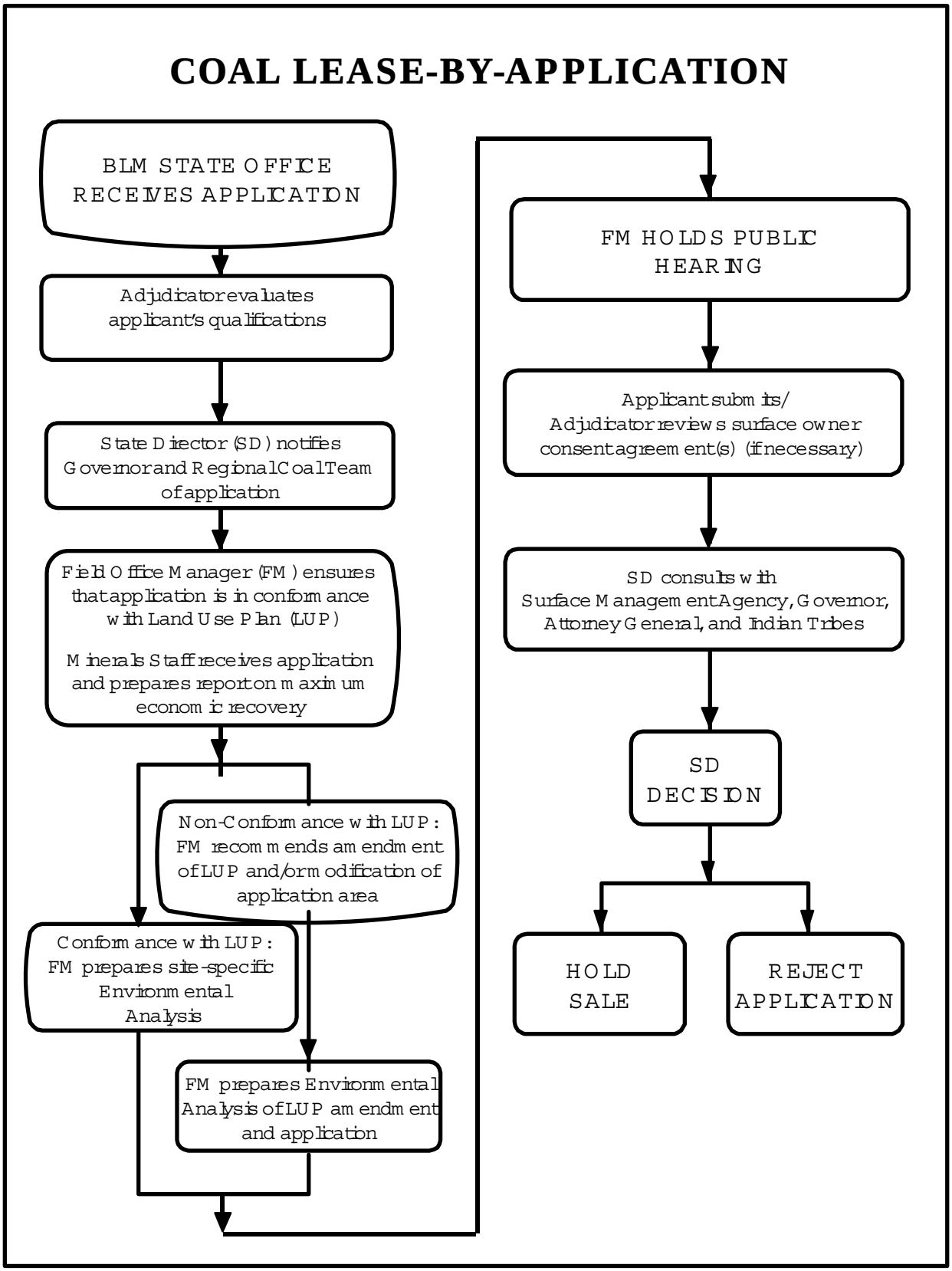
UNSUITABILITY CRITERIA	GENERAL RECOMMENDATIONS FOR BUFFALO RESOURCE AREA (BLM 1985, 2001a)	FINDINGS FOR EAGLE BUTTE WEST LBA TRACT
1. **Federal Land Systems.** With certain exceptions that do not apply to this tract, all federal lands included in the following systems are unsuitable for mining: National Parks, National Wildlife Refuges, National System of Trails, National Wilderness Preservation System, National Wild and Scenic Rivers, National Recreation Areas, Lands acquired through the Land and Water Conservation Fund, National Forests and Federal lands in incorporated cities, towns and villages.	There are Federal lands located around Gillette, Sheridan, and Wright that were determined to be unsuitable under this criterion.	None of the federal lands determined to be unsuitable under Criterion 1 are present on the Eagle Butte West LBA Tract. Therefore, there are no unsuitable findings under this criterion.
2. **Rights-Of-Way and Easements.** Federal lands that are within ROWs or easements or within surface leases for residential, commercial, industrial or other public purposes, on federally owned surface, are unsuitable for mining.	Portions of the BNSF & UP railroad ROWs, the Tri-County 230-Kv transmission line ROW, the Wyoming State Highway 450 ROW, and the I-90 ROW on federal surface were found to be unsuitable under this criterion within the general review area.	The portions of the BNSF & UP railroad ROWs, Tri-County 230-Kv transmission line ROW, the Wyoming State Highway 450 ROW, and the I-90 ROW that were determined to be unsuitable are not located on the Eagle Butte West LBA Tract. Therefore, there are no unsuitable findings under Criterion 2 for the Eagle Butte West LBA Tract.
3. **Buffer Zones for Rights-Of-Way, Communities, and Buildings.** Federal lands within 100 ft of a ROW of a public road or a cemetery; or within 300 ft of any public building, school, church, community or institutional building or public park; or within 300 ft of an occupied dwelling are unsuitable for mining.	Portions of Wyoming State Highway 450, Interstate Highway I-90, and one cemetery were found to be unsuitable under this criterion. Decisions were deferred on other highways/roads, occupied dwellings, and one school until an application to lease is filed.	The portions of Highway 450, I-90, and the cemetery that were determined to be unsuitable are not located on the Eagle Butte West LBA Tract. A portion of U.S. Highway 14-16, a public road, is located on the Eagle Butte West LBA Tract. Therefore, the portion of the Eagle Butte West LBA Tract within the highway ROW and the associated 100-ft buffer zone are designated unsuitable for mining and the lease will be stipulated to exclude mining within these areas unless a permit to move the highway is approved by WYDOT. In addition, a public school, the public road to the school, and a number of occupied dwellings are located within the northern portion of the additional area evaluated under Alternative 1. Therefore, the lands included within the northern portion of the additional area evaluated under Alternative 1 that lie within 300 ft of the Rawhide Elementary School building, within 300 ft of occupied dwellings, or within 100 ft of the ROW of the public road are designated unsuitable for mining.
4. **Wilderness Study Areas.** Federal lands designated as wilderness study areas are unsuitable for mining while under review for possible wilderness designation.	No lands in the general review area are within a wilderness study area.	There are no unsuitable findings under Criterion 4 for the Eagle Butte West LBA Tract.
5. **Scenic Areas.** Scenic federal lands designated by visual resource management analysis as Class I (outstanding visual quality or high visual sensitivity) but not currently on National Register of Natural Landmarks are unsuitable.	No lands in the general review area meet the scenic criteria as outlined.	There are no unsuitable findings under Criterion 5 for the Eagle Butte West LBA Tract.

UNSUITABILITY CRITERIA	GENERAL RECOMMENDATIONS FOR BUFFALO RESOURCE AREA (BLM 1985, 2001a)	FINDINGS FOR EAGLE BUTTE WEST LBA TRACT
6. Land Used for Scientific Study. Federal lands under permit by the surface management agency and being used for scientific studies involving food or fiber production, natural resources, or technology demonstrations and experiments are unsuitable for the duration of the study except where mining would not jeopardize the purpose of the study.	Two vegetation monitoring study sites on the TBNG (NE¼ of Sec. 1, T.41N., R.71W. and NW¼ NW¼ of Sec. 30, T.41N., R.69W.), and the Hoe Creek Site (Sec. 7, T.47N., R.72W.) were found to be unsuitable under this criterion.	The vegetation monitoring sites and the Hoe Creek site are not located on the Eagle Butte West LBA Tract. There are no unsuitable findings under Criterion 6 for the Eagle Butte West LBA Tract.
7. Cultural Resources. All publicly or privately owned places which are included in or are eligible for inclusion in the NRHP and an appropriate buffer zone are unsuitable.	On the basis of the consultation with SHPO, there were no unsuitable findings under this criterion in the general review area. Continue using the "Standard Archeological Stipulation" to new leases.	There are no unsuitable findings under Criterion 7 for the Eagle Butte West LBA Tract. The "Standard Archeological Stipulation" should be applied if this tract is leased.
8. Natural Areas. Federal lands designated as natural areas or National Natural Landmarks are unsuitable.	No lands in the general review area are designated as natural areas or as National Natural Landmarks.	There are no unsuitable findings under Criterion 8 for the Eagle Butte West LBA Tract.
9. Critical Habitat for Threatened or Endangered Plant and Animal Species. Federally designated critical habitat for threatened or endangered plant and animal species, and scientifically documented essential habitat for threatened or endangered species are unsuitable.	There is no federally designated critical habitat for threatened or endangered plant or animal species within the general review area.	There are no unsuitable findings under Criterion 9 for the Eagle Butte West LBA Tract.
10. State Listed Threatened or Endangered Species. Federal lands containing habitat determined to be critical or essential for plant or animal species listed by a state pursuant to state law as threatened or endangered shall be considered unsuitable.	Wyoming does not maintain a state list of threatened or endangered species of plants or animals. Therefore, this criterion does not apply.	There are no unsuitable findings under Criterion 10 for the Eagle Butte West LBA Tract.
11. Bald or Golden Eagle Nests. An active bald or golden eagle nest and appropriate buffer zone are unsuitable unless the lease can be conditioned so that eagles will not be disturbed during breeding season or unless golden eagle nests will be moved.	Defer suitability decisions and evaluate bald and golden eagle nests on a case by case basis at the time of leasing. Establish buffer zones around nests during mining and reclamation planning after consultation with USFWS.	There are currently no bald or golden eagle nests (active or inactive) on the Eagle Butte West LBA Tract. Evaluate suitability prior to lease issuance during consultation with USFWS.
12. Bald and Golden Eagle Roost and Concentration Areas. Bald and golden eagle roost and concentration areas on federal lands used during migration and wintering are unsuitable unless mining can be conducted in such a way as to ensure that eagles shall not be adversely disturbed.	Defer suitability decisions and evaluate bald and golden eagle roost areas on a case by case basis prior to lease issuance. Establish buffer zones after consultation with USFWS.	There are no identified roost sites on the Eagle Butte West LBA Tract. Evaluate suitability prior to lease issuance during consultation with USFWS.
13. Falcon Nesting Sites and Buffer Zones. Federal lands containing active falcon (excluding kestrel) cliff nesting sites and a suitable buffer zone shall be considered unsuitable unless mining can be conducted in such a way as to ensure the falcons will not be adversely affected.	Defer suitability decisions on falcon nesting sites and evaluate on a case by case basis prior to lease issuance. Establish buffer zones around nesting sites after consultation with USFWS.	No falcon nesting sites have been identified on the Eagle Butte West LBA Tract. There are no unsuitable findings under Criterion 13 for the Eagle Butte West LBA Tract.

UNSUITABILITY CRITERIA	GENERAL RECOMMENDATIONS FOR BUFFALO RESOURCE AREA (BLM 1985, 2001a)	FINDINGS FOR EAGLE BUTTE WEST MINE LBA TRACT
14. Habitat for Migratory Bird Species. Federal lands which are high priority habitat for migratory bird species of management concern in Wyoming shall be considered unsuitable unless mining can be conducted in such a way as to ensure that migratory bird habitat will not be adversely affected during the period it is in use.	Defer suitability decisions on high priority habitat for migratory bird species of management concern in Wyoming and evaluate on a case by case basis prior to lease issuance. Establish buffer zones for nesting areas during mining and reclamation planning after consultation with USFWS.	Evaluate suitability during consultation with USFWS.
15. Fish and Wildlife Habitat for Resident Species. Federal lands which the surface management agency and state jointly agree are fish, wildlife and plant habitat of resident species of high interest to the state, and which are essential for maintaining these priority wildlife species, shall be considered unsuitable unless mining can be conducted in such a way as to ensure no long-term impact on the species being provided will occur.	Defer suitability decisions on grouse leks and evaluate on a case by case basis prior to lease issuance. Establish buffer zones after consultation with WGFD.	There currently are no active sage grouse leks and one inactive sage grouse lek on the Eagle Butte West LBA Tract. There are currently three sage grouse leks, which have been active within the last five years, identified on lands adjacent to the LBA tract: one within ¼ mile and two just over two miles from the Eagle Butte West LBA Tract. Evaluate this criterion prior to lease issuance. Establish buffer zones during mining and reclamation planning after consultation with WGFD.
16. Floodplains. Federal lands in riverine, coastal, and special floodplains shall be considered unsuitable where it is determined that mining could not be undertaken without substantial threat of loss of life or property.	The BLM and USDA-FS have determined that the identified floodplains in the general review area could potentially be mined. Therefore, all lands within the general review area are considered suitable.	Site-specific stipulations and resource protection safeguards will be applied if necessary during mining and reclamation planning. There are no unsuitable findings under Criterion 16 for the Eagle Butte West LBA Tract.
17. Municipal Watersheds. Federal lands which have been committed by the surface management agency to use as municipal watersheds shall be considered unsuitable.	There are no designated municipal watersheds in the general review area.	There are no unsuitable findings under Criterion 17 for the Eagle Butte West LBA Tract.
18. National Resource Waters. Federal lands with national resource waters, as identified by states in their water quality management plans, and 1/4-mile buffer zones shall be unsuitable.	There are no designated national resource waters within the general review area.	There are no unsuitable findings under Criterion 18 for the Eagle Butte West LBA Tract.
19. Alluvial Valley Floors. Federal lands identified by the surface management agency, in consultation with the state, as AVFs where mining would interrupt, discontinue or preclude farming, are unsuitable. Additionally, when mining federal lands outside an AVF would materially damage the quality or quantity of water in surface or underground water systems that would supply AVFs, the land shall be considered unsuitable.	Consider areas determined to contain AVFs significant to farming as unsuitable. Defer decisions on other AVFs and analyze on a case-by-case basis prior to lease issuance.	No AVFs or potential AVFs have been identified on the Eagle Butte West LBA Tract with characteristics indicating potential significance to farming. There are no unsuitable findings under Criterion 19 for the Eagle Butte West LBA Tract.
20. State or Indian Tribe Criteria. Federal lands to which is applicable a criterion proposed by the state or Indian tribe located in the planning area and adopted by rulemaking by the Secretary are unsuitable.	There are no criterion proposed by state or Indian tribes that have been approved by the Secretary of the Interior. No tribal lands are located in or near the general review area.	There are no unsuitability findings for this criterion on the Eagle Butte West LBA Tract.

APPENDIX C

COAL LEASE-BY-APPLICATION
FLOW CHART


COAL LEASE-BY-APPLICATION
BLM STATE OFFICE RECEIVES APPLICATION
Adjudicator evaluates applicant's qualifications
State Director (SD) notifies Governor and Regional Coal Team of application
Field Office Manager (FM) ensures that application is in conformance with Land Use Plan (LUP)
Minerals Staff receives application and prepares report on maximum economic recovery
Non-Conformance with LUP: FM recommends amendment of LUP and/or modification of application area
Conformance with LUP: FM prepares site-specific Environmental Analysis
FM prepares Environmental Analysis of LUP amendment and application
FM HOLDS PUBLIC HEARING
Applicant submits/ Adjudicator reviews surface owner consent agreement(s) (if necessary)
SD consults with Surface Management Agency, Governor, Attorney General, and Indian Tribes
SD DECISION
HOLD SALE
REJECT APPLICATION

APPENDIX D

BUREAU OF LAND MANAGEMENT
SPECIAL COAL LEASE STIPULATIONS
AND FORM 3400-12 COAL LEASE

BLM will attach the following special stipulations to the Eagle Butte West LBA Tract if it is leased:

SPECIAL STIPULATIONS

In addition to observing the general obligations and standards of performance set out in the current regulations, the lessee shall comply with and be bound by the following special stipulations.

These stipulations are also imposed upon the lessee's agents and employees. The failure or refusal of any of these persons to comply with these stipulations shall be deemed a failure of the lessee to comply with the terms of the lease. The lessee shall require his agents, contractors and subcontractors involved in activities concerning this lease to include these stipulations in the contracts between and among them. These stipulations may be revised or amended, in writing, by the mutual consent of the lessor and the lessee at any time to adjust to changed conditions or to correct an oversight.

(a) ***CULTURAL RESOURCES***

(1) Before undertaking any activities that may disturb the surface of the leased lands, the lessee shall conduct a cultural resource intensive field inventory in a manner specified by the Authorized Officer of the BLM or of the surface managing agency, if different, on portions of the mine plan area and adjacent areas, or exploration plan area, that may be adversely affected by lease-related activities and which were not previously inventoried at such a level of intensity. The inventory shall be conducted by a qualified professional cultural resource specialist (i.e., archeologist, historian, historical architect, as appropriate), approved by the Authorized Officer of the surface managing agency (BLM, if the surface is privately owned), and a report of the inventory and recommendations for protecting any cultural resources identified shall be submitted to the Regional Director of the Western Region of the Office of Surface Mining (the Western Regional Director), the Authorized Officer of the BLM, if activities are associated with coal exploration outside an approved mining permit area (hereinafter called Authorized Officer), and the Authorized Officer of the surface managing agency, if different. The lessee shall undertake measures, in accordance with instructions from the Western Regional Director, or Authorized Officer, to protect cultural resources on the leased lands. The lessee shall not commence the surface disturbing activities until permission to proceed is given by the Western Regional Director or Authorized Officer.

(2) The lessee shall protect all cultural resource properties that have been determined eligible to the National Register of Historic Places within the lease area from lease-related activities until the cultural resource mitigation

measures can be implemented as part of an approved mining and reclamation or exploration plan unless modified by mutual agreement in consultation with the State Historic Preservation Officer.

(3) The cost of conducting the inventory, preparing reports, and carrying out mitigation measures shall be borne by the lessee.

(4) If cultural resources are discovered during operations under this lease, the lessee shall immediately bring them to the attention of the Western Regional Director or Authorized Officer, or the Authorized Officer of the surface managing agency, if the Western Regional Director is not available. The lessee shall not disturb such resources except as may be subsequently authorized by the Western Regional Director or Authorized Officer.

Within two (2) working days of notification, the Western Regional Director or Authorized Officer will evaluate or have evaluated any cultural resources discovered and will determine if any action may be required to protect or preserve such discoveries. The cost of data recovery for cultural resources discovered during lease operations shall be borne by the lessee unless otherwise specified by the Authorized Officer of the BLM or of the surface managing agency, if different.

(5) All cultural resources shall remain under the jurisdiction of the United States until ownership is determined under applicable law.

(b) ***PALEONTOLOGICAL RESOURCES***

If paleontological resources, either large and conspicuous, and/or of significant scientific value are discovered during mining operations, the find will be reported to the Authorized Officer immediately. Mining operations will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM-approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological value. Operations within 250 feet of such discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The lessee will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant scientific interest discovered during the operations.

(c) ***THREATENED, ENDANGERED, CANDIDATE, or OTHER SPECIAL STATUS PLANT and ANIMAL SPECIES***

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened or endangered under the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 *et seq.*, or that have other special status. The Authorized Officer may recommend modifications to exploration and development proposals to further conservation and management objectives or to avoid activity that will contribute to a need to list such species or their habitat or to comply with any biological opinion issued by the Fish and Wildlife Service for the Proposed Action. The Authorized Officer will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act. The Authorized Officer may require modifications to, or disapprove a proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species, or result in the destruction or adverse modification of designated or proposed critical habitat.

The lessee shall comply with instructions from the Authorized Officer of the surface managing agency (BLM, if the surface is private) for ground disturbing activities associated with coal exploration on federal coal leases prior to approval of a mining and reclamation permit or outside an approved mining and reclamation permit area. The lessee shall comply with instructions from the Authorized Officer of the Office of Surface Mining Reclamation and Enforcement, or his designated representative, for all ground disturbing activities taking place within an approved mining and reclamation permit area or associated with such a permit.

(d) ***MULTIPLE MINERAL DEVELOPMENT***

Operations will not be approved which, in the opinion of the Authorized Officer, would unreasonably interfere with the orderly development and/or production from a valid existing mineral lease issued prior to this one for the same lands.

(e) ***OIL AND GAS/COAL RESOURCES***

The BLM realizes that coal mining operations conducted on Federal coal leases issued within producing oil and gas fields may interfere with the economic recovery of oil and gas; just as Federal oil and gas leases issued in a Federal coal lease area may inhibit coal recovery. BLM retains the authority to alter and/or modify the resource recovery and protection plans for coal operations and/or oil and gas operations on those lands covered by Federal mineral leases so as to obtain maximum resource recovery.

(f) ***RESOURCE RECOVERY AND PROTECTION***

Notwithstanding the approval of a resource recovery and protection plan (R2P2) by the BLM, lessor reserves the right to seek damages against the operator/lessee in the event (i) the operator/lessee fails to achieve maximum economic recovery (MER) (as defined at 43 CFR 3480.0-5(21)) of the recoverable coal reserves or (ii) the operator/lessee is determined to have caused a wasting of recoverable coal reserves. Damages shall be measured on the basis of the royalty that would have been payable on the wasted or unrecovered coal.

The parties recognize that under an approved R2P2, conditions may require a modification by the operator/lessee of that plan. In the event a coal bed or portion thereof is not to be mined or is rendered unmineable by the operation, the operator/lessee shall submit appropriate justification to obtain approval by the Authorized Officer to leave such reserves unmined. Upon approval by the Authorized Officer, such coal beds or portions thereof shall not be subject to damages as described above. Further, nothing in this section shall prevent the operator/lessee from exercising its right to relinquish all or portion of the lease as authorized by statute and regulation.

In the event the Authorized Officer determines that the R2P2, as approved, will not attain MER as the result of changed conditions, the Authorized Officer will give proper notice to the operator/lessee as required under applicable regulations. The Authorized Officer will order a modification if necessary, identifying additional reserves to be mined in order to attain MER. Upon a final administrative or judicial ruling upholding such an ordered modification, any reserves left unmined (wasted) under that plan will be subject to damages as described in the first paragraph under this section.

Subject to the right to appeal hereinafter set forth, payment of the value of the royalty on such unmined recoverable coal reserves shall become due and payable upon determination by the Authorized Officer that the coal reserves have been rendered unmineable or at such time that the operator/lessee has demonstrated an unwillingness to extract the coal.

The BLM may enforce this provision either by issuing a written decision requiring payment of the Mineral Management Service demand for such royalties, or by issuing a notice of non-compliance. A decision or notice of non-compliance issued by the lessor that payment is due under this stipulation is appealable as allowed by law.

(g) ***PUBLIC LAND SURVEY PROTECTION***

The lessee will protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the lease areas. If any monuments, corners or accessories are destroyed, obliterated, or damaged by this operation, the lessee will hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories at the same location, using surveying procedures in accordance with the "Manual of Surveying Instructions for the Survey of the Public Lands of the United States." The survey will be recorded in the appropriate county records, with a copy sent to the Authorized Officer.

(h) ***BUFFER ZONES FOR RIGHTS-OF-WAY OF PUBLIC ROADS, SCHOOL BUILDING, AND OCCUPIED DWELLINGS***

(1) No mining activity of any kind may be conducted within the U.S. Highway 14-16 right-of-way and associated 100-feet buffer zone. The lessee shall recover all legally and economically recoverable coal from all leased lands not within the foregoing right-of-way and associated buffer zone. Provided a permit to move the highway is approved by the Wyoming Department of Transportation, the lessee shall recover all legally and economically recoverable coal from all leased lands within the foregoing right-of-way and associated buffer zone. The lessee shall pay all royalties on any legally and economically recoverable coal which it fails to mine without the written permission of the Authorized Officer.

(2) No mining of any kind may be conducted within 300 feet of the Rawhide public school building, 100 feet of the right-of-way of the public road to the school, and 300 feet of occupied dwellings. The lessee shall recover all legally and economically recoverable coal from all leased lands not within the foregoing right-of-way and buffer zones. Provided written permission is given to mine within these buffer zones by the school's authorized officer and owners of the occupied dwellings, the lessee shall recover all legally and economically recoverable coal from all leased lands within the foregoing buffer zones. The lessee shall pay all royalties on any legally and economically recoverable coal which it fails to mine without the written permission of the Authorized Officer.

Form 3400-12
(February 2005)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

COAL LEASE

FORM APPROVED
OMB NO. 1004-0073
Expires: January 31, 2007

Serial Number

PART 1. LEASE RIGHTS GRANTED

This lease, entered into by and between the UNITED STATES OF AMERICA, hereinafter called lessor, through the Bureau of Land Management (BLM), and *(Name and Address)*

hereinafter called lessee, is effective *(date)* / / , for a period of 20 years and for so long thereafter as coal is produced in commercial quantities from the leased lands, subject to readjustment of lease terms at the end of the 20th lease year and each 10-year period thereafter.

Sec. 1.This lease is issued pursuant and subject to the terms and provisions of the:

☐ Mineral Lands Leasing Act of 1920, Act of February 25, 1920, as amended, 41 Stat. 437, 30 U.S.C. 181-287, hereinafter referred to as the Act;

☐ Mineral Leasing Act for Acquired Lands, Act of August 7, 1947, 61 Stat. 913, 30 U.S.C. 351-359;

and to the regulations and formal orders of the Secretary of the Interior which are now or hereafter in force, when not inconsistent with the express and specific provisions herein.

Sec. 2. Lessor, in consideration of any bonuses, rents, and royalties to be paid, and the conditions and covenants to be observed as herein set forth, hereby grants and leases to lessee the exclusive right and privilege to drill for, mine, extract, remove, or otherwise process and dispose of the coal deposits in, upon, or under the following described lands:

containing acres, more or less, together with the right to construct such works, buildings, plants, structures, equipment and appliances and the right to use such on-lease rights-of-way which may be necessary and convenient in the exercise of the rights and privileges granted, subject to the conditions herein provided.

PART II. TERMS AND CONDITIONS

Sec. 1. (a) RENTAL RATE -Lessee must pay lessor rental annually and in advance for each acre or fraction thereof during the continuance of the lease at the rate of $ for each lease year.

(b) RENTAL CREDITS -Rental will not be credited against either production or advance royalties for any year.

Sec. 2. (a) PRODUCTION ROYALTIES - The royalty will be percent of the value of the coal as set forth in the regulations. Royalties are due to lessor the final day of the month succeeding the calendar month in which the royalty obligation accrues.

(b) ADVANCE ROYALTIES - Upon request by the lessee, the BLM may accept, for a total of not more than 10 years, the payment of advance royalties in lieu of continued operation, consistent with the regulations. The advance royalty will be based on a percent of the value of a minimum number of tons determined in the manner established by the advance royalty regulations in effect at the time the lessee requests approval to pay advance royalties in lieu of continued operation.

Sec. 3. BONDS - Lessee must maintain in the proper office a lease bond in the amount of $. The BLM may require an increase in this amount when additional coverage is determined appropriate.

Sec. 4. DILIGENCE - This lease is subject to the conditions of diligent development and continued operation, except that these conditions are excused when operations under the lease are interrupted by strikes, the elements, or casualties not attributable to the lessee. The lessor, in the public interest, may suspend the condition of continued operation upon payment of advance royalties in accordance with the regulations in existence at the time of the suspension. Lessee's failure to produce coal in commercial quantities at the end of 10 years will terminate the lease. Lessee must submit an operation and reclamation plan pursuant to Section 7 of the Act not later than 3 years after lease issuance.

The lessor reserves the power to assent to or order the suspension of the terms and conditions of this lease in accordance with, inter alia, Section 39 of the Mineral Leasing Act, 30 U.S.C. 209.

5. LOGICAL MINING UNIT (LMU) - Either upon approval by the lessor of the lessee's application or at the direction of the lessor, this lease will become an LMU or part of an LMU, subject to the provisions set forth in the regulations.

The stipulations established in an LMU approval in effect at the time of LMU approval will supersede the relevant inconsistent terms of this lease so long as the lease remains committed to the LMU. If the LMU of which this lease is a part is dissolved, the lease will then be subject to the lease terms which would have been applied if the lease had not been included in an LMU.

(Continued on page 2)

Sec. 6. DOCUMENTS, EVIDENCE AND INSPECTION - At such times and in such form as lessor may prescribe, lessee must furnish detailed statements showing the amounts and quality of all products removed and sold from the lease, the proceeds therefrom, and the amount used for production purposes or unavoidably lost.

Lessee must keep open at all reasonable times for the inspection by BLM the leased premises and all surface and underground improvements, works, machinery, ore stockpiles, equipment, and all books, accounts, maps, and records relative to operations, surveys, or investigations on or under the leased lands.

Lessee must allow lessor access to and copying of documents reasonably necessary to verify lessee compliance with terms and conditions of the lease.

While this lease remains in effect, information obtained under this section will be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 7. DAMAGES TO PROPERTY AND CONDUCT OF OPERATIONS - Lessee must comply at its own expense with all reasonable orders of the Secretary, respecting diligent operations, prevention of waste, and protection of other resources.

Lessee must not conduct exploration operations, other than casual use, without an approved exploration plan. All exploration plans prior to the commencement of mining operations within an approved mining permit area must be submitted to the BLM.

Lessee must carry on all operations in accordance with approved methods and practices as provided in the operating regulations, having due regard for the prevention of injury to life, health, or property, and prevention of waste, damage or degradation to any land, air, water, cultural, biological, visual, and other resources, including mineral deposits and formations of mineral deposits not leased hereunder, and to other land uses or users. Lessee must take measures deemed necessary by lessor to accomplish the intent of this lease term. Such measures may include, but are not limited to, modification to proposed siting or design of facilities, timing of operations, and specification of interim and final reclamation procedures. Lessor reserves to itself the right to lease, sell, or otherwise dispose of the surface or other mineral deposits in the lands and the right to continue existing uses and to authorize future uses upon or in the leased lands, including issuing leases for mineral deposits not covered hereunder and approving easements or rights-of-way. Lessor must condition such uses to prevent unnecessary or unreasonable interference with rights of lessee as may be consistent with concepts of multiple use and multiple mineral development.

Sec. 8. PROTECTION OF DIVERSE INTERESTS, AND EQUAL OPPORTUNITY - Lessee must: pay when due all taxes legally assessed and levied under the laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States; maintain a safe working environment in accordance with standard industry practices; restrict the workday to not more than 8 hours in any one day for underground workers, except in emergencies; and take measures necessary to protect the health and safety of the public. No person under the age of 16 years should be employed in any mine below the surface. To the extent that laws of the State in which the lands are situated are more restrictive than the provisions in this paragraph, then the State laws apply.

Lessee will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and the rules, regulations, and relevant orders of the Secretary of Labor. Neither lessee nor lessee's subcontractors should maintain segregated facilities.

Sec. 9. (a) TRANSFERS

- ☐ This lease may be transferred in whole or in part to any person, association or corporation qualified to hold such lease interest.
- ☐ This lease may be transferred in whole or in part to another public body or to a person who will mine coal on behalf of, and for the use of, the public body or to a person who for the limited purpose of creating a security interest in favor of a lender agrees to be obligated to mine the coal on behalf of the public body.
- ☐ This lease may only be transferred in whole or in part to another small business qualified under 13 CFR 121.

Transfers of record title, working or royalty interest must be approved in accordance with the regulations.

(b) RELINQUISHMENT - The lessee may relinquish in writing at any time all rights under this lease or any portion thereof as provided in the regulations. Upon lessor's acceptance of the relinquishment, lessee will be relieved of all future obligations under the lease or the relinquished portion thereof, whichever is applicable.

Sec. 10. DELIVERY OF PREMISES, REMOVAL OF MACHINERY, EQUIPMENT, ETC. - At such time as all portions of this lease are returned to lessor, lessee must deliver up to lessor the land leased, underground timbering, and such other supports and structures necessary for the preservation of the mine workings on the leased premises or deposits and place all workings in condition for suspension or abandonment. Within 180 days thereof, lessee must remove from the premises all other structures, machinery, equipment, tools, and materials that it elects to or as required by the BLM. Any such structures, machinery, equipment, tools, and materials remaining on the leased lands beyond 180 days, or approved extension thereof, will become the property of the lessor, but lessee may either remove any or all such property or continue to be liable for the cost of removal and disposal in the amount actually incurred by the lessor. If the surface is owned by third parties, lessor will waive the requirement for removal, provided the third parties do not object to such waiver. Lessee must, prior to the termination of bond liability or at any other time when required and in accordance with all applicable laws and regulations, reclaim all lands the surface of which has been disturbed, dispose of all debris or solid waste, repair the offsite and onsite damage caused by lessee's activity or activities incidental thereto, and reclaim access roads or trails.

Sec. 11. PROCEEDINGS IN CASE OF DEFAULT - If lessee fails to comply with applicable laws, existing regulations, or the terms, conditions and stipulations of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease will be subject to cancellation by the lessor only by judicial proceedings. This provision will not be construed to prevent the exercise by lessor of any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver will not prevent later cancellation for the same default occurring at any other time.

Sec. 12. HEIRS AND SUCCESSORS-IN-INTEREST - Each obligation of this lease will extend to and be binding upon, and every benefit hereof will inure to, the heirs, executors, administrators, successors, or assigns of the respective parties hereto.

Sec. 13. INDEMNIFICATION -Lessee must indemnify and hold harmless the United States from any and all claims arising out of the lessee's activities and operations under this lease.

Sec. 14. SPECIAL STATUTES - This lease is subject to the Clean Water Act (33 U.S.C. 1252 et seq.), the Clean Air Act (42 U.S.C. 4274 et seq.), and to all other applicable laws pertaining to exploration activities, mining operations and reclamation, including the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201 et seq.).

Sec. 15. SPECIAL STIPULATIONS

(Continued on page 3)

Sec. 15. SPECIAL STIPULATIONS (Cont'd.) -

THE UNITED STATES OF AMERICA

_____ (Company or Lessee Name)	By _____
_____ (Signature of Lessee)	_____ (BLM)
_____ (Title)	_____ (Title)
_____ (Date)	_____ (Date)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

NOTICES

The Privacy Act of 1974 and the regulation in 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this application.
AUTHORITY: 30 U.S.C. 181-287 and 30 U.S.C. 351-359.
PRINCIPAL PURPOSE: BLM will use the information you provide to process your application and determine if you are eligible to hold a lease on BLM Land.
ROUTINE USES: BLM will only disclose the information according to the regulations at 43 CFR 2.56(d).
EFFECT OF NOT PROVIDING INFORMATION: Disclosing the information is necessary to receive a benefit. Not disclosing the information may result in BLM's rejecting your request for a lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:
The BLM collects this information to authorize and evaluate proposed exploration and mining operations on public lands.
Response to the provisions of this lease form is mandatory for the types of activities specified.
The BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: Public reporting burden for this form is estimated to average one hour per response including the time for reading the instructions and provisions, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004-0073), Bureau Information Collection Clearance Officer (WO-630), 1849 C Street, Mail Stop 401 LS, Washington, D.C. 20240.

APPENDIX E

BIOLOGICAL ASSESSMENT
FOR THE EAGLE BUTTE WEST LBA TRACT EIS

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E-1.0 INTRODUCTION

In 2001, RAG Coal West, Inc., operator of the Eagle Butte Mine in Campbell County, Wyoming filed an application with the Bureau of Land Management (BLM) to lease the federal coal reserves included in a maintenance coal tract under the regulations at 43 CFR 3425, Leasing on Application. Foundation Coal West, Inc. (FCW) purchased the Eagle Butte Mine from RAG Coal West, Inc., in August 2004. The environmental impacts of leasing this tract are being evaluated in the Eagle Butte West Coal Lease Application Environmental Impact Statement (EIS). The tract, referred to as the Eagle Butte West Lease by Application (LBA) Tract, and applicant mine are shown in Figures E-1 and E-2.

The purpose of this Biological Assessment is to provide information about the potential effects that leasing the Eagle Butte West LBA Tract would have on federally listed threatened or endangered (T&E) species. T&E species are managed under the authority of the Endangered Species Act (ESA) of 1973 (PL 93-205, as amended). The ESA requires Federal agencies to ensure that all actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any federally listed species or result in the destruction or adverse modification of their critical habitat. BLM does not authorize mining by issuing a lease for federal coal, but the impacts of mining the coal are considered at the leasing stage because it is a logical consequence of issuing a lease.

This Biological Assessment was prepared to disclose the possible effects to T&E species (plant and animal) that are known to be present or that may be present within the area influenced by the Proposed Action and the alternative to the Proposed Action being evaluated by the BLM. It was prepared in accordance with Section 7 of the ESA.

Biological Assessment objectives are:

1. To comply with the requirements of the ESA that actions of federal agencies not jeopardize or adversely modify critical habitat of federally listed species.

2. To provide a process and standard by which to ensure that threatened or endangered species receive full consideration in the decision making process.

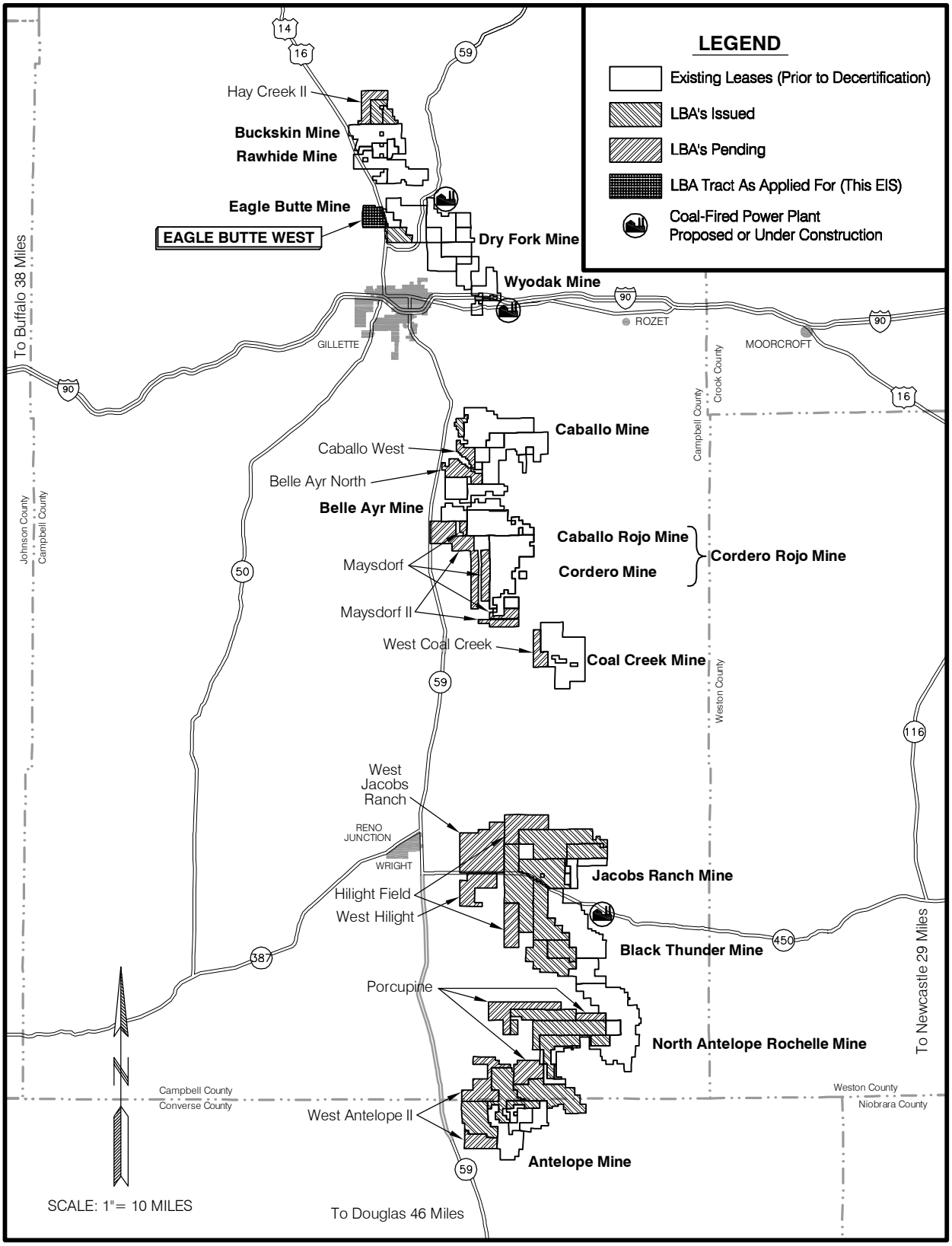

Figure E-1. General Location Map with Federal Coal Leases and LBA Tracts.

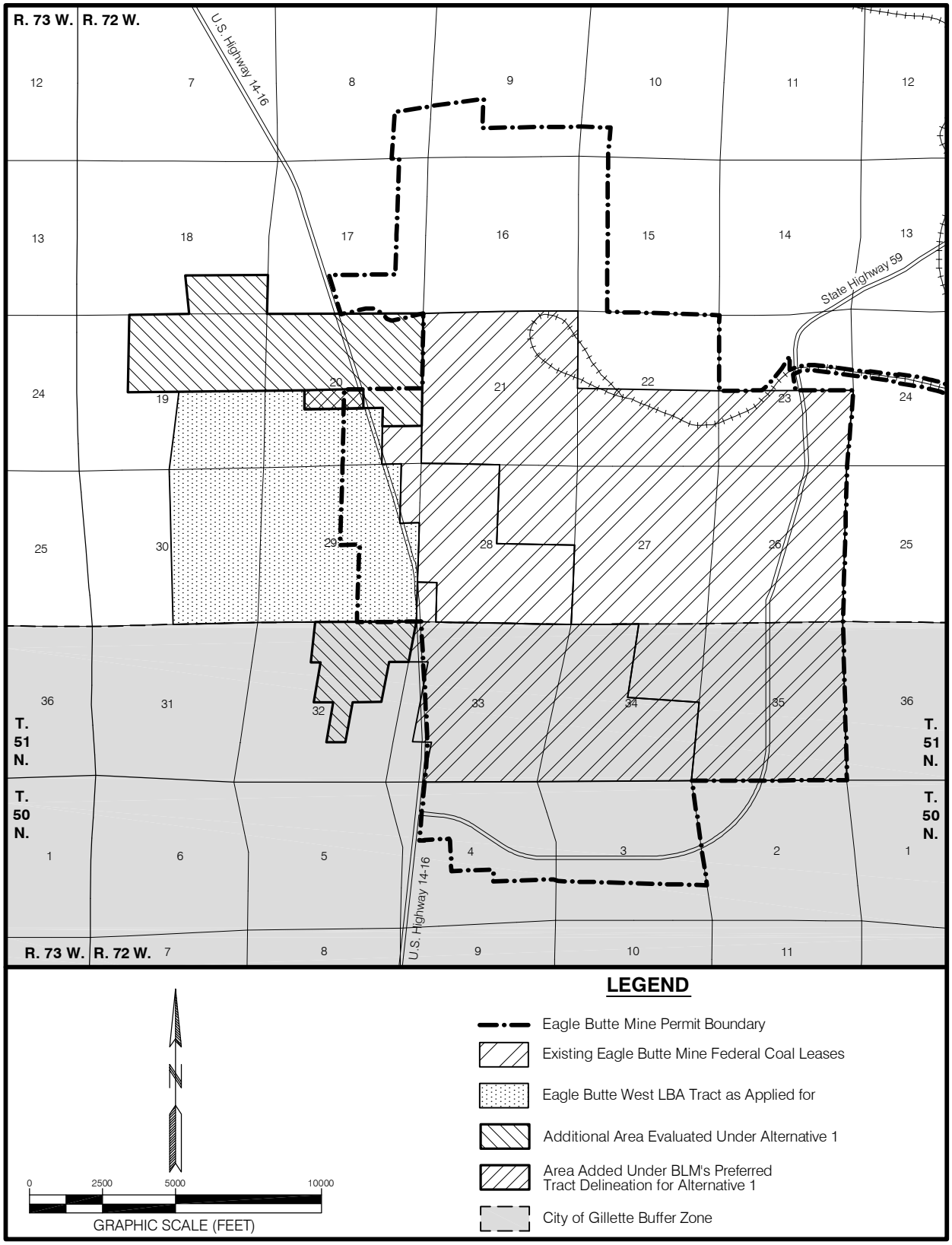

Figure E-2. Eagle Butte West LBA Tract Alternatives.

E-2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

E-2.1 The Proposed Action

On December 28, 2001, RAG Coal West, Inc. filed an application with the BLM to lease federal coal reserves in a tract located west of and immediately adjacent to the Eagle Butte Mine (Figure E-1). The tract, which was originally referred to as the Eagle Butte Mine West Extension LBA Tract, was assigned case file number WYW155132. BLM subsequently renamed the tract the Eagle Butte West LBA Tract and RAG submitted a modification to the application to the BLM, effective October 20, 2003, which decreased the size of the lease area and increased the coal volume. In August 2004, RAG Coal West, Inc. finalized the sale of the Eagle Butte Mine to Foundation Coal West, Inc. (FCW), a directly held subsidiary of Foundation Coal Holdings, Inc.

Under the Proposed Action for the Eagle Butte West LBA Tract, the tract as applied for by FCW would be offered for lease at a sealed-bid, competitive lease sale. The boundaries of the tract would be consistent with the tract configuration proposed in the Eagle Butte West LBA Tract lease application (Figure E-2). The Proposed Action assumes that FCW will be the successful bidder on the Eagle Butte West LBA Tract if it is offered for sale.

The legal description of the proposed Eagle Butte West LBA Tract coal lease lands as applied for by FCW under the Proposed Action is as follows:

T.51N., R.72W., 6th P.M., Campbell County, Wyoming

		Acres
Section 19:	Lots 13, 14, 19, and 20;	187.79
Section 20:	Lots 10(S½), 11(S½), and 12 through 15;	201.74
Section 29:	Lots 1 (W½), 2 through 7, 8(W½ and SE¼), and 9 through 16;	635.45
Section 30:	Lots 5, 6, 11 through 14, 19, and 20;	372.66
Total Acreage:		1,397.64

The coal estate underlying this tract described above is owned by the federal government and administered by the BLM. The surface estate of the tract is owned by FCW.

The tract as applied for includes approximately 1,397.64 mineable acres. It is assumed that an area larger than the tract would have to be disturbed in order to recover all of the coal in the tract. The disturbances outside of the tract would be due to activities like overstripping, matching undisturbed topography, and construction of flood control and sediment control structures.

Under the Proposed Action for the Eagle Butte West LBA Tract, if a decision is made to hold a competitive lease sale and if there is a successful bidder at that

sale, a lease would be issued for the tract of federal coal as applied for. The tract offered for lease would be subject to standard and special lease stipulations developed for the Wyoming Powder River Basin (PRB). The stipulations that would be attached to a lease for the Eagle Butte West LBA Tract are listed in Appendix D of the Eagle Butte West Coal Lease Application EIS. The following stipulation relating to T&E species is one of the special stipulations developed for the Wyoming PRB:

> ***THREATENED, ENDANGERED, CANDIDATE, or OTHER SPECIAL STATUS PLANT and ANIMAL SPECIES –*** *The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened or endangered under the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq., or that have other special status. The Authorized Officer may recommend modifications to exploration and development proposals to further conservation and management objectives or to avoid activity that will contribute to a need to list such species or their habitat or to comply with any biological opinion issued by the Fish and Wildlife Service for the Proposed Action. The Authorized Officer will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act. The Authorized Officer may require modifications to, or disapprove a proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species, or result in the destruction or adverse modification of designated or proposed critical habitat.*
>
> *The lessee shall comply with instructions from the Authorized Officer of the surface managing agency (BLM, if the surface is private) for ground disturbing activities associated with coal exploration on federal coal leases prior to approval of a mining and reclamation permit or outside an approved mining and reclamation permit area. The lessee shall comply with instructions from the Authorized Officer of the Office of Surface Mining Reclamation and Enforcement, or his designated representative, for all ground disturbing activities taking place within an approved mining and reclamation permit area or associated with such a permit.*

The coal mining unsuitability criteria listed in the federal coal management regulations (43 CFR 3461) have been applied to high to moderate coal development potential lands in the Wyoming PRB (see Section E-3.0 for further discussion). As discussed in Chapter 1, Section 1.5 of the Eagle Butte West Coal Lease Application EIS, the coal underlying U.S. Highway 14-16, its right-of-way (ROW), and a buffer zone that extends 100 feet on either side of the ROW is considered unsuitable for mining at this time under Unsuitability Criterion Number 3. An exception under criterion 3, specified in the Surface Mining Control and Reclamation Act (SMCRA), would allow surface coal mining in the ROW and buffer zone for a public road if the regulatory authority (or the appropriate public road authority designated by the regulatory authority) allows the public road to be relocated or closed after providing public notice

and opportunity for a public hearing and finding in writing that the interests of the affected public and landowners will be protected (30 CFR 761.11).

FCW and the Wyoming Department of Transportation (WYDOT), the designated public road authority in Wyoming, are working on a plan to relocate U.S. Highway 14-16, which would allow recovery of the coal underlying the highway, its ROW, and the buffer zone. If the road relocation is approved, the exception would be applicable and the unsuitability determination for the coal underlying U.S. Highway 14-16, its ROW, and the associated buffer zone could be reconsidered. (See Section 3.15 of the EIS for additional discussion of the proposed highway relocation.)

Although the coal within Highway 14-16, its ROW and the associated buffer zone is currently determined to be unsuitable for mining, it is included in the tract to allow maximum recovery of all the mineable coal adjacent to the highway ROW and associated buffer zone and to comply with the coal leasing regulations, which do not allow leasing of less than 10-acre aliquot parts. If a lease is issued for this tract, a stipulation will be attached to the lease stating that no mining operations may be conducted in the portion of the lease within the ROW and buffer zone for U.S. Highway 14-16 unless approval is obtained from the appropriate authority to move the highway.

FCW estimates that about 228 million tons of coal could be recovered from the Eagle Butte West LBA Tract under the Proposed Action if Highway 14-16 is moved. If the highway is not moved, FCW estimates that approximately 203 million tons of coal could be recovered from the tract.

Under the Proposed Action, it is assumed that the LBA tract would be developed as a maintenance lease to extend the life of the adjacent existing Eagle Butte Mine. As a result, under the Proposed Action, the coal included in the tract would be mined by existing employees using existing facilities and roads.

E-2.2 Alternatives to the Proposed Action

E-2.2.1 Alternative 1

Under Alternative 1 for the Eagle Butte West LBA Tract, BLM would reconfigure the tract, hold a competitive coal lease sale for the lands included in the reconfigured tract, and issue a lease to the successful bidder. Alternative 1, holding a competitive coal lease sale for a modified tract, is the BLM's preferred alternative.

In evaluating the Eagle Butte West coal lease application, BLM identified a study area, shown in Figure E-2. The BLM study area includes the tract as applied for and unleased federal coal adjacent to the northern and southern

edges of the tract as applied for. Under this alternative, BLM could add some or all of the additional area evaluated under this alternative (shown in Figure E-2) to the tract as applied for or BLM could reduce the size of the tract as applied for. The tract as modified by BLM would be subject to standard and special lease stipulations developed for the PRB and this tract if it is offered for sale, as discussed above. Alternative 1 for the Eagle Butte West LBA Tract assumes that FCW would be the successful bidder on the tract if a lease sale is held and that the tract would be developed as a maintenance lease to extend the life of the adjacent Eagle Butte Mine. Other assumptions are the same as for the Proposed Action.

BLM evaluated the potential that adding some or all of the adjacent lands shown in Figure E-2 would provide for more efficient recovery of the federal coal, increase competitive interest in the tract, and/or reduce the potential that some of the potentially mineable federal coal in this area would be bypassed in the future if it is not included in the Eagle Butte West LBA Tract. Based on this evaluation, BLM made a decision to add approximately 30 acres to the northeast corner of the tract to allow for more efficient recovery of the federal coal. The lands that BLM would add to the tract under the preferred tract configuration are:

T.51N., R.72W., 6th P.M., Campbell County, Wyoming

	Acres
Section 20: Lot 10(NW¼), and Lot 11(N½);	30.13

The area added under BLM's preferred tract configuration is shown in Figure E-2. The coal estate underlying the above described lands that BLM is proposing to add to the Eagle Butte West LBA Tract is owned by the federal government and administered by the BLM. The surface estate on these lands is owned by FCW.

The portion of U.S. Highway 14-16 that is located in the area that would be added to the tract under the BLM's preferred tract configuration would also be considered unsuitable for mining under Unsuitability Criterion Number 3, as discussed above.

E-2.2.2 Alternative 2

Under Alternative 2, the No Action Alternative, the application to lease the coal included in the Eagle Butte West LBA Tract would be rejected, the tract would not be offered for competitive sale, and the coal included in the tract would not be mined. This would not affect permitted mining activities and employment on the existing leases at Eagle Butte Mine and would not preclude an application to lease the federal coal included in the Eagle Butte West LBA Tract in the future. No additional surface of the Eagle Butte West LBA Tract would be disturbed due to overstripping to allow coal to be removed from the adjacent existing leases.

E-3.0 CONSULTATION TO DATE

The location of the existing Eagle Butte Mine coal leases, the existing approved mine permit area, and the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated by BLM under Alternative 1) are shown in Figure E-2.

The Eagle Butte Mine and Eagle Butte West LBA Tract are included in the area determined to be "acceptable for further consideration for leasing" as part of the coal screening process. The coal screening process is a four part process that includes application of the coal unsuitability criteria, which are defined in 43 CFR 3461.5. BLM has applied these coal screens to federal coal lands in Campbell County several times, starting in the early 1980s. Most recently, in 1993, BLM began the process of reapplying these screens to federal coal lands in Campbell, Converse, and Sheridan Counties. The results of this analysis were included as Appendix D of the 2001 *Approved Resource Management Plan for Public Lands Administered by the BLM Buffalo Field Office* (BLM 2001), which can be viewed on the Wyoming BLM website at http://www.blm.gov/wy/st/en/info/NEPA/documents.html. Consultation with the U.S. Fish and Wildlife Service (USFWS) occurred in conjunction with the unsuitability findings under criterion 9 (Critical Habitat for Threatened or Endangered Plant and Animal Species), criterion 11 (Bald or Golden Eagle Nests), criterion 12 (Bald and Golden Eagle Roost and Concentration Areas), criterion 13 (Falcon Nesting Site(s) and Buffer Zone(s)), and criterion 14 (Habitat for Migratory Bird Species).

Appendix B of the Eagle Butte West Coal Lease Application EIS summarizes the unsuitability criteria, describes the general findings for the screening analyses discussed above, and presents a validation of these findings for the Eagle Butte West LBA Tract based on the current information.

Consultation with USFWS has previously been completed for the area included within the Eagle Butte Mine's existing approved mining permit area, shown in Figure E-2, as part of the mining and reclamation plan approval process. This process began when the mine was initially permitted in 1976.

A letter dated April 7, 2005, from Brian Kelly, USFWS, Cheyenne, Wyoming, to Bill Boger, FCW, Gillette, Wyoming, documents approval of the current updated Raptor and Migratory Birds of High Federal Interest (MBHFI) Monitoring and Mitigation Plan for the Eagle Butte Mine (USFWS 2005a).

USFWS provided BLM a list of the T&E species that may be present in the Eagle Butte West coal lease project area in a memorandum letter from Brian T. Kelly, USFWS, Wyoming Field Office, Cheyenne, Wyoming, to Nancy Doelger, BLM, Casper Field Office, Casper, Wyoming dated July 26, 2005 (USFWS 2005b). The following list of federally listed threatened or endangered species

that may be present in the Eagle Butte West coal lease application project area was provided:

Bald eagle (*Haliaetus leucocephalus*): Threatened

Black-footed ferret (*Mustela nigripes*): Endangered

Ute ladies'-tresses (*Spiranthes diluvialis*): Threatened

E-4.0 SPECIES HABITAT AND OCCURRENCE AND EFFECTS OF THE PROPOSED PROJECT

The Eagle Butte Mine began producing coal in 1976. Wildlife monitoring has been conducted annually for the mine since 1986. This wildlife monitoring was designed to meet the Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD), Wyoming Game and Fish Department (WGFD), and federal requirements for annual monitoring and reporting of wildlife activity on coal mining areas. Detailed procedures and site-specific requirements have been carried out as approved by WGFD and USFWS. The monitoring program was conducted in accordance with Appendix B of WDEQ/LQD Coal Rules and Regulations. Because the areas covered in the wildlife surveys included the mine's permit area and a large perimeter around the permit boundary, the entire Eagle Butte West LBA Tract has been included in baseline inventories and annual wildlife surveys conducted for the Eagle Butte Mine since wildlife studies began in the early 1970s.

The approved Eagle Butte Mine Permit 428 Term T5 (FCW 2005) includes monitoring and mitigation measures for the Eagle Butte Mine that are required by SMCRA and Wyoming State Law. If the Eagle Butte West LBA Tract is acquired by FCW, these required monitoring and mitigation measures would be extended to cover operations on the LBA tract when the Eagle Butte Mine's mining permit is amended to include the tract. This amended permit would have to be approved before mining operations could take place on the tract. These monitoring and mitigation measures are considered to be part of the Proposed Action and Alternative 1 during the leasing process because they are regulatory requirements.

Background information on T&E species in the vicinity of the Eagle Butte West LBA Tract was drawn from several sources, including wildlife survey reports submitted by the Eagle Butte Mine to the WDEQ/LQD from 1974 through 2005, the Final EIS for the West Hay Creek Coal Lease Application (BLM 2004), a Wyoming Natural Diversity Database search (University of Wyoming 2001), and WGFD and USFWS records and contacts in 2004 and 2005. In addition, the Eagle Butte West LBA Tract wildlife study area falls within the wildlife monitoring areas for the nearby Buckskin and Rawhide Mines (Figure E-1).

Site-specific data for a substantial portion of the tract as applied for and the additional area evaluated under Alternative 1 were obtained from several sources, including WDEQ/LQD permit applications and annual wildlife reports for the Eagle Butte Mine and other nearby coal mines. Baseline wildlife studies were conducted by Thunderbird Wildlife Consulting, Inc., (TWC) expressly for the Eagle Butte West LBA Tract beginning in April of 2004 and continuing through December of 2004. Figure E-3 depicts TWC's T&E animal species survey areas for the Eagle Butte West LBA Tract.

The topography within the vicinity of the LBA tract is generally level to gently rolling, dissected by locally shallow gullies and the broader meandering floodplain of Little Rawhide Creek, an intermittent stream. Unmined lands surrounding the LBA tract are characterized by low rolling hills with a prominent ridgeline immediately to the west. Lands affected by surface mining, both ongoing and reclaimed, dominate the landscape adjacent to the LBA tract's eastern edge. Elevations range from approximately 4,240 to 4,560 feet above sea level.

Predominant wildlife habitat types classified on the LBA tract and adjacent area correspond with the major plant communities defined during the vegetation baseline study and consist primarily of seeded grassland (agricultural pasture), grassland, and sagebrush/grassland. Other habitats present in limited extent include bottomland, trees, and open water. Networks of road, pipeline, tank battery, and well-pad disturbance areas associated with oil and gas development overlay much of the study area.

Little Rawhide Creek passes through the eastern portion of the LBA tract, flowing from south to north. Its tributary, Prong Draw, passes through the central portion of the tract, flowing from southwest to northeast (Figure E-3). Under natural conditions, Little Rawhide Creek is classified as an intermittent stream and its tributaries, including Prong Draw, are all ephemeral streams. Essentially all water courses in the study area are currently receiving discharge water from coal bed natural gas (CBNG) development and, as a result, the frequency and duration of streamflow events have been increased. At least seven distinct, in-channel impoundments are located on the Eagle Butte West LBA Tract as applied for and three others are located on the additional area evaluated under Alternative 1. Streamflow is now more persistent and these shallow impoundments along Little Rawhide Creek and Prong Draw are seldom completely dry, resulting in an increase in habitat for waterfowl, shorebirds, and aquatic species.

FCW's approved mining plan allows disturbance of a portion of the Little Rawhide Creek channel. Approximately four miles of the stream is currently diverted from its natural channel to facilitate mining within the existing Eagle Butte Mine permit area. Diversion No. 6 (Figure E-3) channel was constructed in 1981. FCW would propose another diversion of Little Rawhide Creek if they acquire a lease for the Eagle Butte West LBA Tract.

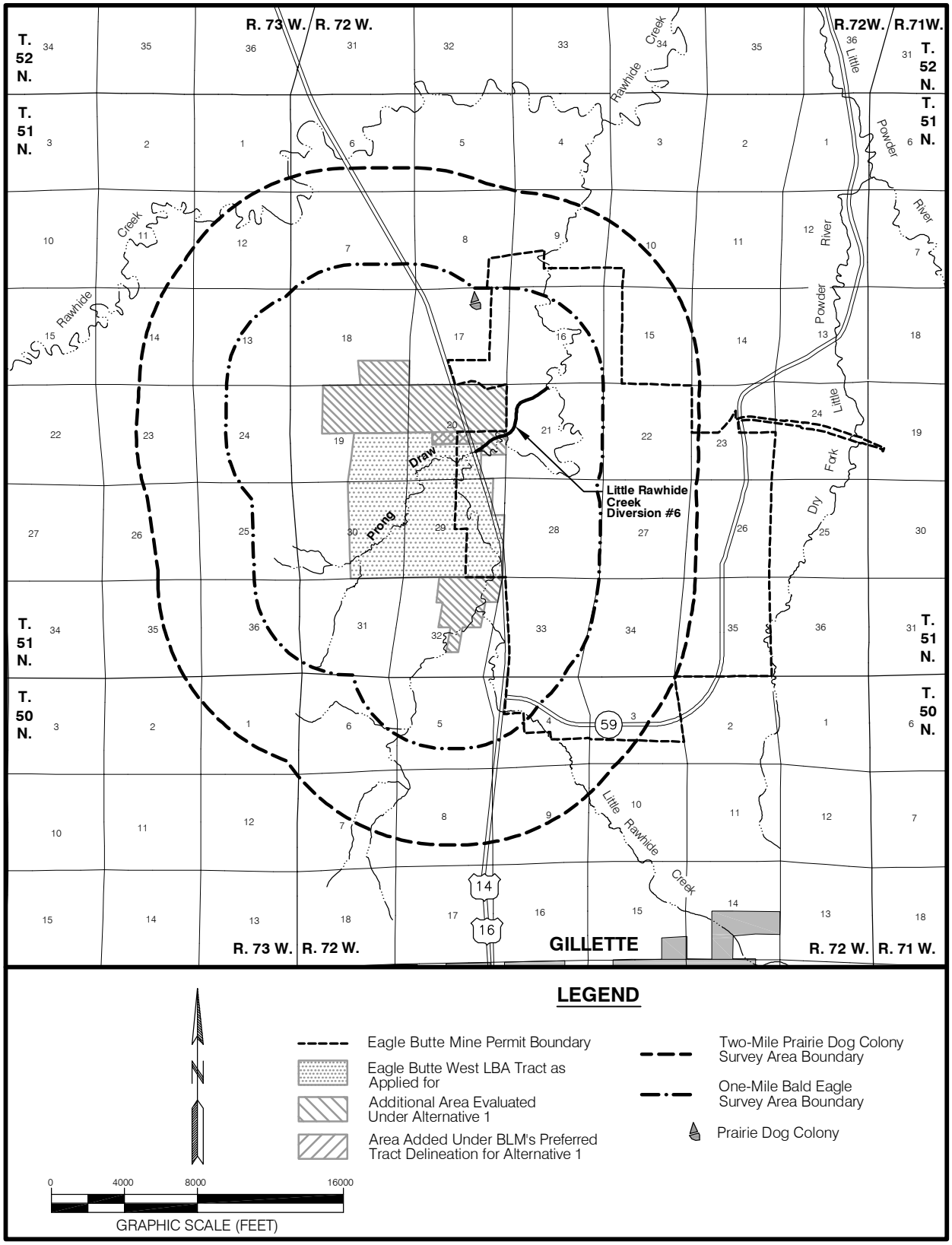

Figure E-3. T&E Animal Species Survey Area for the Eagle Butte Mine and the Eagle Butte West LBA Tract.

A preliminary wetlands inventory, based on USFWS National Wetlands Inventory (NWI) mapping and vegetation mapping in the field, was conducted in 2004. The wetland analysis area includes the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated under Alternative 1) and a ¼-mile disturbance buffer around the tract sufficient to mine and reclaim the tract as a part of the existing Eagle Butte Mine operation. A formal wetland delineation has been confirmed by the U.S. Army Corps of Engineers (COE) for the portion of the wetland analysis area (947.94 acres) that is within the current Eagle Butte Mine permit area. Wetland areas previously mapped by the USFWS NWI have been recently altered due to CBNG-related water production within and upstream of the wetland analysis area. The NWI maps were consulted prior to the initiation of the preliminary wetlands field survey; however, the boundaries of the existing potential jurisdictional wetlands vary to a greater or lesser extent from the boundaries shown on the NWI maps. Due to the ephemeral nature of CBNG dewatering activities, the boundaries, and therefore wetland areas, are likewise ephemeral. A formal jurisdictional wetland survey for the Eagle Butte West LBA Tract has not yet been completed due to the fact that the current field conditions may not be representative of the field conditions in the future. A formal jurisdictional wetland delineation survey would be conducted and submitted to the COE for verification as part of the mining and reclamation permit process, if the tract is leased.

Within the wetland analysis area (4,172 acres), the preliminary inventory identified a total of 50.4 acres of Waters of the U.S., including a total of 49.8 acres of jurisdictional Waters of the U.S. Approximately 37.5 of those acres are jurisdictional wetlands. Identified jurisdictional wetlands occur along the water courses of Little Rawhide Creek and its tributaries. The 12.3 acres of jurisdictional other Waters of the U.S. that did not qualify as jurisdictional wetlands consist primarily of the open water that is held within the linear upland drainage channels and in-channel impoundments and intermittent pools. There is an additional 0.5 acre of non-jurisdictional Waters of the U.S. in the wetland analysis area that consists of small isolated areas of open water where water produced from nearby CBNG development wells has ponded. The identified potential jurisdictional wetlands include Riverine-Emergent Marsh and Riverene-Wet Meadow.

Jurisdictional wetlands located in the Eagle Butte West LBA Tract that are destroyed by mining operations would be replaced in accordance with the requirements of Section 404 of the Clean Water Act, as determined by COE. The replaced wetlands may not duplicate the exact function and landscape features of the pre-mine wetlands. COE considers the type and function of each jurisdictional wetland that will be impacted and may require restoration of additional acres if the type and function of the restored wetlands will not completely replace the type and function of the original wetland. Replacement of non-jurisdictional and functional wetlands may be required by the surface land owner and/or WDEQ/LQD. WDEQ/LQD allows and sometimes requires

mitigation of non-jurisdictional wetlands affected by mining, depending on the values associated with the wetland features.

Within the BLM study area, there is no "critical" habitat designated by USFWS for T&E species. The following discussion describes species' habitat requirements and their occurrence in the area of the Eagle Butte West LBA Tract and evaluates the potential environmental effects of implementing the Proposed Action or Alternative 1 on federal T&E species.

E-4.1 Threatened Species

E-4.1.1 Bald eagle (*Haliaetus leucocephalus*)

On February 14, 1978, the bald eagle was listed as endangered in all of the coterminous United States except Minnesota, Wisconsin, Michigan, Oregon, and Washington, where it was classified as threatened (43 F.R. 6233). The USFWS reclassified the bald eagle from endangered to threatened throughout its range in the lower 48 states on July 12, 1995 (60 F.R. 36000). The bald eagle was proposed for delisting on July 6, 1999 (64 F.R. 36454). On July 9, 2007, the USFWS published a notice in the *Federal Register* removing the bald eagle in the lower 48 states from the list of endangered and threatened wildlife. The effective date for this action will be August 8, 2007. According to the *Federal Register* notice, the protections provided to the bald eagle under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act will continue to remain in place after delisting and USFWS has proposed a draft post-listing monitoring plan to detect the failure of the bald eagle to sustain itself without the protective measures of the ESA.

Biology and Habitat Requirements: Adult bald eagles establish life-long pair bonds and nest primarily in remote areas free of disturbance, in large trees that are near rivers, lakes, marshes, or other wetland areas. In Wyoming, this species builds large nests in the crowns of large mature trees such as cottonwoods or pines. Typically, there are alternate nests within or in close proximity to the nest stand. Snags and open-canopied trees near the nest site and foraging areas provide favorable perch sites. This species is a common breeding resident in some areas of Wyoming (Luce et al. 1999 and USFWS 2005b).

Food availability is probably the single most important determining factor for bald eagle distribution and abundance (Steenhof 1976). Fish and waterfowl are the primary sources of food. Big game and livestock carrion, as well as rodents (e.g., ground squirrels, prairie dogs, etc.) also can be important dietary components where these resources are available (Ehrlich et al. 1988). Bald eagles are opportunistic foragers. They prefer to forage in areas with the least human disturbance (USFWS 1978, McGarigal et al. 1991).

Bald eagles that have open water or alternate food sources near their nesting territories may stay for the winter; other eagles migrate southward to areas with available prey. During migration and in winter, eagles often concentrate on locally abundant food resources and tend to roost communally at night. Communal roosts usually are located in large mature trees, usually in secluded locations that offer protection from harsh weather. Large, live trees in sheltered areas provide a favorable thermal environment and help minimize the energy stress encountered by wintering eagles. Communal roosting also may facilitate food finding (Steenhof 1976) and pair bonding. Bald eagles often return to use the same nest and winter roost year after year (USFWS 2005b). Freedom from human disturbance is also important in communal roost site selection (Steenhof et al. 1980, U.S. Bureau of Reclamation 1981, USFWS 1986, Buehler et al. 1991). Continued human disturbance of a night roost may cause eagles to abandon an area (Hansen et al. 1981, Keister 1981). The proximity of night roosts to the other habitats required by wintering eagles, such as hunting perches and feeding sites, is important (Steenhof et al. 1980). Roosts may be several miles from feeding sites. The absence of a suitable roost may limit the use of otherwise suitable habitat.

Existing Environment: Bald eagles are relatively common winter residents and migrants in northeastern Wyoming's PRB. Qualified biologists with TWC conducted searches for bald eagle winter roosts and potential nesting habitat within the BLM study area for the LBA tract (the LBA tract as applied for and the additional area evaluated under Alternative 1) and a one-mile perimeter during 2004 (Figure E-3). No bald eagles, roosts, or potential nesting habitat were observed at that time. Over time, individual eagles have infrequently been seen during winter foraging within the one-mile survey area, or perched in cottonwood trees in residential windbreaks located in Sections 20 and 29, T.51N., R.72W., or in the cottonwood trees around an impoundment located in the NE¼ of Section 32, T.51N., R.72W. However, no winter roost sites have been documented in the vicinity of the survey area during nearly 20 years of wildlife monitoring in that area for the Eagle Butte Mine, as well as the nearby Buckskin and Rawhide Mines. Additionally, there are no unique or concentrated sources of carrion or prey (including sheep ranching operations) in the survey area, so foraging bald eagles would not be attracted to the area in great numbers. A few isolated bald eagle nesting attempts have been recorded in the general region, but none have occurred within several miles of the survey area.

Effects of the Proposed Project: **Mining the federal coal lease included in the Eagle Butte West LBA Tract, if the tract is leased under the Proposed Action or Alternative 1, may affect, but is not likely to adversely affect bald eagles.** No suitable roosting habitat, known nest sites, or concentrated prey or carrion sources for bald eagles are present on the BLM study area for the Eagle Butte West LBA Tract and surrounding survey area. Use of the trees that are present in and around the BLM study area for the tract by eagles has been infrequent.

Disturbance to nesting eagles can cause nest failure, nest abandonment, and unsuccessful fledging of young; however, no bald eagle nests are known to be present in the area and potential nesting habitat is not present. Bald eagle foraging habitat would be lost on the tract during mining and before final reclamation; however, the Eagle Butte Mine and Eagle Butte West LBA Tract areas do not provide any consistent, reliable or concentrated food sources for eagles. The loss of any potential foraging habitat would be short-term. Foraging habitat that is lost during mining would be replaced as reclamation continues on already mined out areas. Eagles may alter foraging patterns as they fly around areas of active mining activity.

The potential for bald eagles to collide with or be electrocuted by electric power lines on the mine site would be minimal due to use of raptor-safe power lines, which is required under SMCRA (30 CFR 816.97). Use of roads accessing Eagle Butte Mine by mine-related traffic would continue when the Eagle Butte West LBA Tract is mined, which would perpetuate the potential for vehicle-wildlife collisions and the associated roadside carcasses. This could result in bald eagle foraging along roads in this area, which would perpetuate the potential for road kills of foraging bald eagles to occur.

Cumulative Effects: Mineral development, including CBNG development, conventional oil and gas development, and surface coal mining, is a leading cause of habitat loss within the PRB. CBNG development in and adjacent to the LBA tract is extensive and has been ongoing since the late 1980s. Surface coal mining has been ongoing at the Eagle Butte Mine for 30 years.

E-4.1.2 Ute ladies'-tresses (*Spiranthes diluvialis*)

Ute ladies'-tresses, a member of the orchid family, was listed as threatened on January 17, 1992 due to a variety of factors, including habitat loss and modification, hydrological modifications of existing and potential habitat areas, and invasion of exotic plant species. At the time of listing, Ute ladies'-tresses was only known from north-central Colorado, northern and south-central Utah, and southeastern Nevada. As of September 2005, it had also been found in western Nebraska, southeastern Wyoming, southwestern Montana, and north-central Washington, while new populations had been documented in northwestern Colorado and northern Utah (Fertig, et al. 2005). USFWS has determined that a petition to remove the Ute ladies'-tresses orchid from federal protection under the ESA provides substantial biological information to indicate that removal may be warranted. The petition was received from the Central Utah Water Conservancy District (USFWS 2004).

Biology and Habitat Requirements: Ute ladies'-tresses is a perennial, terrestrial orchid with erect, glandular-pubescent stems 8 to 20 inches tall arising from tuberous-thickened roots. This species typically flowers from late July through August. The flowers are white or ivory and clustered into a spike at the top of the stem; however, depending on location and climatic conditions,

it may bloom in early July or still be in flower as late as early October (USFWS 2005b). Plants probably do not flower every year and may remain dormant below ground during drought years. The total known population of this species is currently estimated to be 60,000 individuals (USFWS 2004). Occurrences range in size from one plant to a few hundred individuals.

Ute ladies'-tresses has been found in a variety of habitats, including moist meadows associated with perennial stream terraces, floodplain and oxbows, seasonally flooded river terraces, subirrigated or spring-fed abandoned stream channels and valleys, and lakeshores. They have also been discovered along irrigation canals, berms, levees, irrigated meadows, excavated gravel pits, roadside barrow pits, reservoirs, and other human-modified wetlands. The elevation range of known occurrences is from 720-1,830 feet in Washington to 7,000 feet in northern Utah (Fertig, et al. 2005). Soils where the orchid has been found typically range from fine silt/sand to gravels and cobbles, as well as to highly organic and peaty soil types. The Ute ladies'-tresses orchid is not found in heavy or tight clay soils or in extremely saline or alkaline soils and seems intolerant of shade. Small scattered groups are found primarily in areas where vegetation is relatively open (USFWS 2005b). The Ute ladies'-tresses orchid is commonly associated with horsetail, milkweed, verbena, blue-eyed grass, reedgrass, goldenrod, and arrowgrass.

Populations are often dynamic and "move" within a watershed as disturbances create new habitat or succession eliminates old habitat (Fertig and Beauvais 1999). The orchid is well adapted to disturbances from stream movement and is tolerant of other disturbances, such as grazing, that are common to grassland riparian habitats (USFWS 1995). Ute ladies'-tresses colonize early successional riparian habitats such as point bars, sand bars, and low-lying gravelly, sandy, or cobbley edges, persisting in those areas where the hydrology provides continual dampness in the root zone through the growing season. The orchid establishes in heavily disturbed sites, such as revegetated gravel pits, heavily grazed riparian edges, and along well-traveled foot trails on old berms (USFWS 1995).

This species is known from four occurrences in Wyoming, within Converse, Goshen, Laramie, and Niobrara Counties, all discovered between 1993 and 1997 (Fertig and Beauvais 1999). No occurrences have been recorded in Campbell County.

<u>Existing Environment:</u> Areas of suitable habitat within the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated under Alternative 1) were surveyed by Habitat Management, Inc. in August and September 2004 and in August 2005. Topographical and wetland delineation maps for the study area were reviewed to identify all significant drainages and potential habitat that may contain the orchid.

Suitable habitat was traversed on foot during the time of actual flowering of the known population, and it involved walking entire lengths of the drainages documenting locations of potential habitat and searching for this species.

No individuals of the Ute ladies'-tresses orchid were located during the 2004 and 2005 surveys. Most of the land within the BLM study area for the Eagle Butte West LBA Tract is not potential Ute ladies'-tresses habitat. This includes highly disturbed or modified sites, upland habitat types, and sites inundated by standing water. Potentially suitable habitat within the study area is very limited and is mostly found along the CBNG-impacted bottomlands of Little Rawhide Creek and its tributaries. Suitable habitat factors included areas within and immediately adjacent to wet meadows, stream channels and floodplains, less steep stream banks, light soil texture and well drained soils having close lateral or vertical distance (within approximately 18 inches) to perennial water source during the flowering period, lack of plant competition, lack of general soil alkalinity/salinity, and current or historical management practices that did not promote overgrazing and extensive use of riparian areas. The quality of potential habitat in the survey area is poor for a number of key reasons:

- The soils tend to be heavy and trend from moderately to very saline/sodic. The saline/sodic areas typically have monocultural stands of inland saltgrass (*Distichlis spicata stricta*) or foxtail barley (*Hordeum jubatum*).

- Wet meadow habitat types are heavily colonized by aggressive rhizomatous graminoid plant species, including common spikerush (*Eleocharis palustris*), prairie cordgrass (*Spartina pectinata*), and western wheatgrass (*Pascopyron smithii*). These narrow riparian strips located between emergent aquatic vegetation and dry upland prairie are probably too dense and too shaded by tall vegetation to provide suitable habitat.

- Surface discharge of groundwater associated with CBNG development, within and upstream of the study area has altered historic shallow groundwater and soil moisture conditions along all water courses, causing major shifts in plant community distributions.

- Livestock grazing, particularly during the wetter times of the year, has impacted the quality of riparian areas.

Effects of the Proposed Project: **Mining the federal coal included in the Eagle Butte West LBA Tract, if the tract is leased under the Proposed Action or Alternative 1, may affect, but is not likely to adversely affect Ute ladies'-tresses.** There is limited potential suitable habitat for this species on the tract along the CBNG-impacted bottomlands of Little Rawhide Creek and its tributaries. However, the quality of the potential suitable habitat is

poor. Outside of the narrow riparian strips located along these impacted watercourses, potential suitable habitat is rare or non-existent in the surveyed area. Multiple surveys of the existing suitable habitat at the Eagle Butte Mine and other mines in this area have not found any Ute ladies'-tresses. Because of the ability of this species to persist below ground or above ground without flowering, single season surveys that meet the current USFWS survey guidelines may not detect populations. If undetected populations are present, they could be lost to surface disturbing activities.

Cumulative Effects: Alterations of stream morphology and hydrology are believed to have extirpated Ute ladies'-tresses from most of its historical range (USFWS 2002). Disturbance and reclamation of streams by surface coal mining may alter stream morphology and hydrology. The large quantities of water produced with CBNG development and discharged on the surface may also alter stream morphology and hydrology.

E-4.2 Endangered Species

E-4.2.1 Black-footed ferret (*Mustela nigripes*)

Biology and Habitat Requirements: The black-footed ferret is a federally-listed endangered species. The black-footed ferret historically occurred throughout Texas, Oklahoma, New Mexico, Arizona, Utah, Kansas, North and South Dakota, Montana, Wyoming, Nebraska, and Colorado. The last known wild population of black-footed ferrets was discovered in Meeteetse, Wyoming in 1981. This population became decimated by canine distemper so the remaining individuals were captured and raised in protective captive breeding facilities in an effort to prevent the species' extinction (Clark and Stromberg 1987). In the early 1990s, captive-bred black-footed ferrets were released in the Shirley Basin in the first reintroduction of the species in North America. Recent survey efforts in the Shirley Basin have confirmed a self-sustaining black-footed ferret population at this former re-introduction site. The Forest Service has established a Black-Footed Ferret Habitat Management Area in the Thunder Basin National Grassland, located southeast of Wright, Wyoming, where they plan to reintroduce ferrets (USDA-FS 2002).

The black-footed ferret, a nocturnally active mammal, depends almost entirely upon the prairie dog for its survival. Prairie dogs are the main food source of black-footed ferrets, and few ferrets have been collected away from prairie dog colonies. Ferrets may be present within colonies of white-tailed or black-tailed prairie dogs. The USFWS has determined that, at a minimum, potential habitat for the black-footed ferret must include a single white-tailed prairie dog colony of greater than 200 acres, or a complex of smaller colonies within a 4.3 mile (seven kilometer) radius circle totaling 200 acres (USFWS 1989). Minimum colony size of black-tailed prairie dogs for ferrets is 80 acres (USFWS 1989).

The decline in ferret populations has been attributed to the reduction in the extensive prairie dog colonies that historically existed in the western United States. The three major impacts that have influenced black-tailed prairie dog populations are the initial conversion of prairie grasslands to cropland in the eastern portion of its range from approximately the 1880s through 1920s; large-scale control efforts conducted from approximately 1918 through 1972, when an Executive Order was issued banning the use of compound 1080; and the introduction of sylvatic plague into North American ecosystems in 1908 (USFWS 2000). In Wyoming, this species historically occurred east of the Rocky Mountain foothills and may have occupied millions of acres (USFWS 2000). The Bureau of Sport Fisheries and Wildlife estimated that there were approximately 49,000 remaining acres of black-tailed prairie dog colonies in Wyoming in 1961. USFWS recently estimated that about 125,000 acres of black-tailed prairie dog occupied habitat exists in Wyoming (USFWS 2000).

Existing Environment: The Eagle Butte West LBA Tract is within the historical range of the black-footed ferret, although no black-footed ferrets are presently known to occur in northeastern Wyoming. During the 1980s, WGFD, in cooperation with other agencies, conducted searches for black-footed ferrets in Wyoming in the places they were most likely to be found, but these searches were not successful (Martin Grenier, personal communication, 10/14/2003). In a February 2, 2004 letter to interested parties, the USFWS declared that black-footed ferret surveys are no longer necessary in black-tailed prairie dog colonies within Wyoming.

TWC has mapped the current acreage of prairie dog colonies in the vicinity of the Eagle Butte Mine by walking the perimeters of colonies and delineating them on topographic maps. No black-tailed prairie dog colonies are currently present on the BLM study area for the Eagle Butte West LBA Tract (the tract as applied for and the additional area evaluated under Alternative 1). One small town (approximately one acre in size) is located a little less than one and one-half miles north of the northern edge of the tract as applied for and BLM's preferred tract configuration for the Eagle Butte West LBA Tract (Figure E-3). No evidence of ferrets has been recorded during general or specific ferret surveys conducted from 1976 through 2005 by wildlife consultants for the Eagle Butte Mine and other mines in this area.

Effects of the Proposed Project: **Mining the federal coal included in the Eagle Butte West LBA Tract, if a lease is issued under the Proposed Action or Alternative 1, would have no effect on black-footed ferrets.** No black-tailed prairie dog colonies are currently present on or within about one and one-half miles of the Eagle Butte West LBA Tract as applied for or BLM's preferred tract configuration under Alternative 1. The black-footed ferret is almost entirely dependent on the prairie dog for survival. The reductions in black-tailed prairie dog populations due to poisoning prior to 1972 and due to recent plague outbreaks have reduced the potential for black-footed ferret survival in northeastern Wyoming. Searches of the best remaining black-footed

ferret habitat in Wyoming conducted in the 1980s were not successful in finding any ferrets. General wildlife surveys and specific ferret surveys have been conducted for many years at the Eagle Butte Mine, and at other mines in this area. No black-footed ferrets have ever been observed during these surveys.

Cumulative Effects: Mineral development within black-tailed prairie dog colonies is a leading cause of ferret habitat loss in the PRB. Surface coal mining tends to have more intense impacts on fairly localized areas, while oil and gas development tends to be less intensive but spread over larger areas. Oil and gas development and mining activities have requirements for reclamation of disturbed areas as resources are depleted. In reclaimed areas, vegetation cover may differ from undisturbed areas. In the case of surface coal mines, re-established vegetation would be dominated by species mandated in the reclamation seed mixtures (to be approved by WDEQ). The majority of the approved plant species are native to the area; however, reclaimed areas may not serve ecosystem functions presently served by undisturbed vegetation communities and habitats, particularly in the short-term, when species composition, shrub cover, and other environmental factors are likely to be different. Shifts in habitat composition or distribution following reclamation could increase or decrease potential habitat for prairie dogs and associated habitat for black-footed ferrets. However, black-tailed prairie dogs have been recorded invading and establishing towns on reclaimed coal mined lands in northeastern Wyoming (IR 2005).

Potential ferret habitat is also affected by other impacts to prairie dog populations. Plague can infect and eliminate entire prairie dog colonies. Poisoning and recreational prairie dog shooting may locally reduce prairie dog populations, but seldom completely eliminate colonies.

E-5.0 SUMMARY OF DETERMINATIONS

Table E-1 summarizes the determinations for federally listed T&E species in the area of the Eagle Butte West LBA Tract that may result from implementing the Proposed Action or Alternative 1.

Table E-1. Effects Evaluation of Federal T&E Species in the Area of the Eagle Butte West LBA Tract.

Status	Species Common Name	Potential Effects
Threatened:	Bald eagle	May affect[1]
	Ute ladies'-tresses	May affect[1]
Endangered:	Black-footed ferret	No effect[1]

[1] Not likely to adversely affect individuals or populations.

E-6.0 REGULATORY REQUIREMENTS AND MITIGATION

The issuance of a Federal coal lease grants the lessee the exclusive rights to mine the coal, subject to the terms and conditions of the lease. Lease ownership is necessary for mining federal coal, but lease ownership does not authorize mining operations. Surface coal mining operations are regulated in accordance with the requirements of the Surface Mining Control and Reclamation Act of 1977 (SMCRA) and Wyoming State regulations. SMCRA gives the Office of Surface Mining Reclamation and Enforcement (OSM) primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations. Pursuant to Section 503 of SMCRA, the WDEQ developed, and in November 1980 the Secretary of the Interior approved, a permanent program authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on nonfederal lands within the State of Wyoming. In January 1987, pursuant to Section 523(c) of SMCRA, WDEQ entered into a cooperative agreement with the Secretary of the Interior authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on federal lands within the state. In order to get approval of this cooperative agreement, the state had to demonstrate that the state laws and regulations are no less stringent than, meet the minimum requirements of, and include all applicable provisions of SMCRA.

If the Eagle Butte West LBA Tract is leased, it would be a maintenance lease for the existing Eagle Butte Mine, which currently has both an approved Mineral Leasing Act of 1920 (MLA) mining plan and an approved Wyoming State mining and reclamation permit. In the case of maintenance leases, such as the Eagle Butte West LBA Tract, the existing MLA mining plan and State mining and reclamation plan must be amended to include newly leased areas before those areas can be mined. In order to amend the existing MLA mining plan and state mining and reclamation permit, the company would be required to submit a detailed permit application package to WDEQ before starting surface coal mining operations on any newly acquired lease. WDEQ/LQD would review the permit application package to insure the permit application complies with the permitting requirements and the coal mining operation will meet the performance standards of the approved Wyoming program. If the permit application package does comply, WDEQ would issue the applicant an amended permit that would allow the permittee to extend coal mining operations onto the newly acquired lease.

Protection of fish, wildlife, and related environmental values is required under SMCRA regulations at 30 CFR 816.97, which state:

> "No surface mining activity shall be conducted which is likely to jeopardize the continued existence of endangered or threatened species listed by the Secretary of which is likely to result in the destruction or adverse

modification of designated critical habitats of such species in violation of the Endangered Species Act of 1973, as amended."

In addition to requiring the operator to minimize disturbances and adverse impacts on fish, wildlife, and related environmental values, the regulations at 30 CFR 816.97 disallow any surface mining activity which is likely to jeopardize the continued existence of endangered or threatened species and require that the operator use the best technology currently available to minimize electrocution hazards to raptors; locate and operate haul and access roads to avoid or minimize impacts on important fish and wildlife species; and design fences, conveyors, and other potential barriers to permit passage of large mammals. Section 7 consultation would be required prior to approval of the mining and reclamation plan modification. Additional measures to ensure compliance with the ESA and SMCRA can be developed when the detailed mining plan, which identifies the actual location of the disturbance areas, how and when they would be disturbed, and how they would be reclaimed, is developed and reviewed for approval. At the leasing stage, a detailed mining and reclamation plan is not available for evaluation or development of appropriate mitigation measures specific to an actual proposal to mine.

The following is a partial list of measures related to federally-listed species that are required as part of the mining and reclamation permits:

- avoiding bald eagle disturbance;
- restoring bald eagle foraging areas disturbed by mining;
- using raptor safe power lines; and
- surveying for Ute ladies'-tresses if habitat is present.

E-7.0 CUMULATIVE IMPACTS

Existing habitat-disturbing activities in the PRB include surface coal mining; conventional oil and gas and CBNG development; uranium mining; sand and gravel, and scoria mining; ranching; agriculture; road, railroad, and power plant construction and operation; recreational activities; and rural and urban housing development. Mining, construction and agricultural activities, and urban development tend to have more intense impacts on fairly localized areas, while ranching, recreational activities, and oil and gas development tend to be less intensive but spread over larger areas. Oil and gas development and mining activities have requirements for reclamation of disturbed areas as resources are depleted. The net area of energy disturbance in the Wyoming PRB has been increasing. In the short term, this means a reduction in the available habitat for T&E plant and wildlife species. In the long term, habitat is being and will continue to be restored as reclamation proceeds.

BLM is in the process of completing a regional technical study of current and proposed or potential development activity in the PRB to help the agency evaluate the impacts of coal development in the PRB. The *Powder River Basin*

Coal Review consists of three tasks: Task 1 updates the BLM's 1996 status check for coal development in the PRB, Task 2 develops a forecast of reasonably foreseeable development in the PRB through the year 2020, and Task 3 predicts cumulative impacts that would be expected to occur as a result of the projected development. The information about existing development in the following paragraphs is taken from the *Powder River Basin Coal Review* Task 2 report (BLM 2005) and BLM lease records. The completed PRB Coal Review reports can be accessed at the BLM Wyoming website at http://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/prbdocs.html.

The project area for Tasks 1 and 2 of the PRB Coal Review encompasses over eight million acres and includes all of Campbell, Sheridan, and Johnson Counties and the northern portion of Converse County in northeastern Wyoming.

Oil and gas exploration and production have been ongoing in the PRB for more than 100 years. Conventional (non CBNG) oil and gas fields are, for the most part, concentrated in the central and southern parts of the structural basin. Development of the CBNG resources from the coal beds is a more recent occurrence, with CBNG production in the Wyoming PRB starting in the late 1980s. As of 2003, an estimated 187,761 acres had been disturbed in the coal review project area as a result of oil and gas development activities, but approximately 115,045 acres of that disturbance has been reclaimed. This includes conventional oil and gas and CBNG wells and associated facilities and major transportation pipelines.

BLM estimates that the existing federal coal leases in the Wyoming PRB include approximately 121,185 acres. The currently pending federal coal LBA tracts (including the Eagle Butte West LBA Tract) include approximately 35,352 additional acres. The majority of the coal in the areas permitted for surface coal mining is federal, but some state and private leases are included within some of the existing mine permit areas. All of the current and proposed federal coal leases are concentrated near the outcrop of the Wyodak coal bed, which is located in eastern Campbell County and the extreme northeastern edge of Converse County. As of 2003, the baseline year for the PRB Coal Review, the surface coal mining operations along the Wyodak outcrop had disturbed approximately 68,794 acres. Approximately 24,097 of those acres of disturbance are occupied by "permanent" mine facilities, such as roads, buildings, coal handling facilities, etc., which are not available for reclamation until after coal mining operations end. Of the remaining 44,697 acres of disturbance available for reclamation, approximately 21,238 acres had been reclaimed.

The *Powder River Basin Coal Review* identified an estimated 4,891 additional acres of coal-related development disturbance (i.e., coal-fired power plants, railroads, and coal technology projects) as of 2003.

The estimated total development-related disturbance in the Wyoming PRB in 2003 was 264,704 acres. In addition to the coal and oil and gas development discussed above, this total includes other types of development disturbance, such as reservoirs and industrial fabrication firms, as well as public and private infrastructure, such as highways and roads, government buildings, and residential and commercial real estate development. It should be noted that some of these disturbances overlap one another. In such cases, the disturbance acreage is counted separately under each category, but is not counted twice in determining the total area of disturbance.

Cumulative effects would also occur to T&E plant and wildlife resources as a result of indirect impacts. One factor is the potential import and spread of noxious weeds around roads and facilities. Noxious weeds have the ability to displace native vegetation and hinder reclamation efforts. Control of noxious weeds is addressed in surface coal mining and reclamation plans. If weed mitigation and preventative procedures are applied to all construction and reclamation practices, the impact of noxious weeds on T&E plants and wildlife would be minimized.

In reclaimed areas, vegetation cover often differs from undisturbed areas. In the case of surface coal mines, re-established vegetation would be dominated by species mandated in the reclamation seed mixtures (to be approved by WDEQ). The majority of the species in the approved reclamation seed mixtures are native to the area; however, reclaimed areas may not serve ecosystem functions presently served by undisturbed vegetation communities and habitats. In the short-term in particular, species composition, shrub cover, and other environmental factors are likely to differ from pre-disturbance vegetation communities and habitats. Establishment of noxious weeds and alteration of vegetation in reclaimed areas has the potential to alter T&E plant and wildlife habitat composition and distribution.

Potential adverse effects to listed and proposed species that have occurred and would continue to occur as a result of existing and potential future activities in the PRB would include direct loss of habitat, indirect loss of habitat due to human and equipment disturbance, habitat fragmentation, displacement of bald eagle prey species and the resultant change in bald eagle foraging, and mortality caused by equipment activities, motor vehicle collisions, power line collisions, and power line electrocution. The existing mines have developed mitigation procedures, as required by SMCRA (at 30 CFR 816.97) and Wyoming State regulations, to protect T&E species. These procedural requirements would be extended to include mining operations on the Eagle Butte West LBA Tract, if it is leased as proposed and after required detailed plans to mine the coal and reclaim the mined-out areas are developed and approved.

E-8.0 CREDENTIALS OF SURVEY PERSONNEL

Thunderbird Wildlife Consulting of Gillette, Wyoming

Gwyn McKee
Ms. McKee obtained a Master of Science degree in Wildlife Ecology from the University of Missouri-Columbia. She has accumulated more than 18 years of professional experience, with the last eleven in Wyoming. Ms. McKee has skills that include planning and conducting surveys for a variety of terrestrial and aquatic species, summarizing data, and preparing technical reports for private, state, and federal agencies. Ms. McKee is considered qualified by all state and federal agencies to conduct T&E and other wildlife surveys within the region. Those qualifications include surveys for mountain plovers and their habitat, and certification by the USFWS to conduct black-footed ferret surveys.

Kort M. Clayton
Mr. Clayton earned a Masters of Science degree in Biology from the University of Saskatchewan. He has been professionally involved with wildlife issues in the Northern Great Plains for over 12 years. Since 1998, Mr. Clayton has focused on wildlife inventories, clearances, impact analysis, mitigation, and applied research related to energy developments in the PRB of Wyoming and Montana. Those experiences include surveys for most vertebrate taxa in the region, sage-grouse research, raptor mitigation projects, and clearance surveys for several federally listed species.

Habitat Management, Inc. of Gillette, Wyoming

Wayne Erickson
Mr. Erickson received his B.S. in Forest Biology and Botany from Colorado State University and has accumulated over 30 years of field experience in vegetation and rare plant surveys.
Mr. Erickson's T&E plant survey experience includes:

- T&E plant species survey, Ancho Mine, York Canyon Complex, Colfax County, NM (1995);
- T&E plant species survey, Gauchapin-Brackett Mine, York Canyon Complex, Colfax County, NM (1996);
- T&E plant species survey, Buckskin Mine, Campbell County, WY (1999);
- T&E plant species survey, Eagle Butte Mine, Campbell County, WY (2003);
- T&E plant species survey, Eagle Butte Mine, Campbell County, WY (2004);
- T&E plant species survey, Bar W Ranch, Carrizozo, Lincoln County, NM (2004); and
- T&E plant species survey, ERM/Enogex Pipeline (90 miles in Western Colorado and Eastern Utah), 2005.

Mr. Erickson's familiarity with *Spiranthes diluvialis* includes:

- Observation of flowering populations in Jefferson County, Colorado, 1998-present;
- Conducting *Spiranthes diluvialis* survey, Home Depot Development, Northglenn, CO (1998);
- Conducting *Spiranthes diluvialis* survey, Buckskin Mine, Hay Creek Amendment, Campbell County, WY (1999 & 2004);
- Conducting *Spiranthes diluvialis* survey, Eagle Butte Mine, Eagle Butte West Amendment, Campbell County, WY (2004-2005);
- Conducting *Spiranthes diluvialis* survey, School Creek Mine, School Creek Amendment, Campbell County, WY (2005); and
- Conducting *Spiranthes diluvialis* survey, ERM/Enogex Pipeline (90 miles in Western Colorado and Eastern Utah), 2005.

Richard Bonine

Mr. Bonine received his B.S. in Agronomy with concentration in range and plant science from Kansas State University and has accumulated over 14 years of field experience in vegetation surveys.

Mr. Bonine's familiarity with *Spiranthes diluvialis* includes:

- Study of several taxonomic texts to gain understanding of the identifying characteristics and habitat of the species.
- Research of known locations of the species in Wyoming.
- Conducting *Spiranthes diluvialis* survey, Eagle Butte Mine, Eagle Butte West Amendment, Campbell County, WY (2004-2005).

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APPENDIX F

BLM SENSITIVE SPECIES EVALUATION FOR THE EAGLE BUTTE WEST COAL LEASE APPLICATION EIS

BLM SENSITIVE SPECIES EVALUATION

INTRODUCTION

BLM Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. The authority for this policy and guidance comes from the Endangered Species Act (ESA), as amended; Title II of the Sikes Act, as amended; the Federal Land Policy Management Act of 1976 (FLPMA) (43 U.S.C. 1716); and the Department Manual 235.1.1A (BLM 2001).

The goals of the sensitive species policy are to:

- Maintain vulnerable species and habitat components in functional BLM ecosystems.
- Ensure sensitive species are considered in land management decisions.
- Prevent a need for species listing under the ESA.
- Prioritize needed conservation work with an emphasis on habitat.

PROJECT DESCRIPTION

Under the Proposed Action, BLM will hold a lease for the federal coal lands in the Eagle Butte West LBA Tract as applied for or Alternative 1 (see Figure 2-1 and the land descriptions in Section 2.1 of this EIS). It is assumed that the applicant for the tract, FCW, would be the successful bidder and that the tract would be mined as a maintenance lease for the existing Eagle Butte Mine. The surface estate on the Eagle Butte West LBA Tract includes all privately owned lands.

SPECIES OCCURRENCE AND HABITAT DESCRIPTIONS

Sensitive species were listed for the BLM Buffalo Field Office within its range. Some sensitive species could or do occur within the Eagle Butte West LBA Tract. Specialized habitat requirements (i.e., caves, cliffs, calcareous rock outcrops) make occupation for other sensitive species unlikely. Table F-1 lists BLM sensitive species, summarizes their habitat requirements, and indicates if they have been observed on or around the tract. Additional information on occurrences of these species on the tract can be found in Section 3.10 of this EIS or in the supplemental information document for this EIS, which is available on request.

Table F-1. BLM Sensitive Species for the Buffalo Field Office and Habitat Requirements and Observations on Eagle Butte West LBA Tract.

Common Name ***(scientific name)***	**Habitat**	**Observed on Eagle Butte West LBA Tract**
Amphibians		
Northern leopard frog *(Rana pipiens)*	Beaver ponds, permanent water in plains and foothills	Yes, incidental siting during wildlife surveys
Spotted frog *(Ranus pretiosa)*	Ponds, sloughs, small streams	----[1]
Birds		
Baird's sparrow *(Ammodramus bairdii)*	Grasslands, weedy fields	No
Brewer's sparrow *(Spizella breweri)*	Basin-prairie shrub	Common Breeder
Burrowing owl *(Athene cunicularia)*	Grasslands, basin-prairie shrub	Recent Common Breeder
Ferruginous hawk *(Buteo regalis)*	Basin-prairie shrub, grasslands, rock outcrops	Historic Breeder
Greater sage-grouse *(Centrocercus urophasianus)*	Basin-prairie shrub, mountain-foothill shrub	Common Breeder
Loggerhead shrike *(Lanius ludovicianus)*	Basin-prairie shrub, mountain-foothill shrub	Yes, uncommon
Long-billed curlew *(Numenius americanus)*	Grasslands, plains, foothills, wet meadows	No, rare spring migrant
Mountain Plover *(Charadrius montanus)*	Shortgrass/midgrass grasslands, basin-prairie shrubs	No
Northern goshawk *(Accipiter gentilis)*	Conifer and deciduous forests	----[1]
Peregrine falcon *(Falco peregrinus)*	Cliffs	No, incidental siting during wildlife surveys at Eagle Butte Mine
Sage sparrow *(Amphispiza billneata)*	Basin-prairie shrub, mountain-foothill shrub	No
Sage thrasher *(Oreoscoptes montanus)*	Basin-prairie shrub, mountain-foothill shrub	No, rarely observed at the Eagle Butte Mine during wildlife surveys
Trumpeter swan *(Cygnus buccinator)*	Lakes, ponds, rivers	----[1]
White-faced ibis *(Plegadis chihi)*	Marshes, wet meadows	----[1]
Yellow-billed cuckoo *(Coccyzus americanus)*	Open woodlands, streamside willow and alder groves	No

Table F-1. BLM Sensitive Species for the Buffalo Field Office and Habitat Requirements and Observations on Eagle Butte West LBA Tract (Continued).

Common Name ***(scientific name)***	**Habitat**	**Observed on Eagle Butte West LBA Tract**
Fish		
Yellowstone cutthroat trout *(Oncoryhynchus clarki)*	Cold water streams and lakes	----[1]
Mammals		
Black-tailed prairie dog *(Cynomys ludovicianus)*	Shortgrass/midgrass grasslands	No prairie dog towns on tract
Fringed myotis *(Myotis thysanodes)*	Conifer forests, woodland chaparral, caves and mines	----[1]
Long-eared myotis *(Myotis evotis)*	Conifer and deciduous forest, caves and mines	----[1]
Spotted bat *(Euderma maculatum)*	Cliffs over perennial water, basin-prairie shrub	----[1]
Swift fox *(Vulpes velox)*	Grasslands	No
Townsend's big-eared bat *(Corynorhinus townsendii)*	Forests, basin-prairie shrub, caves and mines	----[1]
Plants		
Porter's sagebrush *(Artemisia porteri)*	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes; 5,300 to 6,500 ft	----[1]
William's wafer parsnip *(Cymopterus williamsii)*	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides; 6,000 to 8,300 ft	----[1]

[1] Habitat generally lacking or very limited

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APPENDIX G

CBNG WELLS CAPABLE OF PRODUCTION
ON OR IN SECTIONS ADJACENT TO THE
EAGLE BUTTE WEST LBA TRACT

Eagle Butte Coal LBA Area
Productive Coalbed Natural Gas Wells
Adjacent Twelve-Section Area
Secs. 16-33, T. 51 N., R. 72 W.

API Number (Short)	*Company*	*Well Name/No.*	*Location*	*WOGCC Status*	*Cumulative Production Gas (MCF)*	*Cumulative Production Water (BBL)*
530177	Continental Industries LC	Rawhide No. 5-17	SW¼ NW¼ Sec.17	PG	7703	144
530208	Continental Industries LC	Rawhide No. 4-17	NW¼ NW¼ Sec.17	PG	4513	613504
538918	Rocky Mountain Gas Inc.	Echo No. 13-17-A	SW¼ SW¼ Sec.17	PG	126351	183949
541497	Continental Industries LC	Rawhide No. 2-17	NW¼ NE¼ Sec.17	PS	6161	56861
529930	Continental Industries LC	Rawhide Butte No. 15-18	SW¼ SE¼ Sec.18	PG	172450	1020952
530007	Continental Industries LC	BTP 5172 No. 10-18	NW¼ SE¼ Sec.18	PS	237811	223284
530008	Continental Industries LC	BTP 5172 No. 11-18	NE¼ SW¼ Sec.18	PG	113711	645935
530009	Continental Industries LC	BTP 5172 No. 12-18	NW¼ SW¼ Sec.18	PS	497641	587896
530048	Continental Industries LC	Wagensen-Rawhide No. 1-18	NE¼ NE¼ Sec.18	PG	20656	44781
530298	Continental Industries LC	Rawhide Fee No. 11-18B	NE¼ SW¼ Sec.18	PS	90251	1268850
530410	Continental Industries LC	Rawhide No. 14-18	SE¼ SW¼ Sec.18	PG	374378	282291
530416	Continental Industries LC	Rawhide No. 13-18	SW¼ SW¼ Sec.18	PG	168977	251561
530528	Continental Industries LC	Rawhide No. 2-18	NW¼ NE¼ Sec.18	PG	33084	28843
530529	Continental Industries LC	Rawhide No. 3-18	NE¼ NW¼ Sec.18	PG	80708	44970
530530	Continental Industries LC	Rawhide No. 4-18	NW¼ NW¼ Sec.18	PG	194341	79424
530531	Continental Industries LC	Rawhide No. 5-18	SW¼ NW¼ Sec.18	PG	145650	155725
530532	Continental Industries LC	Rawhide No. 6-18	SE¼ NW¼ Sec.18	PG	23992	65496
530533	Continental Industries LC	Rawhide No. 7-18	SW¼ NE¼ Sec.18	PG	6601	10821
533916	Rocky Mountain Gas Inc.	Echo No. 16-19-A	SE¼ SE¼ Sec.19	PG	79793	1885481
535631	Rocky Mountain Gas Inc.	Echo No. 02-19-A	NW¼ NE¼ Sec.19	PG	12632	1405848
535632	Rocky Mountain Gas Inc.	Echo No. 01-19-A	NE¼ NE¼ Sec.19	PG	22543	153686
535640	Rocky Mountain Gas Inc.	Echo No. 15-19-A	SW¼ SE¼ Sec.19	PG	118981	1301703
537065	Rocky Mountain Gas Inc.	Echo No. 10-19-A	NW¼ SE¼ Sec.19	PG	19509	573942
537066	Rocky Mountain Gas Inc.	Echo No. 07-19-A	SW¼ NE¼ Sec.19	PG	9181	1046142
537987	Rocky Mountain Gas Inc.	Echo No. 11-19-A	NE¼ SW¼ Sec.19	PG	26222	243093
537989	Rocky Mountain Gas Inc.	Echo No. 9-19-A	NE¼ SE¼ Sec.19	PG	16717	882690
545272	Devon Energy Production Co.	20 Mile Federal No. 12A-1912	SW¼ NW¼ Sec.19	PG	31539	27871
545273	Devon Energy Production Co.	20 Mile Federal No. 14A-1912	SW¼ SW¼ Sec.19	PG	50226	63730
545274	Devon Energy Production Co.	20 Mile Federal No. 21C-1912	NE¼ NW¼ Sec.19	PG	23571	119069
529514	Rocky Mountain Gas Inc.	Echo No. 7-20	SW¼ NE¼ Sec.20	PG	128104	298880
529515	Rocky Mountain Gas Inc.	Echo No. 3-20	NE¼ NW¼ Sec.20	PG	261009	64770
529559	Rocky Mountain Gas Inc.	Rawhide Vandekoppell No. 4-20	NW¼ NW¼ Sec.20	PG	186591	1016005
529615	Rocky Mountain Gas Inc.	Echo Deq No. 2002	SW¼ NE¼ Sec.20	PG	374992	428890
531604	Continental Industries LC	Wings No. 14-20	SE¼ SW¼ Sec.20	PG	8566	128808

537064	Rocky Mountain Gas Inc.	Echo No. 6-20-A	SE¼ NW¼ Sec.20	PG	63313	233185
537988	Rocky Mountain Gas Inc.	Echo No. 12-20-A	NW¼ SW¼ Sec.20	PG	2593	1065028
538919	Rocky Mountain Gas Inc.	Echo No. 13-20-A	SW¼ SW¼ Sec.20	PG	5862	0
546628	Continental Industries LC	Wings No. 11-20	NE¼ SW¼ Sec.20	PG	16092	98743
531606	Continental Industries LC	Wings No. 3-29	NE¼ NW¼ Sec.29	PG	3472	159293
540370	Rocky Mountain Gas Inc.	Airport No. 29-34	SW¼ SE¼ Sec.29	PS	1320	0
546620	Continental Industries LC	Wings No. 14-29	SE¼ SW¼ Sec.29	PG	248	137555
546621	Continental Industries LC	Wings No. 13-29	SW¼ SW¼ Sec.29	PG	25556	94693
546622	Continental Industries LC	Wings No. 10-29	NW¼ SE¼ Sec.29	PG	94	210651
546623	Continental Industries LC	Wings No. 7-29	SW¼ NE¼ Sec.29	PG	453	452585
546624	Continental Industries LC	Wings No. 4-29	NW¼ NW¼ Sec.29	PG	0	57246
546659	Continental Industries LC	Wings No. 6-29	SE¼ NW¼ Sec.29	PG	120	32226
529741	Rocky Mountain Gas Inc.	Walls No. 3	SE¼ NE¼ Sec.30	PG	321315	3114856
529789	Rocky Mountain Gas Inc.	Walls No. B-1-B	SE¼ SE¼ Sec.30	PG	329010	968077
529838	Rocky Mountain Gas Inc.	Walls No. DC-10	SW¼ SE¼ Sec.30	PG	486024	1918261
529839	Rocky Mountain Gas Inc.	Walls No. 747	NE¼ SE¼ Sec.30	PG	55808	2482596
529857	Rocky Mountain Gas Inc.	Red Baron No. 1	NE¼ NE¼ Sec.30	PG	412706	4187674
530592	Rocky Mountain Gas Inc.	Walls No. 30-32	SW¼ NE¼ Sec.30	PG	9054	2675667
541850	Rocky Mountain Gas Inc.	Walls No. 30-12-A	SW¼ NW¼ Sec.30	PS	353686	622977
541899	Rocky Mountain Gas Inc.	Walls No. 30-22-A	SE¼ NW¼ Sec.30	PS	157561	124828
541906	Rocky Mountain Gas Inc.	Walls No. 30-14-A	SW¼ SW¼ Sec.30	PS	465444	676503
541918	Rocky Mountain Gas Inc.	Walls No. 30-11-A	NW¼ NW¼ Sec.30	PS	240863	541888
541919	Rocky Mountain Gas Inc.	Walls No. 30-31-A	NW¼ NE¼ Sec.30	PS	33940	1450553
541921	Rocky Mountain Gas Inc.	Walls No. 30-21-A	NE¼ NW¼ Sec.30	PS	3869	64114
542002	Rocky Mountain Gas Inc.	Walls No. 30-23-A	NE¼ SW¼ Sec.30	PS	74829	139983
540567	Rocky Mountain Gas Inc.	Barbour No. 31-44	SE¼ SE¼ Sec.31	PS	270584	1079080
540568	Rocky Mountain Gas Inc.	Barbour No. 31-34	SW¼ SE¼ Sec.31	PS	114950	763101
540569	Rocky Mountain Gas Inc.	Barbour No. 31-33	NW¼ SE¼ Sec.31	PS	231669	790487
541681	Rocky Mountain Gas Inc.	Walls No. 31-22-A	SE¼ NW¼ Sec.31	PS	40536	139191
541683	Rocky Mountain Gas Inc.	Walls No. 31-12-A	SW¼ NW¼ Sec.31	PS	262952	233142
542063	Rocky Mountain Gas Inc.	Walls No. 31-11-A	NW¼ NW¼ Sec.31	PS	356159	290179
542064	Rocky Mountain Gas Inc.	Walls No. 31-41-A	NE¼ NE¼ Sec.31	PS	2334	161783
542065	Rocky Mountain Gas Inc.	Walls No. 31-42-A	SE¼ NE¼ Sec.31	PS	25252	185220
542318	Rocky Mountain Gas Inc.	Walls No. 31-31A	NW¼ NE¼ Sec.31	PS	1135	116822
543434	Rocky Mountain Gas Inc.	Walls No. 31-32-A	SW¼ NE¼ Sec.31	PG	15086	214027
546625	Continental Industries LC	Wings No. 13-31	SW¼ SW¼ Sec.31	PG	144203	17863
546626	Continental Industries LC	Wings No. 12-31	NW¼ SW¼ Sec.31	PG	78504	2027
546919	Continental Industries LC	Wings No. 9-31	NE¼ SE¼ Sec.31	PG	5427	311287
529939	Rocky Mountain Gas Inc.	Federal No. 727	NW¼ NW¼ Sec.32	PG	594764	923851
540366	Rocky Mountain Gas Inc.	Airport No. 32-42	SE¼ NE¼ Sec.32	PG	129341	672238
540367	Rocky Mountain Gas Inc.	Airport No. 32-21	NE¼ NW¼ Sec.32	PG	70313	1080816
540369	Rocky Mountain Gas Inc.	Airport No. 32-31	NW¼ NE¼ Sec.32	PG	6408	97844

540371	Rocky Mountain Gas Inc.	Airport No. 32-33	NW¼ SE¼ Sec.32	PG	32761	1342525
540372	Rocky Mountain Gas Inc.	Airport No. 32-32	SW¼ NE¼ Sec.32	PG	11942	1177969
540999	Rocky Mountain Gas Inc.	Airport No. 32-41-A	NE¼ NE¼ Sec.32	PG	167073	754036
546916	Continental Industries LC	Wings No. 12-32	NW¼ SW¼ Sec.32	PG	53855	74393
550614	Continental Industries LC	Wings No. 5-32R	SW¼ NW¼ Sec.32	PG	22727	91158

Status Code: PG = Producing Gas Well, PS = Pumping Submersible.

Well data from WOGCC, May, 2005

Reservoir Management Group

D. McGarry Oct., 2005

APPENDIX H

AIRPORT ISSUES

Gillette-Campbell County Airport

Jay Lundell, A.A.E., Executive Director
2000 Airport Road, Suite 108
Gillette, WY 82716
(307) 686-1042
Fax (307) 686-1471

July 20, 2005

Casper Field Office
Bureau of Land Management
ATTN: Nancy Doelger
2987 Prospector Drive
Casper, WY 82604

Re: Eagle Butte West LBA Tract

Dear Ms. Doelger:

While attending the May 17, 2005 public scoping meeting I provided several comments that are important to the Gillette-Campbell County (GCC) airport. On behalf of the GCC airport board, I wish to comment in writing the following concerns.

The GCC airport is concerned with the following issues: 1). Height of mining equipment operating within the airport's influence areas and runway approach path airspace, 2). Height of overburden placement within the airport's influence areas and runway approach path airspace, 3). Blasting effects to the airport, and to aircraft landing and departing the airport, 4). The re-location plan for State Highway 14/16, and its effects to convenient public airport access, and access to the airport's commercial water load-out facility, 5). Future expansion plans per the airport's master plan, and 6). Negative externalities.

Height of Mining Equipment

The closer mining operations are allowed to the airport environment the greater the chance that mining equipment will encroach the airport's protected airspace per Federal Aviation Regulation (FAR) Part 77. This regulation requires an airport's transitional area (Airspace) be protected by a 7:1 slope at least up to a limit that provides a 50-foot terrain and obstacle clearance. Mining equipment such as cranes, drilling masts, and haul trucks may penetrate this airspace. This is just one of several airspace issues that would need to be addressed. Aircraft need to be assured of this protected airspace while landing and departing. Because Campbell County has no height restriction zoning ordinances in place for the airport, the airport may be forced to close if found to not be in compliance with FAR Part 77.

Height of Overburden and Placement

Just as with the height of mining equipment, aircraft need to remain in protected airspace that is free of terrain and obstacles.

Blasting Effects

The closer mining operations are to the airport, the more hazardous this becomes to aircraft during the blasting operations. Presently, Eagle Butte mine contacts the GCC control tower and the tower advises aircraft in the area of the blasting. The control tower will then re-direct these aircraft to the west side of the runway.

If mining is allowed to occur between the two runways, blasting will eliminate most options to aircraft that are landing and departing and will most likely result in airport operational delays.

The effects of blasting near airport facilities are also a major concern. Current blasting to the east of the airport, we believe, has led to the deterioration of the structural integrity of our buildings, i.e. the airport terminal building. This building presently has cracks on the interior floors and exterior walls and may be a result of blasting.

State Highway 14/16 Relocation

Presently, there is no clear plan or proposal that identifies where state highway 14/16 will be relocated. This is a concern to the airport simply because of not knowing how public access will occur from the north to the airport's entrance.

The airport relies on its commercial water load out facility as its major source of revenue. How will access from the north to this facility be addressed? The airport's customers for this facility are the coal bed methane gas producers that have development to the northern portions of Campbell County and eastern portions of Sheridan County. Cutting-off this access from the north to the airport will dramatically reduce airport revenues.

Future Expansion

The airport's Master Plan calls for a future expansion of Runway Three-Four (34) to the north by 1,000 feet and moving existing navigational aids in the same direction and distance. Both will require future property acquisition to the north. Depending upon the location of the final coal lease boundaries as set forth by the Bureau of Land Management, the airport may never have the option of land acquisition and future expansion. Thus, the airport will be permanently land-locked in all directions.

Negative Externalities

Mining operations that are allowed to encroach the airport from the north will result in more dust drifting onto the airport because of the prevailing winds from the north and northwest. Thus, possibly creating visibility problems for aircraft landing and departing. Another negative externality may be the airport's water supply. Even though the airport's well is into the Fortification formation and is approximately 1,200 feet below the surface, what will the effects of mining have on the future water supply of the airport?

I thank you for the opportunity to comment on our concerns as an airport. If you have any questions about our concerns, please contact me at your earliest convenience.

Sincerely,

Jay Lundell

Jay Lundell, A.A.E.
Airport Executive Director

FOUNDATION COAL WEST, INC.

Belle Ayr & Eagle Butte Mines
P.O. Box 3039
Gillette, WY 82717-3039

February, 9, 2006

Jay Lundell
Airport Manager
2000 Airport Road, Ste. 108
Gillette Wyoming 82716

RE: Public Scoping Meeting Comment/Response for Eagle Butte West Extension LBA

Dear Jay:

Enclosed please find final comment/response documentation for comments generated as part of the Eagle Butte West Extension LBA public scoping process. I was pleased to hear that the Airport's concerns have been satisfactorily addressed. Thank you for taking the time to work through these important issues. As suggested, I will contact Vern Fundenberger for a follow-up building inspection as soon as the weather allows for better observation conditions.

Again, thank you for your cooperation in this matter. Foundation Coal West, Inc. considers the Airport an important neighbor.

Please feel free to contact me at anytime should you have questions or concerns.

Sincerely,

William L. Boger
Environmental Supervisor

Cc: File

An affiliate of FOUNDATION COAL

Phone: 307.687.3400 **Fax**: 307.687.3480

1 – EAGLE BUTTE LBA RELATIONSHIP WITH AIRPORT

Runway 34 is located on the northern end of the airport. The LBA is positioned north of the airport. A portion of the LBA is located beneath the airspace for Runway 34.

The approach surface dimensions were taken from plans developed by Washington Infrastructure Services, Inc. for the Gillette-Campbell County Airport.

2 – OBJECT IDENTIFICATION SURFACE DEFINITIONS

A number of imaginary surfaces are defined for obstruction identification. The following surface definitions were extracted from IMAGINARY SURFACES FOR OBSTRUCTION EVALUATION (http://www.ngs.noaa.gov/AERO/OIS/ois.html).

The ***Primary Surface*** is defined as a surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond either end of the runway.

The ***Horizontal Surface*** is defined as a horizontal plane 150 feet above the established Airport Elevation, the perimeter of which is constructed by swing arcs of specified radii from the center of each end of the Primary Surface of each runway. The established elevation of the Gillette-Campbell County Airport is 4,364.5 feet. The elevation of the Horizontal Surface is 4,515 feet.

The ***Conical Surface*** is defined as a surface which extends upward and outward form the outer limits of the Horizontal Surface for a horizontal distance of 4,000 feet. The slope of the conical surface is 20:1 measured in a vertical plane.

The ***Transitional Surface*** is defined as a surface extending outward and upward, at right angles to the runway centerline and runway centerline extended, from the sides of the Primary Surface and Approach Surfaces. The slope is 7:1 and the surface extends until it intersects the Horizontal or Conical Surface.

The ***Approach Surface*** is defined as a surface longitudinally centered on the extended centerline of the runway, beginning at the end of the Primary Surface. The width of this surface is 500 feet at the end of the Primary Surface and flares to a width of 3,500 feet at a distance of 10,000 feet from the end of the Primary Surface. The surface slope is 34:1.

3 – VOLUMETRICS (EXISTING RUNWAY)

For the existing approach surface, an imaginary surface was created including the 34:1 plane of the approach surface and the 7:1 transitional surface. This imaginary surface was clipped against pre-mine topography. Within the plan footprint of the LBA Boundary, there is no topography higher than the imaginary surface. This is also the case within the plan footprint of the BLM Study Area Boundary.

Assuming that an 81-foot high drill is the tallest piece of mining equipment, the imaginary surface was lowered 81 feet to account for the drill height. This lowered surface was clipped against pre-mine topography. Within the plan footprint of the LBA boundary, there is a cut of 1.33 million BCY required. Within the plan footprint of the BLM Study Area, there is a cut of 1.75 million BCY required.

Volumes are summarized in Table 1-1.

4 – VOLUMETRICS (FUTURE RUNWAY)

For the future approach surface, an imaginary surface was created including the 34:1 plane of the approach surface and the 7:1 transitional surface. This imaginary surface was clipped against pre-mine topography. Within the plan footprint of the LBA Boundary, there is no topography higher than the imaginary surface. This is also the case within the plan footprint of the BLM Study Area Boundary.

Assuming that an 81-foot high drill is the tallest piece of mining equipment, the imaginary surface was lowered 81 feet to account for the drill height. This lowered surface was clipped against pre-mine topography. Within the plan footprint of the LBA boundary, there is a cut of 3.66 million BCY required. Within the plan footprint of the BLM Study Area, there is a cut of 4.11 million BCY required.

Volumes are summarized in Table 1-1.

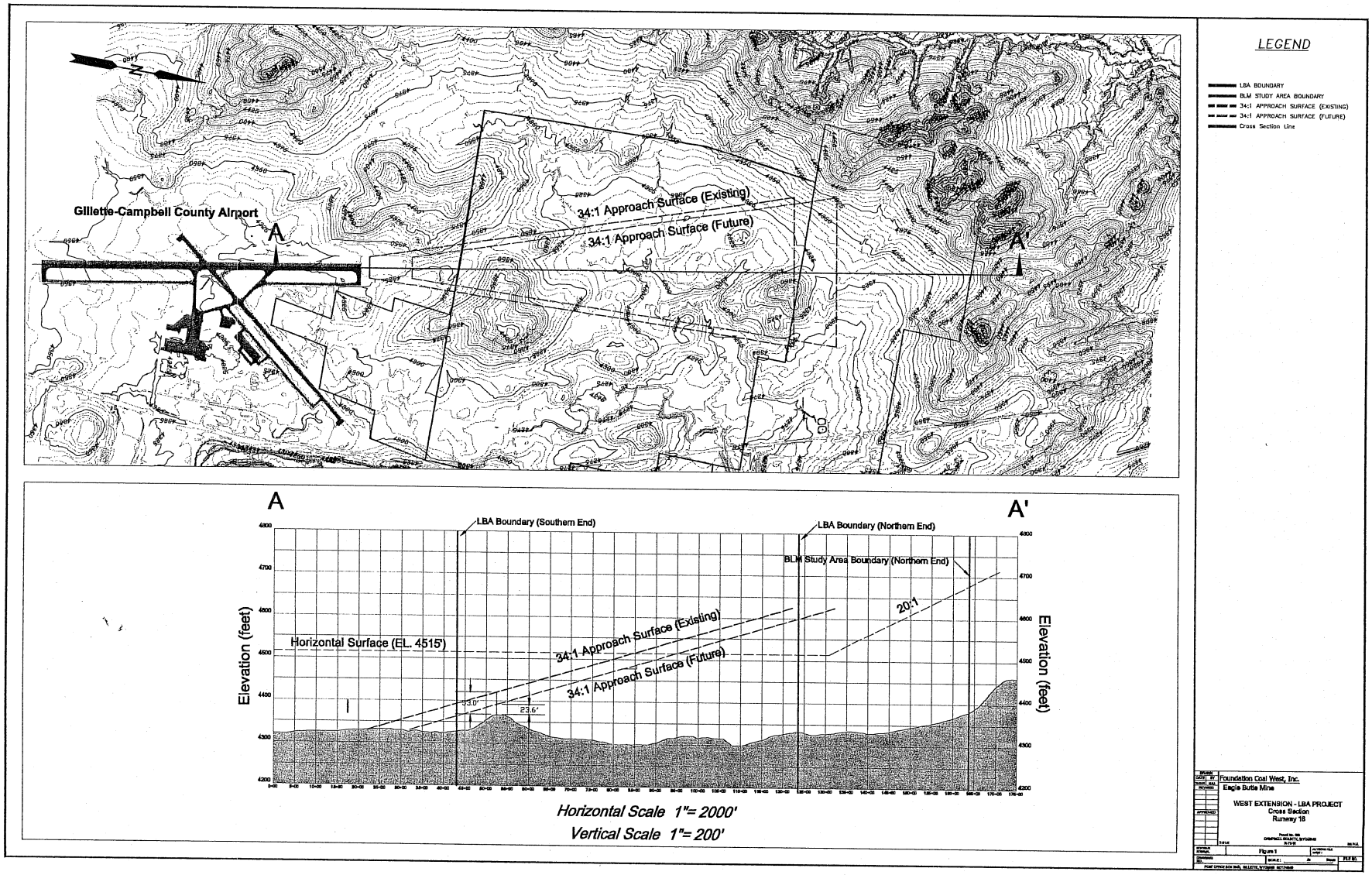
Gillette-Campbell County Airport
34:1 Approach Surface (Existing)
34:1 Approach Surface (Future)
A
A'
LEGEND
LBA BOUNDARY
BLM STUDY AREA BOUNDARY
34:1 APPROACH SURFACE (EXISTING)
34:1 APPROACH SURFACE (FUTURE)
Cross Section Line
LBA Boundary (Southern End)
LBA Boundary (Northern End)
BLM Study Area Boundary (Northern End)
20:1
Horizontal Surface (EL. 4515')
34:1 Approach Surface (Existing)
34:1 Approach Surface (Future)
Elevation (feet)
Horizontal Scale 1"= 2000'
Vertical Scale 1"= 200'
Foundation Coal West, Inc.
Eagle Butte Mine
WEST EXTENSION - LBA PROJECT
Cross Section
Runway 18
Figure 1

Table 1-1
Volumetrics for EB LBA - Airport

Runway	Upper Surface	Lower Surface	Inclusion Boundary	Comment	Cut Volume BCY (millions)
34 (Future)	Pre-Mine topography (2004 aerial)	34:1 approach surface with transitional surface (unadjusted)	LBA boundary	Designed approach surface	0.00
34 (Future)	Pre-Mine topography (2004 aerial)	34:1 approach surface with transitional surface (adjusted down 81 feet)	LBA boundary	Approach surface adjusted for 81' drill height	3.66
34 (Future)	Pre-Mine topography (2004 aerial)	34:1 approach surface with transitional surface (unadjusted)	BLM Study Area	Designed approach surface	0.00
34 (Future)	Pre-Mine topography (2004 aerial)	34:1 approach surface with transitional surface (adjusted down 81 feet)	BLM Study Area	Approach surface adjusted for 81' drill height	4.11
34 (Existing)	Pre-Mine topography (2004 aerial)	34:1 approach surface with transitional surface (unadjusted)	LBA boundary	Designed approach surface	0.00
34 (Existing)	Pre-Mine topography (2004 aerial)	34:1 approach surface with transitional surface (adjusted down 81 feet)	LBA boundary	Approach surface adjusted for 81' drill height	1.33
34 (Existing)	Pre-Mine topography (2004 aerial)	34:1 approach surface with transitional surface (unadjusted)	BLM Study Area	Designed approach surface	0.00
34 (Existing)	Pre-Mine topography (2004 aerial)	34:1 approach surface with transitional surface (adjusted down 81 feet)	BLM Study Area	Approach surface adjusted for 81' drill height	1.75

Notes:
Volumetrics based on 34:1 approach surface and 7:1 transitional surface.
Surfaces approximated by MEI based upon plans completed by Washington Infrastructure Services, Inc. for the Gillette-Campbell County Airport.

Eagle Butte Mine
Airport – Scoping Meeting Comment/Response Document
February 9, 2006

The following are responses to the Gillette-Campbell County Airport comments dated July 20, 2005. Airport management compiled the comments as part of the public scoping associated with Eagle Butte's West Extension Lease by Application (LBA). The public scoping meeting was conducted May 17, 2005. Responses to the Airport's comments follow and were developed following discussions between representatives of Eagle Butte and the Airport.

Height of Mining Equipment:

Comment: The closer mining operations are allowed to the airport environment the greater the chance that mining equipment will encroach the airport's protected airspace per Federal Aviation Regulation (FAR) Part 77. This regulation requires an airport's transitional area (Airspace) be protected by a 7:1 slope at least up to a limit that provides a 50-foot terrain and obstacle clearance. Mining equipment such as cranes, drilling masts, and haul trucks may penetrate this airspace. This is just one of several airspace issues that would need to be addressed. Aircraft need to be assured of this protected airspace while landing and departing. Because Campbell County has no height restriction zoning ordinances in place for the airport, the airport may be forced to closed if found to not be in compliance with FAR Part 77.

Response: An analysis (see attached documentation and schematic) shows that there is a small topographic rise (hill) at the southern end of the LBA boundary just north of Runway Three-Four (34). This is the only area within the Airport's approach surface where mining equipment could penetrate the Airport's 34:1 approach surface. The mines blasting drills operating at existing topographic elevations with masts extended would penetrate the approach surface by approximately 28 feet. Shovels and trucks would operate at bench elevations below the existing topography and therefore would be well below the approach surface.

Eagle Butte obtained a permit from the Federal Aviation Administration (FAA) while conducting mining operations within the approach surface of the Airport's cross-wind runway. This permit resulted in specific requirements for lighting of mine equipment and establishment of protocols and notification procedures when mining activities were conducted within designated areas. Unlike the cross-wind runway, Runway 34 is designed for instrument approach which implies that plane traffic utilizes the runway in fair and foul weather conditions day or night. During the time Eagle Butte would operate the drill in the area where it penetrates the approach surface the mine would conduct drilling operations only from sunrise to sunset and when visibility is unrestricted. Eagle Butte will pursue the necessary permits with the FAA prior to mining in this area. Preliminary mine plans suggest mining in the area of the glide slope in approximately 2019.

The duration of time that the drill would be required to operate in the area where the approach surface is penetrated is considered short-term. A duration estimate was derived by calculating the volume of overburden obtained by lowering the 34:1 approach surface 81 feet to account for the drill height. This lowered surface was clipped against the existing topography to determine volumes of overburden that would require drilling. Whether using the existing approach surface or a future expansion approach surface (see Table 1) the maximum volume of overburden to be moved is approximately 4 million bank cubic yards. This equates to approximately two weeks to one month of drill time necessary to prepare the area for blasting and subsequent mining. The Airport agrees that similar protocols that were established for the cross-wind runway would be acceptable in this case.

Height of Overburden and Placement:

Comment: Just as with the height of mining equipment, aircraft need to remain in protected airspace that is free of terrain and obstacles.

Response: Eagle Butte Mine, as part of the State mining and reclamation plan permitting process has flexibility when designing the post-mine topography. Therefore, within the confines of the existing approach surface the surface topography can be altered and designed to improve the relief surfaces. For example, the hill present at the north end of Runway 34 doesn't need to be reconstructed in this area in the post-mine environment. Eagle Butte will work with the Airport and design a post-mine topography that meets with their approval. This will ensure that the height of any overburden placement remains at an elevation where mining equipment will not impact the protected airspace.

Blasting Effects:

Comment: The closer mining operations are to the airport, the more hazardous this becomes to aircraft during the blasting operations. Presently, Eagle Butte mine contacts the GCC control tower and the tower advises aircraft in the area of the blasting. The control tower will then re-direct these aircraft to the west side of the runway.

If mining is allowed to occur between the runways, blasting will eliminate most options to aircraft that are landing and departing and will most likely result in airport operational delays.

Response: Eagle Butte agrees with the Airport that mining should not occur between the runways. During the tract delineation process Eagle Butte will provide this comment to the BLM. The Airport should also provide comment to the BLM during the comment period after the Draft EIS is made available to the public by the BLM.

Comment: The effects from blasting near the airport facilities are also a major concern. Current blasting to the east of the airport, we believe, has led to the deterioration of the structural integrity of our buildings, i.e. the airport terminal building. This building presently has cracks on the interior floors and exterior walls and may be a result of blasting.

Response: Blasting is conducted in accordance with Chapter 6 of the Wyoming Department of Environmental Quality Rules and Regulations. These regulations establish vibration standards that have been developed to protect both primary structures (dwellings, public buildings, schools, etc.) and secondary structures (pipelines, tunnels, bridges, etc.). Eagle Butte conducts its blasting program in compliance with these regulations and has not exceeded the vibration standards designed to protect such structures. A pre-blast survey of the Airport complex was conducted in 2001. Eagle Butte can review this survey with the Airport and conduct a follow-up survey if required. It should be noted that future mining operations within the proposed LBA will be conducted at distances far greater than those of current operations and this should further minimize blasting related concerns.

State Highway 14/16 Relocation:

Comment: Presently, there is no clear plan or proposal that identifies where state highway 14/16 will be relocated. This is a concern to the airport simply because of not knowing how public access will occur from the north to the airport's entrance.

The airport relies on its commercial water loadout facility as its major source of revenue. How will access from the north to this facility be addressed? The airport's customers for this facility are the coal bed methane gas producers that have development to the northern potions of Campbell County and eastern portions of Sheridan County. Cutting-off this access from the north to the airport will dramatically reduce airport revenues.

Response: Eagle Butte has reviewed the road alternatives with the Airport. These plans show that Eagle Butte will not cut-off access to the Airport's water loadout. Three alternatives have been submitted to the Wyoming Department of Transportation (WYDOT). WYDOT has initiated the public scoping process, which includes public scoping meetings. WYDOT has informed Eagle Butte that the public will have considerable input on which road alternative will ultimately be selected. The first public meeting is scheduled for February 7, 2006.

Future Expansion:

Comment: The airport's Master Plan calls for a future expansion of Runway Three-Four (34) to the north by 1,000 feet and moving existing navigational aids in the same direction and distance. Both will require future property acquisition to the north. Depending upon the location of the final coal lease boundaries as set forth by the Bureau

of Land Management, the airport may never have the option of land acquisition and future expansion. Thus, the airport will be permanently land-locked in all directions.

Response: The Airport's Capital Improvement Plan depicts a possible expansion of Runway 34 in the 2013 timeframe. Preliminary mine plans show mining in the future expansion area in approximately 2020. Discussions with Airport representatives suggest that the expansion has been on the Master Plan for an extended period of time. Even though this expansion is listed on the Master Plan there are currently no definitive plans at this time to expand the Airport's Runway 34. The Airport is further concerned that with current mining to the east, future mining to the north and the City of Gillette to the south the Airport will become land-locked. The land to the north of Runway 34 is owned by Foundation Wyoming Land Company (FWLC). Following mining and backfill placement FWLC would be agreeable to a land easement or acquisition proposal for use of the land by the Airport. If this occurs, coordination between Eagle Butte Mine and the Airport on the design for grading and surface elevation of the backfill during reclamation activities could be completed. This would address these possible future expansion plans.

Negative Externalities:

Comment: Mining operations that are allowed to encroach the airport from the north will result in more dust drifting onto the airport because of the prevailing winds from the north and northwest. Thus, possibly creating visibility problems for aircraft landing and departing. Another negative externality may be the airports water supply. Even though the airport's well is into the Fortification formation and is approximately 1,200 feet below surface, what will the effects of mining have on the future water supply of the airport?

Response: Eagle Butte is required by permit to control fugitive dust. Eagle Butte uses fugitive dust control processes that meet the Wyoming Department of Environmental Quality requirements for Best Available Control Technology. Eagle Butte's monitoring network has recorded no exceedences of the applicable National Ambient Air Quality Standards. In recent years Eagle Butte has purchased larger water trucks to increase the efficiency of dust control efforts. Aggressive management practices including timely reclamation, seeding and in some cases ripping soils to control erosion are utilized. Dust cannot be completely eliminated but it can be managed with aggressive control practices.

Eagle Butte's deep wells are located in the same water bearing formation (Fort Union) as the Airport. This aquifer is well below current mining operations and therefore drawdown impacts from mining are not expected.

Boger, William L.(BE) 3410

From: Jay Lundell [JDL75@ccg.co.campbell.wy.us]
Sent: Friday, February 03, 2006 3:13 PM
To: Boger, William L.(BE) 3410
Subject: Re:

Bill,

Sorry for the delay. I just finished reading your responses and from my perspective all of your responses have addressed the airport's concerns. I see that I identified a non-existing formation, and I stand corrected as you have noted the correct formation to be Ft. Union. Sorry for this mis-representation, I must have been hunting elk or something else in my mind when I mentioned Fortification.

Everything is very well written and again I'm very satisfied with your responses. As far as setting up a building inspection, please contact Vern Fundenberger at 686-0612 (Operations Facility) or 680-6588 (Cell phone) Thanks!

Jay

>>> "Boger, William L.(BE) 3410" <WBoger@foundationcoal.com> 1/30/2006
>>> 4:41 PM >>>
Jay;

Attached are two files. One the comment/responses to the scoping meeting comments and the other a document that Mine Engineers Inc. put together on Runway 34. Please review the responses and I hope that I have included the information we discussed during our meeting. Consider this a Draft and let me know if the information is satisfactory or as we discussed.

Thanks Bill

APPENDIX I

COMMENT LETTERS ON THE DRAFT EIS
AND RESPONSES

1

Lesley Collins/CFO/WY/BLM/DOI
11/13/2006 08:46 AM

To Nancy Doelger/CFO/WY/BLM/DOI@BLM, Mike Karbs/CFO/WY/BLM/DOI@BLM
cc
bcc
Subject Fw: public comment on eis for eagle butte west coal lease application wyw 155132 oct

Lesley A. Collins
----- Forwarded by Lesley Collins/CFO/WY/BLM/DOI on 11/13/2006 08:46 AM -----

Bk1492@aol.com
11/12/2006 04:39 AM

To casper_wymail@blm.gov, comments@whitehouse.gov, vicepresident@whitehouse.gov
cc
Subject public comment on eis for eagle butte west coal lease application wyw 155132 oct

my comments are for the public record on this lease. i have comments as to each page:
es-2 shows an area so torn up its firtually all destroyed by profiteering. i totally object to this lease. this land should be left undisturbed. the effect on wildlife, birds/vegetation is totally horrendous. the mining affects air all across this country. the polluted air goes east across the entire united states.

1

page 2-26 the impacts are enormous. this project should not go forward. i think only mining profiteers that have equpiment that doesnot blast out nox should ever be allowed anywhere. why would blm allow a company that uses equipment that blasts out nox be allowed to operate on national taxpayer owned land? to poison us all?

pg 3-46 - this equipment causes acid rain. the health of people, birds, animals, trees are all negatively impacted by this kind of development. why should we die for these profiteers?

national taxpayers own this land. blm is allowing developers to usurp what should be used to protect all americans, not used to enrich local profiteers. the effects on animals, birds, people are highly toxic. dont give this lease.

2

pg 3-125 - a "promise" is made to "relocate" raptor nests. what a fake and lie. raptors do not "relocate" based on human intervention. in fact they avoid humans totally

big game animals live where the food and cover are. this a lie flat and outright when this report says they are "highly mobile". yes, they can starve to death when "highly mobile" too.

pg 3-108 - so many species will be wiped out by this blm atrocity. this is taxpayer owned land . blm forgets it works for the entire american public and should be working for its protection, not its demise at the hands of profiteers.

3

this plan is extremely risky with this lessee being able to rape and pillage this land and then go out of business, leaving -once again - the national taxpayers holding the poisoned land and paying to clean it up. there is no guarantee of clean up by a corporation which can go out of buisiness at the drop of a hat.

blm is an extremely nasty agency - look at its treatment of wild horses. which are seized from their home lands and thrown in to slaughterhouses where they die grisly deaths. any agency with such a nasty, horrific agenda shows that it does not protect american interests. this agency is as bad as terrorists.

page b-2 - wyoming negligence in not considering any birds or animals threatened shows the worst environmental record in the entire u.s. how can this state be so negligent? are they not aware this country is finite?

b. sachau
15 elm st
florham park nj 07932

United States Department of the Interior

2

U. S. GEOLOGICAL SURVEY

Reston, VA 20192

In Reply Refer To:
Mail Stop 423

November 21, 2006

Ms. Nancy Doelger
Bureau of Land Management
2987 Prospector Drive
Casper, WY 82604

RE: Draft Environmental Impact Statement for the Eagle Butte Mine in the Wyoming Powder River Basin

Dear Ms. Doelger:

The U.S. Geological Survey has reviewed the draft environmental impact statement and has no comments.

Sincerely,

/Signed/
Lloyd H. Woosley, Jr., P.E.
Chief, Environmental Affairs Program

Cc: EAP Chron, MS 423
USGS:WRD:LWOOSLEY:bjjohnso:x6832:11/21/06

WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

Phone: (307) 777-4600 Fax: (307) 777-4610

Web site: http://gf.state.wy.us

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CLIFFORD KIRK
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3

December 6, 2006

WER 319.03
Bureau of Land Management
Casper Field Office
Draft Environmental Impact Statement
Eagle Butte West Coal Lease Application
WYW155132
Campbell County

DEC -8 PM 3:03

Nancy Doelger
Bureau of Land Management
Casper Field Office
2987 Prospector Drive
Casper, WY 82604-2968

Dear Ms. Doelger:

The staff of the Wyoming Game and Fish Department has reviewed the Environmental Impact Statement for the Eagle Butte West Coal Lease Application WYW155132 in Campbell County. We offer the following comments for your consideration.

We provided terrestrial wildlife and aquatic comments on this project in a letter dated July 19, 2005, and those remain valid. It appears the BLM has considered impacts to wildlife and wildlife-related recreation in the Draft EIS. We recommend the Final EIS and Record of Decision include the recommended mitigation for negative impacts.

1 We have two minor editorial comments to improve the accuracy of the document. On several pages, the document refers to "critical [big game] ranges" (e.g., pages 3-108 and 3-134). "Critical" is a federal designation for T&E species habitat. Our agency designates "crucial" ranges for big game. For clarification, we recommend making that change. Also, on page 3-118, the graph refers to "No. Males per Lek." For accuracy and clarification, this should read "Average No. Males per Lek."

Thank you for the opportunity to comment.

Sincerely,

for JOHN EMMERICH
DEPUTY DIRECTOR

JE:VS:gfb

cc: USFWS

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

4

December 11, 2006

Bureau of Land Management
Casper Field Office
Attn: Nancy Doelger
2987 Prospector Drive
Casper, WY 82604

RE: Response to Eagle Butte Coal LBA Draft EIS

Dear Ms. Doelger:

These comments regarding the Eagle Butte Coal LBA Draft EIS are specific to this agency's mission within State government which is protection of public health and the environment. In that regard, these comments are meant to, in association with all other agency comments, assist in defining the Official State Position. Any comments regarding Land Quality Division concerns will be under separate cover.

We appreciate the opportunity to comment in this process and look forward to working with you in the future. If you have any questions, please feel free to contact me at 307-777-7555.

Sincerely,

Todd Parfitt
Deputy Director

Enclosure

cc: Governor's Planning Office
Kelly Bott
Darla Potter

Herschler Building • 122 West 25th Street • Cheyenne, WY 82002 • http://deq.state.wy.us

ADMIN/OUTREACH	ABANDONED MINES	AIR QUALITY	INDUSTRIAL SITING	LAND QUALITY	SOLID & HAZ. WASTE	WATER QUALITY
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		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

DRAFT EIS COMMENT FORM

Reviewer:	Darla Potter / Kelly Bott	Agency:	WDEQ - AQD		Date: 10/31/2006
Contact (phone/email):	307-777-7346 / -6088	dpotte@state.wy.us	kbott@state.wy.us		Comments Due: 12/18/2006

Page	Section	Paragraph	Line	Comment	Follow up to Comment
3-23	3.4.1.1	Table 3-3		Please remove reference to 1-hour Averaging Time for Ozone in the table **or** include text in the EIS that provides the following explanation. EPA published a final rule on August 3, 2005 identifying areas for which the 1-hour ozone standard was revoked. In that notice, the 1-hour ozone standard was revoked, effective June 15, 2005, for all areas of Wyoming. The WDEQ-AQD then completed the process to remove the 1-hour standard from Wyoming Air Quality Standards & Regulations. That action was completed and the effective date for the removal from the regulations was January 30, 2006. As a result, there is no federal 1-hour ozone standard that applies to Wyoming and there is no state 1-hour ozone standard that applied to Wyoming.	
3-23	3.4.1.1	Table 3-3		Please update the PM2.5 standards. On September 21, 2006, EPA announced final revisions to the National Ambient Air Quality Standards for particulate matter, which were published in the Federal Register on October 17, 2006 and take effect on December 18, 2006. The revision strengthens the 24-hour PM2.5 standard from 65 to 35 ug/m3 and revokes the annual PM10 standard of 50 ug/m3. EPA retained the existing annual PM2.5 standard of 15 ug/m3 and the 24-hour PM10 standard of 150 ug/m3. After the final rule becomes effective, the State of Wyoming will enter into rulemaking to revise the Wyoming Ambient Air Quality Standards. It is our understanding that the final EIS will be released in 2007, after the new National Ambient Air Quality Standards for particulate matter become effective.	
3-30	3.4.2.1	1st Column, last sentence		Prior to the last sentence in the column, beginning "Wyoming's ambient air standards...", please include the following statement: "On September 21, 2006, EPA announced final revisions to the National Ambient Air Quality Standards for particulate matter, which were published in the Federal Register on October 17, 2006 and take effect on December 18, 2006. The revision strengthens the 24-hour PM2.5 standard from 65 to 35 ug/m3 and revokes the annual PM10 standard of 50 ug/m3. EPA retained the existing annual PM2.5 standard of 15 ug/m3 and the 24-hour PM10 standard of 150 ug/m3. After the final rule becomes effective, the State of Wyoming will enter into rulemaking to revise the Wyoming Ambient Air Quality Standards."	

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U.S. Department of the Interior - Bureau of Land Management
COMMENT FORM
Public Hearing
Eagle Butte West Coal Lease Application Draft EIS
Gillette, Wyoming
November 14, 2006

LEAVE COMMENTS AT REGISTRATION TABLE. You can also mail them to: Bureau of Land Management; Nancy Doelger, Project Manager; Casper Field Office; 2987 Prospector Drive, Casper, Wyoming 82604. They can be faxed to the attention of Nancy Doelger at 307-261-7587, or emailed to the attention of Nancy Doelger at casper_wymail@blm.gov.

Please Read Carefully

Comments, including names and street addresses of respondents will be available for public review at the Casper Field Office; 2987 Prospector Drive, Casper, Wyoming during regular business hours (7:30 a.m. to 4:30 p.m.) Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish to withhold your name or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your comments. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Name/Organization: Gayle + Ginny Nannemann

Address: 1810 GOLD DR **Zip Code:** 82716

Comments:

1 Correction on housholds in T 50N R72W Sec.8 Maps show one. There are three housholds

2 We are concerned with the effect mining will have on our water, both domestic and livestock.

3 Air Quality - The brown haze That hangs in the valley already

4 Blasting - damage to foundations and underground pipes etc already felt when they were blasting.

Signature: Ginny Nannemann

WY 1278-4 (9/99)

6

ENCOURAGING RESPONSIBLE DEVELOPMENT TODAY ~ FOR TOMORROW

934 N. MAIN ST. SHERIDAN, WY 82801 (307) 672-5809 FAX (307) 672-5800
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POWDER RIVER BASIN
Resource Council

December 18, 2006

Bureau of Land Management
Casper Field Office
Attn: Nancy Doelger
2987 Prospector Drive
Casper, WY 82604
casper_wymail@blm.gov

RE: Draft EIS Eagle Butte Coal Lease Application

Dear Ms. Doelger:

Thank you for the opportunity to review and present our comments and concerns on the proposed Eagle Butte Coal Lease Application.

The Powder River Basin Resource Council has a long history of involvement working for responsible coal leasing and mining in the Powder River Basin. We have members living in and around the Eagle Butte mine that have been negatively impacted in the past and whose health and welfare have been threatened by dangerous levels of NOx gases and by poor air quality emissions from the Eagle Butte Mine.

1 Alternatives: We request that the proposed lease expansion carefully consider an alternative to reduce the impacts to nearby landowners and members of the public. We believe the BLM should consider an alternative that reviews a lease boundary that ensures the least impact to public locations, including the airport, the highway and Rawhide school and to private landowners. We request a broader alternatives review in the final EIS that provides a lease boundary with a larger buffer to the airport, Rawhide School and private landowners.

2 Please provide more analysis of potential impacts to the airport and please provide information regarding FAA regulations and any restrictions regarding proximity to mining operations.

Site Specific NOx emissions: - the Draft EIS contains incorrect information in the executive summary and on page 3-47 and 3-51 where the document states: "To date,

3 there have been no reported events of public exposure to NO2 from blasting activities at the Eagle Butte Mine." and "Residents in the area have reported observing blasting clouds coming off of blasts at the mine, but there have been no events of public exposure to NO2 from blasting activities at the Eagle Butte Mine reported to WDEQ/LQD through 2005. Contrary to these statements, in the past several years there have been several reported events of public exposure to NO2 from blasting activities at the Eagle Butte Mine where large orange clouds drifted off the site and engulfed nearby homeowners. It was these events and exposures that lead to the public outcry and concerns brought to the DEQ, the Land Quality Advisory Board, the Environmental Quality Council, the Office of Surface Mining and the EPA.

4 Further, regarding NOx emissions the EIS should evaluate whether or not there is an increased potential for NOx emissions in the proposed area to be mined and ensure if those locations are closer to public areas like schools and airports and ensure that there are protections in place for the public from NOx blasting gases. The EIS should also evaluate what conditions, wetter coal, might exist that would lead to increased NO2 gas emissions during blasting operations.

5 Air Quality and Particulate Matter - This organization has received repeated complaints and concerns over the years regarding the degraded and poor air quality caused to nearby landowners from the dust and other emissions coming off the Eagle Butte Mine. Please provide more discussion regarding both site specific air quality impacts to the area and threats to health. Also, please provide more discussion regarding the cumulative impacts to air quality from all sources including coal mining, coal plants, CBM development and other sources. Also, please provide more information regarding the impact to nearby Class I airsheds and adequate air quality monitoring to demonstrate the impacts from all cumulative sources. Where impacts are noted to exceed standards please provide required mitigation measures to reduce those impacts.

6 A matter that receives little discussion in this EIS is the issue of mercury emissions. The DEIS states that leasing the Eagle Butte West LBA tract will not result in increased or new emissions of mercury. Please explain and justify this statement. Will the Eagle Butte West LBA tract result in longer term mercury emissions? Please provide more discussion on the impacts of mercury to wildlife and human health.

Another matter that BLM completely ignores is the issue of CO2 emissions from burning coal. Please provide a discussion of the impacts of burning coal and the resultant greenhouse gas issues. What role does burning coal play in the build up of greenhouse gas emissions in the atmosphere? What impacts are predicted for climate change? How will a potential carbon tax which is being discussed in order to address greenhouse issues impact the proposed mining of coal?

7 Groundwater drawdown and loss - The discussion on groundwater fails to note the number of water wells in the area that have been impacted over the years and have been replaced due to overlapping impacts from coal mining and CBM development. The

DEIS also fails to discuss the growing demand for water in the Gillette area and the issue of where this water supply will be met.

8 Wildlife Issues – the DEIS fails to mention that elk have been documented and killed in the past several years on a more frequent basis in the area of the proposed LBA north and east of the airport. Please provide more up to date information on elk usage in the area.

9 Sage Grouse leks are known to historically occur in and near the proposed area. Please provide updated information on the status of the leks and the sage grouse in this area. Given the critical nature of this species please provide protection for the leks and buffer areas to protect this species. Please provide a map showing the leks and known sage grouse populations in the area in the Final EIS. Please state the impacts to the bird from the proposed Eagle Butte LBA.

Thank you for the opportunity to review and comment on the Proposed Eagle Butte LBA. We look forward to your responses and to the reviewing the Final EIS.

Sincerely,

Jill Morrison

Jill Morrison
Powder River Basin Resource Council

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

7

Ref: 8EPR-N

DEC 18 2006

Ms. Nancy Doelger
Bureau of Land Management, Casper Field Office
2987 Prospector Drive
Casper, Wyoming 82604

Re: Draft Environmental Impact Statement for
Eagle Butte West Coal Lease Application
Campbell County, Wyoming
CEQ # 20060430

Dear Ms. Doelger:

Thank you for forwarding a copy of the Eagle Butte West Coal Lease Application Draft Environmental Impact Statement (DEIS) to the U.S. Environmental Protection Agency Region 8 (EPA) for review. In accordance with our responsibilities under the National Environmental Policy Act (NEPA), 42 U.S.C. Section 4321, et. seq., and Section 309 of the Clean Air Act, EPA Region 8 has reviewed the DEIS and offers the following comments.

The DEIS assesses both the site-specific and cumulative environmental impacts of leasing and developing federal coal included in the Eagle Butte West Lease by Application (LBA) Tract. Under the Proposed Action, BLM would hold a competitive lease sale and issue a maintenance lease for a 1,397.6 acre tract. The DEIS also considers an alternative to expand the proposed lease area to 2,372.6 and a no action alternative. The area under consideration is located adjacent to the existing Eagle Butte Mine, approximately three miles north of Gillette, Wyoming, and includes Rawhide Elementary School, several occupied dwellings, and a public road. The DEIS indicates that the coal underlying these structures is considered unsuitable for mining. However, mining operations may still occur within close proximity of the buildings under the lease areas added by the Proposed Action and Alternative 1.

1 After careful review of the DEIS, EPA's primary concerns are assuring that air quality in the Powder River Basin does not exceed the Clean Air Act standards and minimizing potential localized air quality impacts from blasting and mining activities to the surrounding school and homes. The air quality modeling conducted under the Powder River Coal Review indicates a potential for cumulative impacts to exceed significant thresholds for the National Ambient Air Quality Standards (NAAQS) for particulate matter as PM_{10} and some increments under the Prevention of Significant Deterioration (PSD) regulations. While air monitoring stations near the Eagle Butte Mine have not measured exceedances of the 24-hour PM_{10} standard, other monitoring stations in the Powder River Basin have. Consequently, both monitoring data and

modeling results suggest potentially significant cumulative PM_{10} impacts caused by existing or future development. Given the magnitude of the predicted PM_{10} violations, nearly three times the level of the 24-hour PM_{10} NAAQS, Best Available Work Practice mitigation should be required for this project.

2 The FEIS should identify all relevant, reasonable mitigation measures for air quality impacts, even if they are outside the jurisdiction of BLM. In addition, EPA recommends the FEIS identify a strategy to assure compliance with the 24-hour and annual PM_{10} NAAQS. Specifically, the FEIS should identify both regulatory and non-regulatory processes that are in place to address air quality concerns in the Powder River Basin, as well as mitigation measures. EPA strongly recommends BLM consider addressing additional source and fugitive dust control at the regional level. This effort should involve BLM's Casper and Buffalo Field Offices in cooperation with Wyoming Department of Environmental Quality (DEQ) and EPA. As expressed in our comment letter on the Maysdorf Coal Lease Application DEIS dated July 26, 2006, we have coordinated these comments with EPA Region 8's Air Program and suggest we convene a meeting with BLM, DEQ, and EPA to discuss these issues.

3 EPA is also concerned about the proximity of the mining operation to homes and the Rawhide Elementary School. Children may be especially susceptible to the health effects of NO_2 and fine particulates. Children have greater exposure to air pollution because of their faster breathing rates and the amount of time spent playing outdoors. Particulates and NO_2 can aggravate asthma, irritate airways, coughing and cause breathing difficulties. The Final EIS should detail mitigation and monitoring measures that will be undertaken to minimize exposure to particulates and NO_2 for children at the nearby elementary school.

It is EPA's responsibility to provide an independent review and evaluation of the potential environmental impacts of the project. Since the DEIS was published, BLM has identified a preferred alternative that closely approximates the Proposed Action. However as the preferred alternative was not identified in the DEIS, EPA is rating the DEIS based on both the Proposed Action and Alternative 1. Under both ~~of these alternatives~~ BLM would hold a competitive coal lease sale and issue a maintenance lease to the successful bidder. EPA is rating this DEIS as Environmental Concerns - EC, Insufficient Information - 2 (EC-2). The EC rating means that EPA's review of the proposed alternatives has identified environmental impacts to air quality that should be avoided in order to fully protect the environment. Mitigation measures should be identified and implemented to reduce the environmental impact. The 2 rating means the DEIS does not contain sufficient information to fully assess the environmental impacts that should be avoided in order to fully protect the environment. A full description of EPA's EIS rating system is enclosed.

If you have any questions regarding the NEPA process or this rating, please contact Joyel Dhieux at 303-312-6647 or me at 303-312-6004. Also, please make note that the EPA Region 8 office will be moving in January 2007. After January 5, 2007, all mail, FedEx and UPS shipments should be sent to our new mailing address:

US EPA Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

Sincerely,

Larry Svoboda
Director, NEPA Program
Office of Ecosystems Protection and Remediation

Enclosures

cc: Cindy Cody, EPA Region 8 Air Quality Planning and Management Program
Darla Potter, Wyoming Dept. of Environmental Quality

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements
Definitions and Follow-Up Action*

Environmental Impact of the Action

LO - - Lack of Objections: The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - - Environmental Concerns: The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - - Environmental Objections: The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - - Environmentally Unsatisfactory: The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 - - Adequate: EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - - Insufficient Information: The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - - Inadequate: EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

Detailed Comments by the Region 8 Environmental Protection Agency
Draft Environmental Impact Statement for the Eagle Butte West Coal Lease Application
Campbell County, Wyoming

Air Quality

EPA commends BLM for undertaking the Powder River Coal Review to help evaluate the cumulative impacts of coal and other energy development in the Powder River Basin. In an area with rapidly expanding energy development, such as the Powder River Basin, cumulative impact analysis is a dynamic process. For example in August 2006, Medicine Bow Fuel and Power LLC announced it had awarded a contract to an engineering firm to develop, design and construct a coal-to-liquids plant in northern Carbon County, Wyoming, beginning in the fourth quarter 2006. As other coal mining or gas development is proposed in the Powder River Basin, the cumulative air impacts analysis will need to be revisited and updated to reflect the rapidly expanding energy development.

One of EPA's primary concerns is assuring that air quality in the Powder River Basin does not exceed the Clean Air Act standards. Potential cumulative impacts modeled by BLM in the Powder River Coal review are disclosed in Chapter 4 of this EIS. Projected cumulative impacts exceed the National Ambient Air Quality Standards (NAAQS) for particulate matter as PM_{10} and some of the increments under the Prevention of Significant Deterioration (PSD) regulations. While air monitoring stations near the Eagle Butte Mine have not measured exceedances of the 24-hour PM_{10} standard, other PM_{10} stations in the Powder River Basin have. Consequently, both monitoring data and modeling results suggest potentially significant cumulative PM_{10} impacts caused by existing or future development.

Section 4.2.3 includes reference to a January 24, 1994, Memorandum of Agreement (MOA) between EPA and the Wyoming Department of Environmental Quality (DEQ) which allows the Wyoming DEQ to conduct air quality monitoring in lieu of short term modeling for assessing the significance of coal mining impacts in the Powder River Basin. However, this same agreement requires Wyoming DEQ to implement "Best Available Work Practice" mitigation measures at any mine where an exceedance of the PM_{10} NAAQS has occurred. Exceedances have occurred at other Wyoming coal mines in recent years and given the magnitude of the predicted 24-hour PM_{10} violations, nearly three times the level of the PM_{10} NAAQS, Best Available Work Practice mitigations should be required for this project.

It should also be noted that the 1994 MOA does not apply to modeled violations of the annual PM_{10} NAAQS because modeled predictions tend to be more accurate for annual averages. The DEIS also predicts violations of the annual average NAAQS. Even without the predicted 24 -hour PM_{10} NAAQS violations, the predicted annual NAAQS violations are a strong indication of the need for Best Available Work Practice mitigation of PM_{10} emissions throughout the Powder River Basin.

As noted in Section 3.4.2.3 of the DEIS, increased activity by operators of coal bed natural gas projects and dry conditions have contributed to fugitive dust problems. EPA strongly recommends BLM consider addressing additional source fugitive dust control at the regional level of the Casper and Buffalo Field Offices. BLM should coordinate with the Wyoming Department of Environmental Quality, Air Quality Division, to identify and track cases where monitoring shows exceedances of air quality standards for particulate matter, and give priority to activities that the Air Quality Division issues Notices of Violation.

The third paragraph of Section 3.4.1.1 (page 3-22) includes the following description of the NAAQS and Wyoming Ambient Air Quality Standards (WAAQS): "The NAAQS and WAAQS set the absolute upper limits for specific air pollutant concentrations at all locations where the public has access." EPA recommends that the FEIS clarify the statement to prevent any misunderstanding. For example, BLM's recent Draft EIS for the Pit 14 Coal Lease-by-Application (Black Butte Mine) has the following wording: "The NAAQS and WAAQS are health-based criteria for the maximum acceptable concentrations of air pollutants at all locations to which the public has access."

Proximity to Residences and Elementary School

EPA is concerned about the potential health risk to the public associated with short term exposure to NO_2 from blasting emissions. The proposed Eagle Butte West mine is closer to population centers, such as schools, bus stops, roads and dwellings, than the other major coal mining operations in the Powder River Basin and we believe this factor increases the potential risk to the public. In Section 3.4.3.3, the DEIS discusses various mitigation strategies that have been used historically to mitigate NO_2 exposures in the Powder River Basin, but does not commit to any specific mitigation strategy. The DEIS acknowledges that while no one single procedure has consistently proven successful in mitigating blasting-related NO_2 emissions, the most successful control measure has been to reduce the size of the cast blasting shots.

EPA recommends blasting restrictions similar to those adopted by the Wyoming Environmental Quality Council (EQC) for the existing Eagle Butte Mine be applied to proposed mine extension. This would include the use of low NO_2 blasting techniques (bore hole liners, improved blasting agents/additives etc.), no blasting when winds are blowing toward populated areas, and limiting the blast size to 50,000 pounds or less. In addition, all public access should be restricted at the time of the blast to within a safe setback distance. Given the proximity of the blasting to the Rawhide Elementary School, EPA further recommends the FEIS detail specific mitigation and monitoring measures that will be undertaken to minimize NO_2 exposure to children at the nearby elementary school. EPA also encourages BLM to explore and include mitigation measures to minimize particulate matter exposure.

Wetlands

Executive Order 11990 directs all Federal Agencies to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. Indirect draining of, or direct disturbance of, wetland areas should be avoided if at all possible. If there may be wetlands in the project area, EPA recommends consultation with the U.S. Army Corps of Engineers to determine whether any of the project activities require a Clean Water Act (CWA) Section 404 permit. If disturbance is unavoidable, EPA suggests BLM require a commitment to replace *in kind* such impacted wetlands. As studies indicate that traditional mitigation is generally not successful in fully restoring wetland function, EPA suggests that BLM require a two-to-one mitigation of wetland disturbance. Due to the time it can take to adequately reclaim disturbed wetlands and the potential life of this project, BLM may consider requiring mitigation to begin concurrently with the disturbance.

Noxious Weeds

Noxious weeds are becoming an increasingly difficult problem to manage on western lands, including in the Powder River Basin. The FEIS should list the noxious weeds and exotic plants that occur in the resource area. EPA recommends the FEIS detail a strategy for prevention, early detection of invasion, and control procedures for each species of noxious weed that may pose a threat in the project area.

Printed on Recycled Paper

8

December 19, 2006

Nancy Doelger
EIS Coordinator
Bureau of Land Management
Casper District Office
2987 Prospector Drive
Casper, WY 82604

RE: Draft EIS Comments – Eagle Butte

Dear Nancy:

Please accept the following comments on the Draft EIS. All the following comments refer to Section 3.10 Wildlife. I have not included the comments that arose during the Public Hearing as I assume those are already being addressed.

During the past several years there have been numerous discussions centered on concerns related to sage-grouse populations. Therefore I think it is important to provide some input on those sections that discuss sage-grouse. Much of this discussion centers on information specific to Eagle Butte Mine.

Although sage-grouse leks (historic and recently active) are present within the LBA tract and surrounding perimeter, the Final EIS should clarify the difference between documented display grounds (i.e., breeding) and actual nesting within the tract. As described in the Draft EIS, the LBA tract and lands included within BLM Alternative 1 have been included in annual wildlife monitoring for the Eagle Butte mine since such studies began in 1986, due to their proximity to the mine. No confirmed sage-grouse nests were discovered in that area during at least the last 14 years of annual monitoring, and only one suspected nesting attempt (in 1998) was recorded during that period (refer to 1993-2006 Annual Wildlife Reports for the Eagle Butte Mine, on file with WDEQ-LQD in Sheridan, WY). Review of earlier reports may reveal similar results in numerous additional years, but those documents were not examined when preparing these comments.

Although specific nest searches were not conducted as part of the annual monitoring program at Eagle Butte, biologists did regularly walk and drive through potential nesting habitat throughout spring and summer incidental to surveys for other species. Additionally, specific surveys for sage-grouse broods were conducted twice annually from 1993 through 2002 for the Eagle Butte mine. Those efforts included the entire reach of Little Rawhide Creek as it flows through the eastern portion of the LBA tract. No sage-grouse or their sign

(droppings, feathers) were ever recorded along that drainage during those surveys. The only sage-grouse broods documented within the Eagle Butte monitoring area over the last 14 years were approximately 2.4 mile northeast of the LBA tract under BLM Alternative 1, and 3.0 mile northeast of the LBA tract as applied for (refer to 1997 Annual Wildlife Report for the Eagle Butte Mine, on file with WDEQ-LQD in Sheridan, WY).

We believe these long-term data should be better explained in all discussions of sage-grouse throughout the Wildlife Section when the Final EIS is released, to more accurately depict: the low population of sage-grouse in the proposed LBA area; the documented limited and largely season-specific use of the area by those grouse that are present; and the minimal (28% of total) potential habitat available and thus likely to be impacted by mining for this important species. The inclusion of this information will consequently affect discussions regarding current and future carrying capacity for grouse and other sage obligates, and should be considered during revisions of relevant sections of the EIS (existing conditions, effects sections, etc.).

The general discussion of the Affected Environment accurately describes the area's "predominant natural habitat" as sagebrush grassland (pg. 3-105). However, it fails to remind the reader that only 28% of the entire LBA tract is comprised of this habitat type, whereas 48% is described as Agricultural Pasture (see pp. ES14-15). Given the importance of sagebrush grassland to numerous species of concern in subsequent discussions in this section, we submit that it is important to state and clarify the lower presence of sagebrush habitat within the tract at the beginning of this section to help the reader understand the potential impacts to sage obligates that could, or are known to, occur in the study area. Failure to do so leads to misinterpretation and overstatement of these potential negative effects on sage obligates in the area.

Additionally, the decline in sage-grouse lek attendance at Eagle Butte preceded physical disturbance within 2-3 miles of those sites, and thus cannot be attributed to mine-related activities. Those activities would preclude birds from returning to mined-out leks and nesting habitat. Conversely, increased residential housing developments have affected potential nesting habitat near the Schiermeister lek in recent years, and thus may have contributed to declines in male attendance at that lek during that period (refer to 1993-2006 Annual Wildlife Reports for the Eagle Butte Mine, on file with WDEQ-LQD in Sheridan, WY). Furthermore, long-term attendance patterns at the Barbour lek are beginning to suggest that it is a satellite site to a larger source lek beyond the wildlife monitoring area, as it only appears to be used during years when regional populations are high. That might explain the apparently minimal use of the LBA tract as nesting habitat for hens attending that lek; perhaps more suitable nesting habitat is present within the 2-3 mile radius west of the lek site, beyond the monitoring perimeter for the mine.

Figure 3-14: This figure might be more accurate if the legend indicated that the three-mile radius applied only to leks that have been active in recent years: Rawhide School Satellite, Barbour, and Schiermeister. Additionally, the use of "Historic" for leks sites only applies to those that have been inactive for 10 consecutive years (per WGFD definition). Thus, the former locations for both the Barbour and Schiermeister leks should not be defined in text or figure as "historic".

Pg. 3-120: Cerovski et al. should be 2001. Specific surveys for migratory bird species of management concern are conducted in spring and summer vs. winter through summer as described on this page. The same was true for former MBHFI surveys.

Pg. 3-120: Please include the reference documenting McCown's longspurs, chestnut-collared longspurs, and sage-thrashers as "species that have been recorded nesting in the area". Those species are not listed as known nesters in the document referenced as the source for this information (the Eagle Butte West LBA Wildlife Baseline Report, a.k.a., supplementary information document to this Draft EIS). The presentation of these species as known nesters in the area directly conflicts with the discussion of Level 1 species nesting vs. observed in the area on page 3-122.

Pg. 3-125: Include inactive nests in third bullet, as active nests are rarely relocated. Note also that permits are required and obtained for all nest relocations, not just those implemented for golden eagles. Bullet #11: MBHFI species are no longer included in Monitoring and Mitigation Plans; Eagle Butte and other mines now use birds on the list of Migratory Bird Species of Management Concern for Coal Mines in Wyoming.

Pg. 3-126: The first bullet item should be deleted because it is incorrect. Eagle Butte no longer conducts surveys for winter resident and migrant avian species, and the nesting reference in that bullet is incorrect. Surveys for nesting birds are adequately described in subsequent bullets in that section.

Pg. 3-126: Fourth bullet in first column should describe reclamation of creek channel vs. river channel. Also, annual wildlife monitoring has been conducted at Eagle Butte since 1986, vs. mid-1970s, though baseline work and periodic monitoring for other reasons was done during that earlier period.

Pg. 3-126: Eagle Butte has voluntarily conducted annual and/or periodic surveys for numerous additional species not included in the annual monitoring bullets on this page. Those efforts should be acknowledged in this document, as they provide valuable information relevant to presence/absence of various wildlife species of concern and the potential impacts of mineral extraction on those species, as illustrated in the previous comments. The following bullets should therefore be included in this section:

- winter surveys for big game on and surrounding the permit area (alternate years);
- annual surveys for migrating and nesting waterfowl, shorebirds, and other water obligate avian species;
- breeding bird surveys (previously periodic, now annual);
- periodic small mammal trapping (1986-2001).

Pg. 3-127: Clarify that, although big game surveys are no longer required as part of the annual wildlife monitoring program, FCW recognizes the value of maintaining some level of effort to track big game populations and their use of native and reclaimed habitats within the survey area, as described in a bullet above, and has voluntarily continued these surveys on a reduced but regular schedule.

Please consider the following comments and feel free to contact me with specific questions.

Sincerely,

William L. Boger
Environmental Manager

"Boger, William L.\(BE\) 3410"
<WBoger@foundationcoal .com>
12/19/2006 05:09 PM

To <Nancy_Doelger@blm.gov>
cc <kcollier@wwcengineering.com>
bcc
Subject Comments on DEIS

Nancy;

Please find attached comments on the DEIS. It looks like I'm late so consider what you can. All the comments refer to Section 3.10 Wildlife. I assumed the comments identified in the public hearing are already being addressed. I know Ken has been working on some of them. Please consider the comments related to sage-grouse as the most important as that topic has certainly been a focal point in recent years.

Call if you have any questions.

Bill <<drafteiscomment.doc>> drafteiscomment.doc

Responses to Comment Letter 1
B. Sachau

Comment Response 1: Air emissions, including nitrogen dioxide emissions, are regulated and monitored. As discussed in Section 3.4.3.3 of the Final and Final EIS documents, the Eagle Butte Mine mining permit includes conditions regarding procedures that the mine must follow when conducting blasting operations. These procedures are designed to control or limit both emissions of nitrogen dioxide and public exposure to nitrogen dioxide.

As discussed in Section 3.11, the coal is owned by the federal government but the surface of the land included in the tract under the BLM's preferred tract delineation is owned by the applicant for the coal lease, not by the state or the federal government.

Comment Response 2: The statements in the EIA regarding impacts to wildlife as a result of surface coal mining are based on monitoring that has been and continues to be required and has been conducted for more than 20 years in this area.

The relocation of raptor nests that will be impacted by surface coal mining is a requirement of the raptor monitoring and mitigation plan for each mine. Approval by the US Fish and Wildlife Service and the Wyoming Department of Environmental Quality is required before mining can occur within buffer zones of active raptor nests. Territorial occupancy and nest productivity are monitored annually. Raptor nest relocations have been successfully conducted by the Eagle Butte Mine and by other mines in the area.

The Wyoming Game and Fish Department reviewed monitoring data on big game species in and around the mine sites in the Powder River Basin in 1999 and concluded that the monitoring indicated a lack of impacts to big game on existing mine sites. No severe mine-caused mortalities had occurred and no long-lasting impact to big game had been noted on existing mine sites.

Comment Response 3: Lands that are disturbed to recover coal must be reclaimed following mining in accordance with the requirements of state and federal law. The mines are required to post substantial bonds to cover the cost of reclamation; the final reclamation bond is not released until a minimum of 10 years has elapsed after the reclaimed area is seeded with a final seed mixture. Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures, which would be approved by the Wyoming Department of Environmental Quality. The majority of the approved species are native to the LBA tract. After reclamation the reclaimed lands support the same uses as they did before mining.

Recently, one of the coal mines and the Rocky Mountain Elk Foundation signed an agreement to create a Conservation Easement for wildlife on lands that were mined for coal and reclaimed in the Powder River Basin. Wyoming Game and

Fish Department has designated about 1,000 of the reclaimed land as crucial winter elk habitat.

Response to Comment Letter 3
Wyoming Game and Fish Department

Thank you for providing information to improve the accuracy of the document. We have made the changes you recommended.

Response to Comment Letter 4
Wyoming Department of Environmental Quality

We have incorporated the information that you provided into the Air Quality section of the EIS.

Response to Comment Letter 5
Gayle and Ginny Nannemann

Comment Response 1: Figure 3-8 has been corrected to show multiple dwellings in Section 8, T. 50 N., R. 72 W.

Comment Response 2: SMCRA and Wyoming state law require surface coal mine operators to provide the owner of a water right whose water source is interrupted, discontinued, or diminished by mining with water of equivalent quantity and quality.

Comment Response 3: The mines are required to conduct long-term air quality modeling to show that their proposed operations will comply with the National and Wyoming Ambient Air Quality Standards, and they are required to monitor to demonstrate that their actual air emissions do not exceed the standards. In the case of the Eagle Butte Mine, the mine permit includes specific blasting control measures that the mine must use to control blasting emissions.

Comment Response 4: Blasting by surface coal mines is conducted in accordance with Chapter 6 of the Wyoming Department of Environmental Quality Rules and Regulations. These regulations establish vibration standards that have been developed to protect buildings and other structures such as pipelines and bridges. The Eagle Butte Mine's blasting program is designed to comply with these regulations and has not exceeded the vibration standards designed to protect these structures. Home owners can request pre-blast surveys, which can be used to verify damage that occurs after blasting begins.

Response to Comment Letter 6
Powder River Basin Resource Council

Comment Response 1: Alternative 1 of the EIS identifies a study area, consisting of the tract as applied for and adjacent unleased federal coal. The

BLM generally considers providing for more efficient coal recovery, increasing competitive interest in the tract, reducing the potential that federal coal will be bypassed, and comments received in the Final EIS in identifying a preferred tract delineation, which is identified in the final EIS. The regulations at 43 CFR 3425.1-9 state: "The authorized officer may add or delete lands from an area covered by an application for any reason he/she determines to be in the public interest." As a result, under Alternative 1, BLM could select a preferred tract delineation that would either enlarge or reduce the size of the tract as applied for.

BLM's preferred tract configuration under Alternative 1, which is discussed in Section 2.2 and shown in Figure 2-2 of the final EIS, is to add approximately 30 acres to the northeast corner of the tract as applied for. BLM did not reduce the size of the tract because the tract as applied for is configured to allow recovery of the federal coal while maintaining the required setback distances for conducting blasting operations established by WDEQ/LQD for safety purposes. BLM contacted the WDEQ/LQD to ask if these setback distances would be maintained if the Eagle Butte West LBA Tract is leased and mined. The WDEQ/LQD has indicated that, if the tract is leased, permit conditions designed to control or limit public exposure to NO_2 and flyrock from blasting operations would be no less stringent than the permit conditions for the existing Eagle Butte Mine. There may be coal included in the tract that is considered mineable under the current permit conditions, but would not be considered mineable and would not be recoverable under more stringent permit conditions.

Comment Response 2: Additional information regarding the airport's concerns, expressed during the scoping process, is included in Appendix H of the final EIS. The FAA is included on the mailing list and was provided with a copy of the Final EIS and will be provided with a copy of the Final EIS.

Comment Response 3: The Final EIS did incorrectly make the statement that there have been no reported events of public exposure to NO_2 from blasting activities at the Eagle Butte Mine. The Final EIS did, however, identify that residents in the area had brought concerns about blasting practices at the Eagle Butte Mine to the Environmental Quality Council and that control measures to limit public exposure to NO2 from blasting had been instituted at the mines following those complaints. The statement about reported events has been corrected in the final EIS.

According to WDEQ/LQD, since these control measures were implemented, they have received one report of an orange-tinged blasting cloud at the mine, but no visible NO_2 fumes were reported to have left the mine permit area during that incident.

Comment Response 4: The final EIS (Sections 3.4.2.2.1, 3.4.3.2.1, and 3.14.2.1) identifies that the distance between the area that would be mined in the Eagle Butte West LBA Tract (as applied for or under BLM's preferred tract configuration) and the occupied dwellings and the airport would be similar to,

and not less than, the distance between the federal coal that has previously been recovered from the existing Eagle Butte Mine leases and the dwellings and airport. It also identifies that the distance between the coal that would be mined in the Eagle Butte West LBA Tract (as applied for or under BLM's preferred tract configuration) would be closer to Rawhide Elementary School than the federal coal included in any of the existing Eagle Butte Mine leases. As discussed above, the WDEQ/LQD has indicated that, if the tract is leased, permit conditions designed to control or limit public exposure to NO_2 and flyrock from blasting operations would be no less stringent than the permit conditions for the existing Eagle Butte Mine.

Section 3.4.3.2.1 identifies potential conditions that could lead to increased NO_2 emissions and Section 3.4.3.3 identifies the measures that are used to reduce NO_2 emissions during blasting.

Comment Response 5: The Final and final EISs identify that BLM received comments from local residents indicating that blowing dust from operations at the Eagle Butte Mine has affected air quality around their residences and that they have concerns about dust impacts in the future (Section 3.4.2.2.1). Additional information about potential threats to health from particulate matter is included in the final EIS.

The Final and final EIS identify measures that are required and are in place to control particulate emissions at the Eagle Butte Mine (Section 3.4.2.3). If the Eagle Butte West LBA Tract is leased, measures specific to mining operations on the tract will be determined during the permitting process, however, the measures listed in Section 3.4.2.3 are representative of the types of control measures that are required at the Powder River Basin mines. There have been no monitored exceedances of the 24-hour or annual PM_{10} Wyoming Ambient Air Quality Standards at the Eagle Butte Mine. PM_{10} monitors located at the active mines in the Wyoming Powder River Basin are now required by WDEQ/AQD to sample air quality for a 24-hour period every three days.

Projected cumulative impacts to air quality from all sources, including coal mining coal plants, conventional and CBNG development, and other sources, as well as projected impacts to Class I airsheds, are discussed in Chapter 4, Section 4.2.3. The measures that Wyoming Department of Environmental Quality, Air Quality Division has implemented or is proposing to implement to prevent exceedances of the National and Wyoming Ambient Air Quality Standards by surface coal mines is discussed in Chapter 3, Section 3.4.2.3.

Comment Response 6: Additional information about mercury and CO_2 emissions, which are addressed in Section 3.18, has been added to the final EIS. The information that the applicant (Foundation Coal West) provided to BLM during preparation of this EIS indicates that they plan to produce the coal included in the LBA tract at currently permitted levels using existing production and transportation facilities if the Eagle Butte West LBA Tract is leased and mined as proposed. As a result, leasing the Eagle Butte West LBA

Tract under the Proposed Action or Alternative 1 should not be expected to result in increased or new emissions of mercury or CO_2 from coal-fired power plants; however, as stated in Section 3.18, mining operations would be extended if the tract is leased.

Approximately 51.1 percent of electric power in the United States is provided by coal, and the Wyoming Powder River Basin produced about 37.6 percent of the coal used for power generation in 2005. Given this reliance on coal as a source of electric power, if a carbon tax is enacted, it is likely that it will have to be phased in to avoid disruptions in the power supply. Coal could also be needed to power new types of coal-fired power plants designed to reduce emissions in the future. As a result, if a carbon tax is enacted, it is not likely that it would affect demand for the coal included in the Eagle Butte West LBA Tract.

Comment Response 7: The Final EIS describes the projected drawdown in the coal and overburden aquifers (Section 3.5.1.2.1), acknowledges that private water supply wells in this area have been impacted by past surface coal mining as well as CBNG development (Section 3.5.3.2.1), identifies the non-mine groundwater and surface water rights that would potentially affected if the Eagle Butte West LBA Tract is leased and mined (Section 3.5.3 of the Final and Final EIS and the Supplementary Information Document), and identifies that there is a regulatory requirement for surface coal mine operators to provide the owner of a water right whose water source is interrupted, discontinued, or diminished by mining with water of equivalent quantity and quality (Section 3.5.3.3).

Water use in Gillette and the surrounding area is discussed in Sections 3.17.5.1 and 4.2.12.7. If the Eagle Butte West LBA Tract is leased, Foundation Coal West does not project any increases in employment or production rates in order to recover the coal in the tract. Therefore, there would be no projected additional demands on Gillette's water supply capacity or projected increased use of water by the mine under the Proposed Action or Alternative 1, but the existing levels of employment and water use would be extended for a longer period of time.

Comment Response 8: Elk are addressed in Section 3.10.2 of the EIS. Although isolated elk sightings have been reported in the area of the proposed Eagle Butte West LBA Tract, the Wyoming Game and Fish Department classifies this area as being outside of the normal elk use range, and big game surveys conducted in this area support this classification.

Comment Response 9: The occurrence of sage grouse and the status of the sage grouse leks in this area is described in the Final and final EIS in Section 3.10.5 and Figure 3-14 of the Final and final EIS shows the locations and status of the leks in this area. There are no active leks on the LBA tract itself but there are three active leks within three miles of the tract. Sagebrush is a component of both the Sagebrush/Grassland and Agricultural Pasture 2 vegetation communities, which occupy about 40 percent of the vegetation

analysis area. The only documented presence of sage-grouse broods from 1993 to 2002, when specific brood surveys were conducted, occurred three miles northeast of the LBA tract as applied for or BLM's preferred tract configuration under Alternative 1.

Response to Comment 7
Environmental Protection Agency

Comment Response 1: While the air quality modeling conducted for the Powder River Coal Review does indicated a potential for cumulative impacts to exceeds the National Ambient Air Quality Standards for PM_{10}, it does not project exceedances of any increments under the PSD regulations. As is noted in the Final and final EIS, the modeling analysis did not separate PSD increment-consuming sources from those that do not consume increment. The PSD-increment comparison is provided for information purposes only and cannot be directly related to a regulatory interpretation of PSD increment consumption.

The impacts of mining the coal are considered in the Eagle Butte West Coal Lease Application EIS because it is a logical consequence of issuing a maintenance lease to an existing mine, however, BLM's issuance of a lease for the Eagle Butte West LBA Tract does not authorize mining operations on that lease. If a lease is issued for Eagle Butte West LBA Tract, the lessee would be required to file a permit application package with the Wyoming Department of Environmental Quality-Land Quality Division (WDEQ/LQD) and the Office of Surface Mining (OSM) for a surface mining permit and approval of the Mineral Leasing Act mining plan prior to mining the tract. A new coal mine or a modification to an existing mine must also be permitted by the WDEQ Air Quality Division (AQD) under Chapter 6, Section 2 of the Wyoming Air Quality Standards and Regulations (WAQSR) and must demonstrate that the proposed mining operations will comply with all applicable aspects of WAQSR. The mitigation measures that would be required to control air emissions would be developed at that time, based on an analysis of a detailed site-specific mining and reclamation plan.

According to the WDEQ/AQD, the circumstances associated with the monitored exceedances of the 24-hour PM_{10} standard in the Powder River Basin prior to 2007 provided adequate reason to believe that high wind events and blowing dust have caused exceedances of the ambient air quality standards that otherwise would not have occurred. In response to the measured exceedances of the 24-hour PM_{10} ambient air quality standards and in anticipation of conditions that would potentially lead to future exceedances, the WDEQ/AQD has collaborated with the Wyoming Mining Association to develop a Natural Events Action Plan for the coal mines of the Powder River Basin, based on EPA Natural Event Policy guidance. A report describing the plan has been submitted to EPA. Additional information regarding the plan and the proposed measures that would be implemented as a part of the plan, as well as the dust control measures that are considered to be Best Available

Control Measures is described in the Air Quality section (specifically Sections 3.4.2.1.1 and 3.4.2.3) of the Final EIS.

Comment Response 2: Mitigation measures for air quality impacts and the strategy proposed by WDEQ/AQD to address mining-related air quality impacts are identified in Sections 3.4.2.3 and 3.4.3.3 of the EIS. As indicated in the response to your comment letter in the Final Environmental Impact Statement for the Maysdorf Coal Lease Application, BLM is considering scheduling a federal and state agency briefing on the status of the PRB Coal Review. The main topics of that briefing would be an update on the status of the Powder River Basin Coal Review water and air quality modeling analyses and the database for tracking development activities. This might provide an opportunity to set up a meeting as suggested in your comment letter. Please advise us if you schedule such a meeting to discuss additional source and fugitive dust control in the PRB.

Comment Response 3: The EIS identifies control measures that are in place to minimize public exposure to particulates and NO_2. The specific mitigation and monitoring measures that will be required for operations on the Eagle Butte West LBA Tract will be determined during the permitting process, which is when mining operations on the tract will be authorized. BLM contacted the Land Quality Division (LQD) of the WDEQ regarding conditions that would be included in the mining permit if the Eagle Butte West LBA Tract is leased and mined. WDEQ/LQD indicated that, if the tract is leased, permit conditions designed to control or limit public exposure to NO_2 and flyrock from blasting operations would be no less stringent than the permit conditions for the existing Eagle Butte Mine.

<u>Detailed Comments by the Region 8 Environmental Protection Agency</u>

Air Quality

Sections 3.4.1.1.1 and 4.2.3 have been revised to include the requirement to implement "Best Available Work Practice" mitigation measures that is part of the 1994 Memorandum of Agreement.

As discussed above, WDEQ/AQD believes that exceedances of the 24-hour PM10 standard that have been measured in the Powder River Basin are related to high wind events. In response, the WDEQ/AQD has collaborated with the Wyoming Mining Association to develop a Natural Events Action Plan for the coal mines of the Powder River Basin, based in EPA Natural Event Policy guidance, which includes measures to prevent future exceedances. Information about the Natural Events Action Plan and associated measures is included in the Final Environmental Impact Statement.

The Natural Events Action Plan currently proposed by WDEQ/AQD only includes measures for control of coal mine sources since it is the ambient monitoring systems around the large surface coal mines that have recorded the exceedances of the 24-hour PM_{10} NAAQS. If it is demonstrated that there are

non-coal sources contributing to elevated measurements in an area of concern, WDEQ/AQD indicated that they may address these additional sources separately from the proposed Natural Events Action Plan or as a future update of the plan.

The statement about the National Ambient Air Quality Standards has been revised in the final EIS.

Proximity to Residences and Elementary School

As discussed above, the specific control measures for blasting operations on the Eagle Butte Mine would be developed during the permitting process, when mining operations are authorized. The Eagle Butte Mine has never conducted cast blasting operations and, according to the applicant, they do not plan to conduct cast blasting in the future.

According to WDEQ/LQD, since the current blasting restrictions were implemented, they have received one report of an orange-tinged blasting cloud at the mine, but no visible NO_2 fumes were reported to have left the mine permit area during that incident. As indicated above, BLM contacted WDEQ/LQD to ask if blasting restrictions would be maintained if the Eagle Butte West LBA Tract is leased and mined. WDEQ/LQD indicated that, if the tract is leased, permit conditions designed to control or limit public exposure to NO_2 and flyrock from blasting operations would be no less stringent than the permit conditions for the existing Eagle Butte Mine.

Wetlands

Restoration of jurisdictional wetlands is required and consultation with the U.S. Army Corps of Engineers would be completed during the permitting process. There are special required permitting procedures to assure that after mining there will be no net loss of wetlands.

Noxious Weeds

There are few occurrences of noxious weeds in the mine areas, because WDEQ/LQD rules and regulations require surface coal mine operators to control and minimize the introduction of noxious weeds, in accordance with federal and state requirements. The mining and reclamation plan for the existing Eagle Butte Mine includes steps to control invasion from such species and the mining and reclamation plan for the Eagle Butte West LBA Tract would also include steps to control invasion from such species.

A list of the plants that the State of Wyoming has designated as noxious weeds is included in Section 4.2.7.3. Campbell County does not have a declared county list of weeds.

Response to Comment 8
Bill Boger, Foundation Coal West

The information provided in your comment letter has been considered in the preparation of the final EIS.